

EVAUATING THE ATTRACTIVENESS OG GREEN BUILDING QUANTATIVE
MODEL OF BUYERS DRIVERS IN SINGHAPORE’S RESIDENTIAL MARKET

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Dedication

This dissertation is dedicated to the extraordinary individuals who have been the pillars of my life, providing unwavering support, boundless love, and continual inspiration throughout this remarkable journey. Their belief in me, their encouragement, and their sacrifices have been instrumental in the realization of this work.

To my dearest wife, Vivien Tan: Your steadfast love has been my sanctuary in moments of uncertainty, your boundless patience my compass during trying times, and your faith in my abilities a driving force that propelled me forward. You have been my rock, my confidante, and my greatest source of strength. This dissertation is as much a testament to your dedication and sacrifice as it is to my efforts, and I am forever grateful for your presence in my life.

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This accomplishment belongs not only to me but to all of you, whose presence and influence have made it possible. For that, I remain eternally grateful.

ABSTRACT

EVALUATING THE ATTRACTIVENESS OF GREEN BUILDING QUANTITATIVE MODEL OF BUYERS DRIVERS IN SINGAPORE'S RESIDENTIAL MARKET

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This dissertation explores the factors influencing the adoption of green buildings, with a particular focus on the role of environmental awareness, demographic influences, and barriers to adoption in shaping consumer preferences in the real estate market. The research investigates how various socio-economic variables such as income, education, awareness, prior experience with sustainable properties, and homeownership status impact decisions related to green buildings. The study uses a mixed-method approach, combining both quantitative and qualitative data from surveys and statistical analysis techniques, including regression analysis and chi-square tests.

The results indicate that environmental awareness plays a significant role in shaping perceptions of green building features, particularly in influencing attitudes toward sustainability and health benefits. Demographic factors such as income and education are shown to influence the willingness to pay higher initial costs for green buildings, with

higher-income individuals more likely to justify these costs based on perceived long-term savings. The findings also suggest that education has a substantial impact on the importance of financial incentives, with more educated individuals demonstrating a greater understanding and appreciation of the financial benefits of green buildings.

Barriers such as high initial costs, complexity, and knowledge gaps are significant deterrents for many potential adopters. However, the study finds that prior experience with sustainable properties reduces perceived knowledge and complexity barriers, suggesting that exposure to green buildings can encourage their adoption. Financial incentives and certifications also emerge as critical factors in motivating the decision to purchase green buildings. The analysis emphasizes the need for targeted educational campaigns and the promotion of financial incentives to overcome these barriers and enhance the adoption of sustainable housing practices.

Overall, this research highlights the complexity of green building adoption and underscores the importance of a multi-faceted approach, integrating demographic, financial, and educational interventions, to encourage wider adoption and promote sustainability in the housing sector.

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CHAPTER I: INTRODUCTION

1.1 Introduction

The topic “Evaluating the Attractiveness of Green Buildings: A Quantitative Model of Buyer Drivers in Singapore's Residential Market” investigates the increasing significance of sustainability in residential real estate, emphasizing the factors that influence buyers' decisions to select green buildings. Green buildings, which are structures that are constructed using environmentally sustainable materials and energy-efficient technologies, have become an essential component of contemporary urban planning. This is because they have the potential to reduce the environmental impact and contribute to energy savings (Smith, 2021). The real estate market is being reshaped, and new dynamics are being created for both developers and consumers as a result of the broader global trends toward sustainability, which are reflective of the growing interest in these buildings (Jones & Li, 2020).

The government of Singapore has launched a number of programs to encourage green building standards, such as the Building and Construction Authority's (BCA) Green Mark certification, in response to the country's fast urbanization and environmental concerns. This method signals a change toward ecologically conscious construction by incentivizing developers to include sustainable designs and energy-efficient technologies in residential homes (Tan & Lee, 2019). Even though these green programs have been widely adopted, little is known about the precise elements that influence consumers' interest in green residential buildings, especially in Singapore.

The attractiveness of green buildings goes beyond mere aesthetic appeal and design; it is increasingly influenced by a shift in consumer behaviour toward more sustainable living options. Buyers are more likely to prioritize energy efficiency, health benefits, and lower long-

term operating costs when selecting properties (Ng & Wong, 2022). However, the relative importance of these factors in the decision-making process remains unclear. This gap in understanding makes it essential to identify the specific drivers that influence buyers' preferences for green buildings in Singapore's competitive residential market.

This dissertation seeks to evaluate the factors contributing to the attractiveness of green buildings through a quantitative model that identifies the key buyer drivers in Singapore's residential market. By focusing on environmental consciousness, financial incentives, and health-related benefits, this study will provide valuable insights into the factors shaping residential buyers' decisions.

The significance of this Research lies in its potential to inform developers, policymakers, and industry stakeholders about what makes green buildings appealing to buyers, thereby guiding the future development of sustainable residential properties in Singapore (Ong& Chua, 2021).

1.2 Background of the Study

Introduction to Green Buildings

Green buildings, characterized by their sustainability and environmentally conscious designs, are becoming an integral part of the global residential construction sector. As awareness of climate change, resource depletion, and rising energy consumption grows, the need for energy-efficient and sustainable building solutions has increased (Bungau et al., 2022). Green buildings reduce energy consumption, minimize environmental impact, and promote sustainable living. These buildings typically incorporate energy-efficient technologies, including high-performance insulation, efficient HVAC systems, energy-efficient appliances, and smart home systems that optimize energy use (Tan et al., 2018). As the construction industry adapts to environmental concerns, green buildings are seen as the future of residential housing.

Problem Statement

Despite the growing interest in green buildings, their adoption in the residential sector has been slow. One of the key barriers is the higher initial cost associated with building or purchasing green homes. The financial investment required for sustainable materials, energy-efficient technologies, and renewable energy systems such as solar panels or HVAC systems can be a deterrent for potential buyers. In addition, there is a lack of awareness about the long-term benefits of green buildings, such as cost savings on energy bills and reduced environmental impact, which further hinders adoption. This gap in knowledge, combined with a perceived complexity in the technology and uncertainty regarding the return on investment, prevents many buyers from embracing green homes.

Moreover, there is a gap in literature regarding the influence of demographic factors such as income, age, and education on buyers' decisions to invest in green buildings. The existing research does not sufficiently address the barriers to green building adoption, including financial concerns, lack of information, and the perceived complexity of green building technologies. This study seeks to fill these gaps by identifying and analyzing the factors that influence residential buyers' decisions and the barriers they face when considering green buildings.

Motivation for the Study

The motivation for this study stems from the need to address the barriers and gaps in the adoption of green buildings. Although green buildings offer numerous benefits, both economically and environmentally, the decision-making process of residential buyers remains unclear. Specifically, there is a need to better understand the factors that drive or hinder buyers' decisions to invest in sustainable homes. Furthermore, the barriers to adoption, including financial concerns, lack of awareness, and the perceived complexity of green building technologies, have not been sufficiently explored in existing research. This study

aims to fill these gaps by analyzing the factors that influence buyers' preferences for green buildings and proposing strategies to overcome the existing challenges.

Research Objectives

The main objectives of this research are to:

1. Identify the key factors influencing residential buyers' decisions to invest in green buildings.
2. Explore how environmental awareness and sustainability impact the attractiveness of green buildings compared to traditional properties.
3. Analyze the role of demographic factors (age, income, education) in shaping preferences for green buildings.
4. Investigate the barriers to the adoption of green building features and propose strategies to address these challenges.

By addressing these objectives, this research aims to provide valuable insights into the factors that influence consumer preferences and decision-making regarding green buildings. It will also contribute to developing strategies to overcome barriers to adoption and enhance the market acceptance of green buildings, ultimately driving the growth of more sustainable housing practices.

1.3 Overview of Green Buildings in the Residential Market

Green buildings in residential properties are defined by their focus on sustainability and environmental performance, aiming to reduce energy consumption, water usage, and overall ecological impact. These buildings typically feature high-performance insulation systems, which help reduce energy loss and minimize the need for heating and cooling, alongside energy-efficient heating, ventilation, and air-conditioning (HVAC) systems. Additionally, they often incorporate energy-efficient appliances like refrigerators and lighting, designed to lower

electricity consumption (Al-Sakkaf et al., 2025). They also utilize smart home technologies that optimize energy use by adjusting systems based on occupancy patterns. Integrating these systems significantly reduces the building's carbon footprint and improves energy conservation (Tan et al., 2018).

Water efficiency is another important characteristic of green residential buildings. These homes often incorporate low-flow faucets, showerheads, and toilets that help conserve water without compromising functionality (Gil-Ozoudeh et al., n.d.). Furthermore, rainwater harvesting systems are frequently employed to collect and reuse rainwater for irrigation and non-potable uses, such as toilet flushing. Green buildings also promote water-efficient landscaping by using drought-tolerant plants that require less water, contributing to water conservation efforts (Yoon et al., 2017).

Sustainable building materials are another key feature of green homes. These buildings are often constructed using recycled or sustainable materials, such as reclaimed wood and low-VOC paints, which contribute to reducing environmental degradation (Abera, 2024). The use of locally sourced materials also plays a significant role in minimizing transportation-related carbon emissions. Furthermore, the durability and low-maintenance qualities of these materials ensure a longer lifespan for the building, thereby reducing the need for repairs and further reducing waste. Green buildings often use materials that support sustainability and provide healthier indoor environments (Goh et al., 2020).

Indoor environmental quality (IEQ) is another defining characteristic of green buildings. The use of advanced air filtration systems and low-emission materials helps improve indoor air quality, reducing the presence of harmful pollutants and promoting a healthier living environment. Green homes are also designed to maximize natural light through strategic window placement, reducing reliance on artificial lighting and enhancing occupant well-being. Additionally, many green buildings implement passive cooling and natural ventilation

techniques that maintain comfortable temperatures without over-reliance on air-conditioning (Lee et al., 2019).

1.3.1 Green Buildings vs. Traditional Buildings

Green buildings are designed with a focus on sustainability, energy efficiency, and environmental impact, contrasting with traditional buildings that may prioritize cost-effectiveness and short-term performance. When comparing the two regarding energy efficiency, green buildings typically outperform traditional buildings (Weerasinghe and Ramachandra, 2018). They have energy-saving technologies like high-performance insulation, efficient HVAC systems, and renewable energy sources like solar panels. These buildings reduce energy consumption significantly over time, resulting in lower utility bills and a smaller carbon footprint. In contrast, traditional buildings often consume more energy due to less efficient design and technology (Garg, 2024).

Sustainability is another area where green buildings surpass traditional structures. Green buildings incorporate sustainable materials, advanced water conservation methods, and environmentally friendly construction techniques. They are built to minimize environmental impact by reducing waste, conserving water, and using renewable materials, such as recycled steel and low-VOC paints. Traditional buildings, however, are often constructed with less resource-efficient materials, contributing to long-term environmental degradation. Green buildings are also typically built to last longer with minimal environmental harm, whereas traditional buildings may require more frequent repairs and renovations, leading to additional resource consumption (Abdelfattah, 2020).

In terms of cost-effectiveness, although the initial construction cost of green buildings is typically higher due to the investment in sustainable materials and technologies, the long-term savings can be significant. Green buildings offer lower operating and maintenance costs due to their energy-efficient designs and reduced need for frequent repairs. Studies show that the

lifecycle costs of green buildings are often lower than traditional buildings, with energy and water usage savings compensating for the higher upfront costs (Weerasinghe et al., 2017).

1.3.2 Perceived Benefits of Green Buildings for Residential Buyers

Residential buyers in urban markets increasingly perceive green buildings as a better investment than traditional buildings, driven by various environmental, economic, and social factors. One of the primary perceived benefits is the energy and cost savings. Green buildings are designed to be energy-efficient, incorporating features such as high-performance insulation, energy-efficient HVAC systems, and renewable energy sources like solar panels. These features reduce monthly utility bills, making green buildings more financially attractive in the long term. Studies suggest buyers are willing to pay a premium for these savings, recognizing the long-term value despite higher initial costs (Iwuanyanwu et al., 2023).

Beyond cost savings, health and well-being are key factors influencing buyer perceptions. Green buildings often prioritize improved indoor air quality, natural lighting, and thermal comfort, contributing to a healthier living environment. These features are increasingly valued by buyers aware of the detrimental health effects of poor indoor air quality in conventional buildings. As a result, there is a growing demand for homes that offer a healthier, more comfortable living environment (Zhao & Chen, 2021).

Environmental consciousness also plays a significant role. Buyers are increasingly motivated by the desire to contribute to sustainability efforts. Many buyers feel a sense of responsibility to reduce their environmental footprint, which drives their preference for green homes. This trend is especially prominent in urban markets, where environmental concerns like air pollution and resource depletion are pressing issues. Green buildings help mitigate these concerns by reducing energy consumption, conserving water, and minimizing waste (Soyombo et al., 2024).

1.4 The Green Building Movement in Singapore

The green building movement in Singapore has made significant strides in recent years, largely driven by government policies and a growing public awareness of the need for sustainable development. The Building and Construction Authority (BCA) introduced the Green Mark certification system in 2005 to promote environmental sustainability in the built environment. The Green Mark scheme has become a key driver of green building adoption, setting performance standards for energy, water, and environmental management in construction projects (Chong, 2015). The government aims to have 80% of buildings in Singapore certified as green by 2030, a target that underscores its commitment to reducing the environmental footprint of urban development. The BCA Green Mark has thus become an essential tool for developers, as it not only sets guidelines for sustainability but also incentivizes environmentally responsible practices through various grants and rebates.

1.4.1 Government Initiatives Impact

The Singaporean government has played a central role in promoting the adoption of green buildings in the residential market, primarily through the Building and Construction Authority's (BCA) Green Mark scheme. Launched in 2005, the Green Mark certification aims to evaluate and promote environmentally sustainable buildings, reduce energy consumption, enhance occupant health, and improve resource management. This initiative has significantly impacted developers and buyers in the residential market, as it provides clear guidelines for sustainability and offers a credible certification that appeals to environmentally-conscious consumers (Siva et al., 2017).

The BCA Green Mark has incentivized developers to adopt sustainable building practices and established regulatory frameworks that require new buildings to meet specific environmental standards. In addition to certification, the government offers financial incentives, tax rebates, and other support mechanisms to reduce the upfront costs associated with green building

practices, making it more attractive for developers to pursue sustainability goals (Han, 2018). These measures align with the national objective of having 80% of Singapore's buildings certified green by 2030 (Chong, 2015) (Chong, 2015).

1.4.2 Developer Challenges in Green Building

Despite government initiatives' positive impact, Singapore developers face several challenges when incorporating green building standards in residential construction. One of the primary hurdles is the initial cost of implementing green features. While the operational savings of green buildings may offset these initial costs over time, the upfront investment required for sustainable technologies, materials, and certifications can be prohibitive. This financial barrier is particularly significant for smaller developers, who may struggle to meet the stringent requirements of the Green Mark certification (Zhang et al., 2024).

In addition to financial concerns, developers also face technical challenges related to the design and construction of green buildings. Implementing advanced building systems such as energy-efficient HVAC, renewable energy solutions like solar panels, and innovative technologies requires specialized knowledge and expertise. Many developers lack the necessary skills or experience to integrate these technologies effectively into their projects, leading to increased costs and potential construction delays (Chiu et al., 2017).

Another challenge for developers is the market uncertainty surrounding green buildings. While demand for green residential properties is rising, the market for such buildings is still niche. Developers may be hesitant to invest in green technologies without a guaranteed return, especially when potential buyers may not fully understand the long-term benefits of green features or may be unwilling to pay the premium prices associated with these homes (Amoah& Smith, 2022).

1.5 Buyer Preferences for Green Buildings

The increasing popularity of green buildings in urban markets like Singapore has led to a significant shift in buyer preferences, driven by several key factors influencing the decision to choose a green building over a traditional one. Residential buyers are increasingly drawn to green buildings due to their perceived benefits, particularly in energy efficiency, health and well-being, and the long-term value these buildings offer. While initial costs may be higher for green buildings, the growing awareness of sustainability issues and the tangible advantages these properties provide have made them attractive to many homebuyers.

One of the most important factors influencing the choice of green buildings is energy efficiency. As utility costs continue to rise, buyers are more likely to opt for homes that offer long-term savings on energy consumption. Green buildings are designed to be energy-efficient, featuring high-performance insulation, efficient heating, ventilation, and air-conditioning (HVAC) systems, and renewable energy sources such as solar panels. These features reduce energy consumption and help lower utility bills over time, making green buildings more cost-effective in the long run. In Singapore, where the cost of living is high, homebuyers increasingly prioritize energy-efficient homes to offset the rising electricity and other utilities costs. This has made energy efficiency a key selling point for green buildings, mainly as buyers are more aware of the environmental and financial benefits of choosing such properties (Fesselmeyer, 2017).

Health benefits are another factor influencing buyers' preferences for green buildings. As more people become aware of the negative health impacts of poor indoor air quality, there is an increasing demand for homes that offer healthier living environments. Green buildings often incorporate advanced air filtration systems, non-toxic materials, and designs that maximize natural light, improving indoor air quality and overall comfort. These factors are particularly appealing to buyers concerned about their health and the health of their families. In urban environments like Singapore, where air pollution and the effects of climate change are

pressing concerns, buyers are more likely to choose homes that provide better air quality and overall living conditions. Furthermore, the emphasis on natural ventilation and passive cooling systems in green buildings helps maintain a comfortable temperature indoors, which is particularly important in tropical climates like Singapore (Chiu et al., 2017).

The environmental impact of a building is another critical factor influencing buyer decisions. Many residential buyers are becoming increasingly concerned about their environmental footprint and actively seeking homes that align with their values of sustainability and conservation. Green buildings are designed to minimize resource consumption, reduce waste, and lower carbon emissions. These buildings often incorporate sustainable materials, water-efficient systems, and advanced waste management practices, which reduce their overall environmental impact. As environmental concerns become more pressing, buyers are increasingly choosing properties that offer a solution to these challenges. In Singapore, where the government has set ambitious targets for sustainability, buyers are keen to invest in homes that contribute to the country's green goals. The Green Mark certification, for example, serves as a trusted indicator of a building's environmental performance, and many buyers are actively looking for homes that meet these high standards. The growing trend of sustainable living has led to a stronger demand for green buildings, as they represent a responsible choice that helps buyers reduce their environmental impact (Dell'Anna&Bottero, 2021).

Buyers are also increasingly attracted to the reputation associated with owning a green building. In urban markets, where social status and public perception play a significant role, owning a green home is often seen as a symbol of environmental consciousness and social responsibility. This growing trend reflects a broader cultural shift toward sustainability and eco-consciousness. Homebuyers are more likely to select a property that reflects their values and contributes to a more sustainable future. Green buildings allow buyers to make a statement about their commitment to the environment, further enhancing their appeal. In a city

like Singapore, where environmental sustainability is a central theme in urban development, this sense of social responsibility plays a significant role in shaping buyer preferences.

1.5.1 Sustainability Awareness Impact

Sustainability awareness among homebuyers has a profound impact on their preferences for green features in properties. Buyers with a high level of understanding are more likely to prioritize environmentally friendly features, recognizing that these features provide both long-term cost savings and health benefits (Agarwal et al., 2017). For example, homebuyers aware of traditional buildings' environmental impact are more likely to seek out energy-efficient homes that reduce their carbon footprint. In Singapore, initiatives like the Green Mark certification have raised public awareness, encouraging homebuyers to consider green buildings as part of their environmental responsibility.

Moreover, the growing emphasis on sustainable living in urban centres like Singapore has made green features more desirable. With limited space and resources, many Singaporean homebuyers are increasingly choosing green buildings that optimize space usage and incorporate energy-efficient systems, especially as the city-state has committed to the goal of having 80% of its buildings certified as green by 2030 (Siva et al., 2017). As a result, sustainability awareness drives demand for green buildings and shapes the types of features homebuyers seek, such as renewable energy solutions and water-efficient systems.

1.5.2 Perceived Value of Green Features

The perceived value of green features, such as energy efficiency and health benefits, significantly influences buyers' willingness to pay a premium for green buildings. Numerous studies have shown that green buildings often command a price premium compared to traditional buildings due to their perceived value (Fang et al., 2019). Homebuyers are willing to pay more for properties that offer long-term energy savings, improved indoor air quality,

and overall sustainability. These factors make green buildings attractive, as buyers expect the benefits to outweigh the initial price difference.

In Singapore, for example, green-certified properties tend to attract a 3-5% price premium due to their energy-saving features and environmental credentials (Fesselmeyer, 2017). This premium is justified by the perceived long-term savings on energy bills and the enhanced comfort of living in a building with superior air quality and natural lighting. However, the perceived value can vary depending on the level of certification—higher-rated buildings typically command higher premiums, as they are seen as offering more comprehensive green features.

The reputation and status of owning a green building also add to its perceived value. In urban markets like Singapore, sustainability is increasingly seen as a marker of social responsibility, and buyers may be willing to pay a premium to align with this growing trend (Juan et al., 2017). Homebuyers may perceive green buildings as better for the environment and valuable assets that can increase resale value, providing emotional and financial returns.

1.6 Research Problem

Like many urban markets worldwide, Singapore's residential real estate market is experiencing an increasing shift toward sustainability and environmental consciousness. This shift is evident in the growing demand for green buildings that minimize environmental impact through energy-efficient systems, sustainable materials, and resource conservation technologies. The BCA Green Mark certification, a key initiative by the Singaporean government, has played a significant role in promoting the adoption of green buildings. However, despite the growing interest and governmental support, the factors influencing buyer decisions to choose green buildings over traditional properties remain under-explored, particularly in Singapore's residential market.

While it is evident that green buildings offer several advantages—such as lower operating costs, energy efficiency, and enhanced health and well-being—there is limited Research that quantifies the specific drivers behind residential buyers' preferences for these properties. Understanding what makes green buildings attractive to potential buyers in the Singaporean residential market is crucial, considering factors such as energy efficiency, environmental impact, and the perceived value of green features. Moreover, it is equally important to examine how these factors are influenced by buyer perceptions and whether the willingness to pay a premium for green buildings is linked to perceived long-term benefits such as cost savings, environmental responsibility, and quality of life improvements.

A key issue is whether green buildings' aesthetic and functional features—such as energy-efficient technologies, improved air quality, and the integration of natural elements like green roofs—significantly impact a buyer's decision-making process. Additionally, the environmental impact of a property, including its contribution to reducing carbon footprints and conserving resources, may play a central role in shaping buyer perceptions and their willingness to choose green buildings over traditional options. Despite the growing interest in sustainable living, there remains a gap in the literature regarding how these aesthetic, functional, and environmental factors influence buyer behaviour in green residential properties.

This Research addresses these gaps by investigating the key drivers of buyer decisions in Singapore's residential real estate market. Specifically, it will explore the attractiveness of green buildings in terms of their aesthetic and functional features, the perceived value of sustainability-related attributes, and how these elements influence the willingness of buyers to pay a premium for such properties. Furthermore, this study will examine how awareness of the environmental impact of green buildings contributes to buyer perceptions and purchasing

behaviour, focusing on understanding whether these factors are central to the broader trend of increasing demand for green residential properties in Singapore.

1.7 Purpose of the Research

This Research aims to evaluate the attractiveness of green buildings in Singapore's residential real estate market and identify the key factors influencing buyers' decisions to choose green properties over traditional buildings. As environmental sustainability continues to gain importance globally, this study seeks to understand how green buildings' aesthetic, functional, and environmental features contribute to their appeal. It aims to examine the extent to which these features, such as energy efficiency, eco-friendly materials, and health benefits, shape buyer perceptions and influence their purchasing behaviour.

Additionally, the Research will explore how the environmental impact of a property, including its contribution to reducing energy consumption and carbon emissions, affects a buyer's decision to invest in green buildings. This study will assess whether the perceived value of sustainability-related attributes—such as cost savings, improved quality of life, and environmental responsibility—leads to a higher willingness to pay a premium for green buildings.

The Research also aims to provide insights into the role of sustainability awareness in shaping residential buyers' preferences and how government initiatives, such as the BCA Green Mark certification, impact buyer perceptions. Ultimately, this Research aims to bridge the gap in the existing literature by identifying and quantifying the key drivers behind the growing demand for green residential properties in Singapore, offering practical recommendations to developers, policymakers, and other stakeholders on effectively promoting green building adoption.

1.8 Significance of the Study

This study holds significant academic and practical value, offering insights into the growing role of sustainability in the residential real estate market, particularly in urban settings like Singapore. As green buildings become increasingly popular due to their environmental, economic, and health benefits, understanding the factors influencing buyer decisions in this sector is crucial. The findings of this Research will contribute to the existing body of knowledge on green building adoption and provide a clearer understanding of the drivers behind consumer preferences for sustainable housing.

From an academic perspective, this study fills a gap in the literature by exploring the attractiveness of green buildings in a specific market—Singapore—and by investigating the interaction of factors such as energy efficiency, health benefits, and environmental impact in shaping buyer perceptions and behaviours. While much Research has focused on the general benefits of green buildings, there is limited focus on how residential buyers perceive these features and how they influence purchasing decisions. This study will thus provide valuable insights into consumer behaviour within the context of green residential properties.

Practically, the findings of this Research will be significant for several stakeholders in the real estate industry, including developers, policymakers, and urban planners. This study will enable developers to design and market properties that align with consumer preferences by identifying the key factors that make green buildings attractive to buyers. Furthermore, the Research will inform policymakers on how to strengthen initiatives, such as the BCA Green Mark, and implement strategies to encourage further adoption of sustainable housing solutions. Additionally, the study will help developers and government bodies understand the

financial implications of green building adoption, particularly the perceived value of green features and the willingness of buyers to pay a premium for such properties.

1.9 Research Questions:

1. What are the primary factors influencing buyer decisions when considering green buildings?
2. How does environmental sustainability affect the attractiveness of green buildings compared to traditional properties?
3. How do demographic factors such as age, income, and education level influence buyers' preferences for green buildings?
4. What are the key drivers and barriers to adopting green building features in residential properties?

CHAPTER II:

REVIEW OF LITERATURE

2.1 Introduction

Evaluating the attractiveness of green buildings in Singapore's residential market is becoming increasingly relevant as the demand for sustainable and energy-efficient living spaces grows. Green buildings, designed to minimize, optimize energy, and the health and well-being of their occupants, have gained significant attention in recent years. This heightened interest can be attributed to the growing awareness of environmental issues, particularly climate change, and the increasing desire to reduce energy consumption and carbon footprints in urban areas. Singapore's residential real estate market, known for its high density and rapid urbanization, is particularly urbanization to the pressures of sustainable development. In this context, understanding the factors that drive the attractiveness of green buildings is essential for developers and policymakers seeking to promote sustainable housing solutions.

Several studies have explored the motivations behind green building adoption, emphasizing various buyer-driven factors influencing purchasing decisions. For instance, research by Chan and Lee (2019) suggests that environmental concerns, coupled with government incentives and certification schemes like the Building and Construction Authority's (BCA) Green Mark certification, play a pivotal role in shaping buyer preferences. Moreover, economic factors such as the potential for long-term cost savings, mainly through energy-efficient features, have been identified as key drivers of demand (Liu et al., 2020). These findings align with the work of Zhang and Li (2018), who highlight that prospective buyers in Singapore are increasingly factoring in the long-term economic benefits of owning a green property, such as lower utility bills and higher resale value.

Social and personal values have also been critical in understanding buyer motivations. Research by Tan and Wong (2021) indicates that many Singaporean homebuyers prioritize priority reasons as part of their commitment to environmental stewardship. This trend is reflected in the increasing market share of green buildings in Singapore's residential market, which has seen a steady rise in both new developments and retrofits of existing buildings (Yeo et al., 2022). Additionally, factors such as indoor air quality, natural lighting, and the overall well-being of occupants have become essential considerations in the purchasing process, with many buyers now viewing these features as necessary for their health and quality of life (Zhou et al., 2019).

Despite the increasing interest in green buildings, it remains crucial to understand the complex interplay of these various buyer drivers. A quantitative model that captures the relative importance of each factor can provide valuable insights for developers and stakeholders in the residential real estate market. Previous studies, such as those by Tam et al. (2017), have attempted to quantify the drivers of green building adoption. Still, gaps remain in understanding how these factors are weighted in decision-making. This research aims to fill that gap by developing a model that evaluates the attractiveness of green buildings and provides a clearer understanding of the specific drivers that influence buyer preferences in Singapore's unique residential market.

2.2 Theoretical Framework

2.2.1 Theory of Planned Behavior (TPB)

1. Attitudes & Sustainability

Potential buyers' attitudes toward environmental sustainability and energy efficiency play a significant role in their decision to purchase green buildings in Singapore.

As environmental concerns increase, many buyers prioritize the inability to prioritize decisions, viewing green buildings as a means to reduce their environmental impact. Research indicates that more environmentally conscious consumers tend to favour properties that offer energy-efficient features, such as solar panels, better insulation, and energy-efficient appliances (Liu et al., 2020). These buyers are often motivated by the long-term cost savings on utilities and the positive environmental impact of reducing their carbon footprint. Moreover, Singapore's emphasis on green building certifications, such as the BCA Green Mark, further aligns with buyers' attitudes toward sustainability, as these certifications signal environmental responsibility (Chan & Lee, 2019). Ultimately, buyers' positive attitudes toward energy efficiency and sustainability drive their preference for green buildings, making them more likely to invest in properties that align with their values and long-term environmental goals.

2. Subjective Norms & Influences

Subjective norms, including social pressures and government incentives, play a significant role in shaping the decision-making process of homebuyers in the green building market. In Singapore, the government's strong push towards sustainable development, coupled with social awareness of environmental issues, has created an environment where adopting green buildings is increasingly seen as a social norm. The government's role in promoting green buildings is exemplified through initiatives such as the Building and Construction Authority's (BCA) Green Mark certification, which provides recognition and incentives for energy-efficient buildings. Buyers are more likely to purchase green buildings when they perceive that these actions align with governmental expectations and broader societal values (Chan & Lee, 2019).

Moreover, subjective norms are influenced by peer and social group dynamics. Research by Tan and Wong (2021) highlights that social pressures, such as the influence of family, friends,

and colleagues who prioritize environmental sustainability, can significantly impact an individual's decision to adopt green buildings. This effect is strengthened in communities where sustainable practices are becoming the norm, and individuals are increasingly motivated to conform to these expectations. Additionally, government incentives such as tax rebates or grants for green building purchases can create external pressure that nudges homebuyers toward making environmentally conscious decisions (Yeo et al., 2022). These incentives reduce the financial burden of purchasing green properties and promote a broader cultural shift toward sustainability, deciding to buy green buildings both socially desirable and financially advantageous.

3. Perceived Control & Affordability

Perceived behavioural control, particularly in terms of financial affordability and the availability of financing options, significantly influences the purchase decisions of buyers considering green buildings in Singapore. Buyers are more likely to purchase green buildings when they believe they have the financial means. The perception of affordability is shaped by the initial cost of green buildings and the long-term economic benefits, such as lower utility bills and reduced maintenance costs. Research by Liu et al. (2020) indicates that homebuyers are increasingly attracted to the energy-efficient features of green buildings as they expect to save on energy costs over time. This perceived benefit of long-term savings can enhance buyers' confidence in purchasing, even if the upfront costs are higher than traditional buildings.

Furthermore, the availability of financing options plays a critical role in reducing perceived barriers to purchasing green buildings. In Singapore, various financial institutions offer green financing products that make it easier for buyers to invest in green properties (Yeo et al., 2022). Government-backed initiatives, such as subsidies and grants for green building purchases, enhance buyers' perceived behavioural control by making green buildings more

accessible. These incentives can reduce the financial strain of purchasing environmentally friendly properties, making them a more feasible option for a broader range of potential buyers. As buyers perceive that they can afford the initial investment and access favourable financing terms, their intention to purchase green buildings will likely increase.

2.2.2 Diffusion of Innovations (DOI) Theory

1. Relative Advantage & Adoption

The perceived relative advantage of green buildings, particularly in terms of energy savings and environmental impact, plays a significant role in their adoption by homebuyers in Singapore. Green buildings, equipped with energy-efficient technologies such as solar panels, intelligent energy management systems, and advanced insulation, promise substantial long-term savings on utility bills, making them an attractive option for cost-conscious buyers. Studies show that homebuyers are increasingly motivated by the promise of reduced energy consumption, which lowers their monthly expenses and supports broader sustainability goals (Liu et al., 2020). In Singapore, a city-state that strongly emphasizes environmental sustainability, the relative advantage of green buildings becomes even more pronounced as the government encourages energy-efficient designs through initiatives like the Building and Construction Authority's (BCA) Green Mark certification (Chan & Lee, 2019). This certification highlights the environmental benefits of green buildings, which appeal to buyers increasingly aware of the importance of reducing their carbon footprint and contributing to climate change mitigation efforts.

In addition to energy savings, the environmental advantages of green buildings—such as reduced carbon emissions, conservation of natural resources, and sustainable construction materials—further enhance their appeal to buyers with strong environmental values. Research by Zhang and Li (2018) suggests that buyers view green buildings as superior to conventional properties due to their energy-saving potential and because they align with personal and

societal goals of environmental preservation. As such, the relative advantage of green buildings in terms of both economic and environmental benefits makes them a beautiful choice for homebuyers in Singapore.

2. Compatibility & Buyer Values

The compatibility of green buildings with the values and lifestyle of Singaporean buyers plays a crucial role in their decision to adopt these innovations. Singaporean buyers, particularly those prioritizing sustainability, are more likely to embrace green buildings that align with their values, such as environmental responsibility, resource conservation, and the desire to reduce their carbon footprint. Research has shown that consumers are more inclined to adopt innovations that fit their beliefs and behaviours, which are held in green buildings (Tan & Wong, 2021). In Singapore, where sustainability is a core national value, green buildings are often seen as an extension of a buyer's commitment to sustainable living.

Moreover, the practical benefits these properties offer enhance the compatibility of green buildings with buyers' lifestyles. Green buildings in Singapore are designed to provide both environmental benefits and a high level of comfort and convenience. Features such as improved indoor air quality, natural lighting, and smart home technologies appeal to buyers seeking to enhance their quality of life (Yeo et al., 2022). Integrating eco-friendly elements with modern living standards makes green buildings more compatible with the lifestyles of Singaporean homebuyers, who value both sustainability and comfort.

Additionally, government policies that promote green building adoption further facilitate the compatibility of these innovations with buyers' values. For example, the availability of subsidies and financing options for green buildings makes it easier for buyers to align their environmental values with their purchasing power, thus enhancing the overall compatibility of green buildings with their lifestyle choices (Liu et al., 2020).

3. Visibility & Diffusion

The visibility and observable benefits of green buildings, including energy efficiency and sustainability certifications, play a critical role in influencing the diffusion process of these innovations among potential buyers in Singapore's residential market. As more green buildings are constructed and marketed with visible eco-friendly features such as solar panels, energy-efficient windows, and water-saving technologies, the broader public becomes more aware of these buildings' advantages. Research suggests that visible environmental features and the tangible benefits of green buildings—such as lower utility bills and improved indoor air quality—are strong incentives for potential buyers to adopt these properties (Zhou et al., 2019).

The observability factor, as outlined in the Diffusion of Innovations theory (Rogers, 1962), is particularly relevant in the context of green buildings. When potential buyers see their peers adopting green buildings and benefiting from sustainability certifications such as the BCA Green Mark, they are more likely to perceive green buildings as desirable and trustworthy. This social proof process can accelerate the diffusion of green building adoption as buyers look to others for cues on what constitutes a wise and responsible purchasing decision. For instance, in Singapore's competitive real estate market, buyers are often influenced by the observable success of green buildings in terms of long-term cost savings, higher resale value, and a positive environmental impact (Liu et al., 2020).

Moreover, the growing recognition of sustainability certifications and labels, such as the Green Mark, increases the credibility and marketability of green buildings. These certifications are visible indicators of a building's environmental performance, making it easier for potential buyers to assess the environmental benefits of a property (Yeo et al., 2022). As more green buildings are introduced into the market with these certifications, their observable benefits further reinforce their attractiveness to a broader audience, driving the adoption of green buildings across different segments of the population.

2.2.3 Legitimacy Theory

1. Green Building Certification and Market Legitimacy

Developers use green building certifications and sustainability practices as key strategies to align with consumer environmental values and gain legitimacy in the market. As demand for environmentally responsible construction grows, these certifications such as LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method) provide credibility to developers. These certifications serve as third-party validation, ensuring that a building meets high environmental standards, which helps to assure environmentally conscious consumers of the sustainability of the properties they are purchasing or renting.

Green certifications not only serve as a marketing tool, but they also help developers establish a reputation as responsible corporate entities. Research suggests that consumers are increasingly willing to pay a premium for homes that are environmentally friendly and energy-efficient. For example, studies show that certified green buildings often have higher market values due to their energy efficiency, lower operating costs, and enhanced environmental performance (Gil-Ozoudeh et al., 2024). In a similar vein, the integration of sustainability into the development process can lead to higher property values and greater market demand (Sheina et al., 2024).

Moreover, the market is increasingly valuing sustainability not only for the direct environmental benefits but also for the long-term cost savings associated with energy-efficient buildings. Buildings that meet green certification standards often result in lower energy bills and higher levels of comfort for occupants, which translates to increased satisfaction and a healthier living environment (Paez-Perez et al., 2020). These features are particularly

attractive to buyers and renters who are both environmentally conscious and cost-sensitive, reinforcing the developers' market position.

Furthermore, developers utilize green building certifications as a way to secure financing and gain access to tax incentives. Many governments and financial institutions offer favorable terms for developments that meet sustainability criteria, including green mortgages and lower interest rates (Madhavi & Jose, 2024). These financial incentives not only reduce the initial cost burden of sustainable development but also provide developers with an economic incentive to pursue green certifications, which can be critical in competitive markets.

Lastly, the use of green building practices aligns developers with emerging regulatory frameworks and sustainability standards. These frameworks are increasingly becoming a requirement in many jurisdictions, ensuring that new developments meet environmental standards and remain compliant with future regulations. This proactive approach ensures that developers stay ahead of potential regulatory changes, mitigating future risks associated with non-compliance (Sari, 2017).

2. Public Perception and Developer Motivation

The public perception of environmental responsibility plays a pivotal role in motivating developers to adopt green building practices and enhance their market legitimacy. As consumer awareness of environmental issues, such as climate change and resource depletion, continues to rise, there is an increasing demand for sustainable and energy-efficient properties. Consumers are not only more eco-conscious but also actively seek out properties that align with their environmental values, making green building practices an attractive proposition for developers. Properties that incorporate energy-saving technologies, use sustainable materials, and offer reduced carbon footprints tend to appeal to these

environmentally aware consumers. Many are even willing to pay a premium for homes that meet these criteria, recognizing the long-term cost savings and the positive environmental impact, further motivating developers to invest in sustainable building practices (Gil-Ozoudeh et al., 2024).

In addition to consumer demand, the public's growing emphasis on environmental responsibility enhances a developer's market legitimacy. By obtaining green certifications such as LEED (Leadership in Energy and Environmental Design) or BREEAM, developers gain a credible third-party endorsement that showcases their commitment to sustainability. This not only builds trust with environmentally conscious consumers but also strengthens the developer's reputation in the market. The adoption of green building practices is seen as a form of corporate social responsibility (CSR), where developers demonstrate their awareness of the pressing environmental issues facing society. This responsible image can foster long-term relationships with consumers, many of whom prioritize environmental values when making purchasing decisions (Sheina et al., 2024).

Moreover, public perception of sustainability influences not only consumer behavior but also investor priorities. As ESG (Environmental, Social, and Governance) criteria become more central to investment decisions, developers who embrace green building practices are more likely to attract investment from environmentally conscious financiers. Public demand for sustainable buildings aligns with the expectations of investors who are increasingly aware of the financial risks associated with ignoring environmental issues. Additionally, governments and regulatory bodies are introducing incentives and support for sustainable construction, making it financially advantageous for developers to adopt green practices. These financial benefits, such as tax breaks or favorable financing terms, further motivate developers to align with public environmental concerns.

As public perception continues to evolve, developers also recognize the importance of future-proofing their business. By integrating green building practices, developers can ensure they remain relevant in a market that is shifting towards sustainability. This forward-thinking approach enables them to stay ahead of potential regulatory changes and meet future consumer demands. Public perception of environmental responsibility, therefore, not only impacts the immediate demand for sustainable properties but also shapes the long-term direction of the real estate market, encouraging developers to adopt green building practices for lasting success.

3. Regulatory Influence on Industry Legitimacy

Government regulations and environmental standards play a critical role in legitimizing the adoption of green building practices within the development and construction industry. As sustainability becomes a pressing global concern, many governments have implemented regulations that either mandate or encourage environmentally responsible construction practices. These regulations often require new buildings to meet specific energy efficiency, water conservation, and material sustainability standards. As a result, developers must comply with these regulations to meet the minimum environmental performance criteria, and in doing so, they help to make green building practices more mainstream and widely accepted. Such compliance not only ensures that developers stay within the legal framework but also strengthens the market legitimacy of green building as a recognized industry standard. This shift towards regulation-driven sustainability fosters an environment where green buildings are no longer seen as niche or optional but as essential components of modern construction.

In addition to compliance, governments often provide various financial incentives to encourage developers to adopt green building practices. These incentives can include tax

credits, grants, subsidies, and favorable financing options such as green mortgages and bonds. Developers who incorporate sustainable building materials, energy-efficient designs, or renewable energy systems may qualify for these incentives, making green building more economically viable. This financial support lowers the initial cost burden of sustainable development, making it an attractive option for developers. It also positions green building practices as legitimate and supported by public policy, reinforcing the notion that sustainability is not just a trend but a core value that is increasingly embedded in the construction industry.

Furthermore, government regulations and environmental standards significantly influence consumer demand for sustainable properties. As governments continue to enforce stricter environmental regulations, consumers become more educated and aware of the benefits of living in green-certified buildings, such as lower energy costs, improved air quality, and reduced environmental impact. This shift in consumer behavior creates a demand for buildings that meet green certification standards, further motivating developers to align their projects with these expectations. By complying with these regulations and obtaining recognized green certifications, developers can appeal to environmentally conscious buyers and renters, thereby enhancing their market position and gaining a competitive edge in an increasingly green-minded market.

Additionally, the growing alignment between government policies and sustainability expectations has led to the normalization of green building practices across the industry. As sustainability becomes more integrated into building codes and regulations, developers who fail to adopt these practices risk falling behind in an industry that is rapidly moving towards greener standards. Over time, this transformation shifts industry norms, making sustainable construction a default expectation. Developers who embrace these regulations and lead the

charge in green building adoption are perceived as forward-thinking and responsible, further bolstering their legitimacy in the market.

Finally, government regulations and standards not only enforce compliance but also stimulate innovation within the construction industry. By setting high standards for environmental performance, governments push developers to adopt new technologies, sustainable materials, and advanced building techniques. This regulatory push encourages the construction sector to continuously evolve, creating new solutions to meet sustainability goals. As a result, green building practices are not just limited to compliance but become a driver of innovation, making them an integral and dynamic part of the industry's future.

2.2.4 Stakeholder Theory

1. Influence of Stakeholders on Green Building Adoption

The adoption of green building features in residential properties is significantly shaped by various stakeholders, including developers, buyers, government regulators, and environmental organizations. Stakeholder theory provides a useful lens for understanding how these groups, each with distinct interests, influence the integration of sustainable practices in the construction industry. The interaction between these stakeholders is crucial in determining the extent to which green building features are incorporated into residential properties, creating a dynamic environment that drives the industry's shift toward sustainability.

Developers

Developers are at the heart of the adoption of green building features, as they are responsible for the design, construction, and marketing of residential properties. Their decisions are often influenced by a mix of market demand, financial incentives, and regulatory requirements. As public awareness of environmental issues increases, developers recognize the growing consumer demand for sustainable housing, which has led them to adopt green

features in their properties. For instance, many developers are incorporating energy-efficient systems, renewable energy sources, and sustainable building materials into their projects to attract environmentally conscious buyers. Research has shown that green building features not only appeal to eco-conscious consumers but also offer long-term cost savings in energy and maintenance, making them attractive to a wider market (Hossain et al., 2022). Furthermore, financial incentives provided by governments, such as tax credits, grants, and subsidies for sustainable construction, help make green building practices more financially viable for developers, incentivizing them to adopt these practices (Batool et al., 2024).

Buyers

Buyers play a critical role in the adoption of green building features, as their preferences and purchasing decisions directly impact developers' strategies. As sustainability becomes a more prominent factor in purchasing decisions, homebuyers are increasingly prioritizing energy-efficient homes and properties with a lower environmental impact. Many buyers are willing to pay a premium for homes that align with their environmental values, such as homes equipped with solar panels or energy-efficient insulation. This growing consumer demand for sustainable housing is a powerful motivator for developers to include green features in their residential projects. Research has shown that factors like environmental knowledge, environmental concern, and green awareness significantly influence buyers' intentions to purchase green residential properties (Wijayaningtyas, 2017). Moreover, buyers are not just driven by environmental considerations but also by the long-term cost savings that green buildings offer in terms of reduced utility bills and lower maintenance costs, further incentivizing the adoption of green features by developers.

Government Regulators

Government regulators are key players in the adoption of green building features, as they set the standards and policies that shape the construction industry's approach to

sustainability. Many governments around the world are introducing building codes and regulations that require or encourage the use of sustainable practices in construction. These regulations often include energy efficiency standards, water conservation measures, and requirements for the use of environmentally friendly materials. By mandating these standards, governments ensure that new buildings meet certain environmental criteria, thus making green building practices a norm in the construction industry. Additionally, governments offer financial incentives, such as tax breaks or low-interest loans, to developers who incorporate green features into their projects, making sustainable construction more financially attractive (Ngubane, 2024). These incentives not only motivate developers but also help ensure that green building becomes the standard in the industry, creating a strong regulatory framework for sustainable construction.

Environmental Organizations

Environmental organizations play a vital role in advocating for the adoption of green building features by raising awareness about the environmental and social benefits of sustainable construction. These organizations often serve as advocates for stronger environmental policies and regulations and work to influence both public opinion and industry practices. They engage in lobbying, public education campaigns, and collaborations with businesses to encourage the adoption of green technologies and construction methods. By endorsing green certifications, such as LEED or BREEAM, environmental organizations help establish these standards as legitimate and desirable benchmarks for sustainable construction. Furthermore, they push for the inclusion of sustainability criteria in government regulations and developer practices, ensuring that environmental concerns remain a priority in the construction industry (Xu & Zhang, 2020).

2. Conflicting Stakeholder Interests and Sustainability

The adoption of green building features in residential construction involves multiple stakeholders, each with distinct interests and priorities. These stakeholders—developers, buyers, government regulators, environmental organizations, and investors—often have conflicting goals that can hinder the widespread implementation of sustainable construction practices. Understanding these conflicts is crucial for addressing barriers to green building adoption and finding ways to reconcile differing interests to drive progress in the industry.

Developers vs. Environmental Standards and Costs

A major source of conflict in the adoption of green building practices arises between developers and the environmental standards or regulations that encourage sustainable construction. Developers are primarily driven by profit margins, project timelines, and cost efficiency, all of which can be at odds with the additional costs of incorporating green features. Sustainable building technologies, such as energy-efficient systems, renewable energy sources, and sustainable materials, often require significant upfront investment. Developers may view these green features as financially burdensome, especially if the long-term return on investment (ROI) is unclear or if these features are not perceived as essential to potential buyers. This reluctance to incur additional costs can slow the adoption of green building practices, as developers seek to minimize expenses and maintain competitive pricing.

Buyers vs. Cost and Perceived Value

Another key conflict exists between buyers and the cost of green residential properties. Although there is a growing interest in sustainability, many buyers may not yet be willing to pay a premium for green features, especially when traditional housing options are more affordable. This discrepancy in expectations creates a tension between what developers are willing to invest in sustainable features and what buyers are willing to pay for them. While some buyers prioritize environmental responsibility and energy efficiency, others may place more importance on factors such as price, location, and size, leading to a mismatch between

the demand for green homes and their market availability. Furthermore, buyers' lack of understanding of the long-term savings offered by green homes, such as lower utility bills and reduced maintenance costs, can also contribute to lower demand for sustainable housing.

Government Regulators vs. Industry Flexibility

Government regulators are essential in driving the adoption of green building practices by setting and enforcing building codes, sustainability standards, and environmental regulations. However, the policies they implement can sometimes conflict with the need for industry flexibility. Stringent building codes and sustainability regulations may increase the complexity and cost of construction projects, particularly for smaller developers who struggle to meet these requirements. In contrast, there are cases where government regulations may not be stringent enough to drive meaningful change in the industry. Some environmental organizations and green building advocates argue that regulatory standards are insufficient to push developers toward higher sustainability goals. This lack of robust regulation can limit the effectiveness of government efforts to accelerate the transition to sustainable residential construction, resulting in uneven adoption across the industry.

Environmental Organizations vs. Practical Implementation

Environmental organizations, which advocate for higher standards of sustainability, may sometimes face conflicts with developers regarding the practical implementation of green technologies. While these organizations push for the widespread adoption of green building certifications such as LEED or BREEAM, these systems can often be seen as complex, costly, and difficult for developers to integrate into their projects. Additionally, the specific technologies and materials promoted by environmental organizations may not always be economically feasible or suitable for all regions or building types. For example, some green technologies may require a higher initial investment than developers are willing to make, or they may not provide enough long-term benefits to justify the cost. This disconnect between

the goals of environmental organizations and the realities of construction costs can make it difficult for developers to meet the expectations of these groups, slowing down the adoption of green features.

Investors vs. Long-Term Sustainability

Investors, particularly in real estate, often focus on short-term returns and immediate financial performance. Green building features, which typically involve higher upfront costs, may not always align with investors' priorities, especially if the financial benefits of sustainability—such as reduced operational costs and long-term value—are uncertain or not immediately realized. Investors may also be wary of the risk associated with green buildings, particularly if the market for sustainable housing is still emerging or if the return on investment is not guaranteed. While some investors are increasingly interested in supporting projects that align with Environmental, Social, and Governance (ESG) goals, others remain focused on more traditional financial metrics. This creates a conflict between the desire for long-term sustainability and the drive for short-term financial returns, making it difficult to secure consistent funding for green residential projects.

Impact on the Widespread Implementation of Sustainable Residential Construction

These conflicting interests significantly impact the widespread implementation of sustainable residential construction practices. Developers' reluctance to adopt green features due to higher costs, coupled with limited buyer demand, can delay the transition to greener homes. Additionally, government regulations, which are crucial for driving sustainability, can either be too stringent or insufficient, depending on the regulatory environment. Environmental organizations' push for higher standards and advanced green technologies can clash with the practical realities of construction, particularly for developers working within tight budgets. Finally, investors' focus on short-term returns creates a further obstacle to

securing funding for green building projects, especially those with high initial costs and uncertain payoffs.

3. Stakeholder Pressures and Developer Decisions

Stakeholder pressures, including consumer demand for sustainability and government regulations, significantly influence developers' decisions to invest in green buildings. Developers, as key players in the real estate market, must balance multiple competing interests when deciding whether to adopt green building practices. These pressures—stemming from both the market and regulatory environment—shape their strategies and impact the level of investment in sustainable construction.

Consumer Demand for Sustainability

Consumer demand for sustainability plays a critical role in motivating developers to invest in green buildings. As public awareness of environmental issues grows, more homebuyers and tenants are prioritizing sustainable living spaces that offer energy efficiency, better indoor air quality, and lower environmental impact. Research shows that many consumers are willing to pay a premium for green features, such as energy-efficient appliances, renewable energy systems, and sustainable building materials (Wijyaningtyas, 2017). This increased demand for environmentally friendly homes is a powerful motivator for developers to integrate green building practices into their projects.

Developers recognize that meeting consumer preferences for sustainability can lead to higher property values, increased marketability, and more competitive offerings in a growing green housing market. As consumer interest in green homes expands, developers are more inclined to adopt sustainable features to meet the preferences of potential buyers, especially in markets where sustainability is increasingly becoming a key determinant in purchasing decisions. Thus, consumer demand not only drives the adoption of green building practices but

also encourages developers to focus on creating properties that align with environmental values.

Government Regulations and Incentives

Government regulations also play a significant role in shaping developers' decisions to invest in green buildings. Governments around the world are implementing stricter building codes and sustainability standards to reduce the environmental impact of the construction industry. Regulations may require developers to meet certain energy efficiency standards, use sustainable materials, or incorporate water-saving technologies. In many cases, these regulations push developers to adopt green building practices to ensure compliance with local or national policies, avoiding fines or penalties.

In addition to regulatory requirements, governments often offer financial incentives to encourage developers to adopt sustainable practices. These incentives can include tax credits, grants, subsidies, or access to green financing options like low-interest loans or green bonds. Such incentives reduce the financial burden of incorporating green building features and make it more economically viable for developers to invest in sustainable construction. In some cases, governments even offer expedited permitting or zoning approvals for projects that meet certain green standards, providing further motivation for developers to invest in green buildings (Ngubane, 2024).

However, while regulations and incentives can encourage investment in green buildings, they may also present challenges. For example, compliance with stringent regulations may increase construction costs or lead to delays, especially for smaller developers who may struggle with the financial and logistical complexities of meeting sustainability standards. Despite these challenges, the long-term benefits—such as reduced operating costs and increased property value—can outweigh the initial investment, making green buildings an attractive option in the eyes of developers.

Investor Pressure and Return on Investment

In addition to consumer demand and government regulations, investors exert pressure on developers to invest in green buildings. With the growing popularity of ESG (Environmental, Social, and Governance) investing, many investors now prioritize projects that align with sustainability goals. Investors are increasingly aware that green buildings tend to offer higher long-term value through operational cost savings, better marketability, and increased tenant satisfaction. As a result, developers are often encouraged to integrate green building features to attract investors and secure financing for their projects.

However, the pressure from investors can sometimes create tension. While many investors favor sustainability, they also demand a clear return on investment. The upfront costs of green buildings—such as those associated with green certifications, energy-efficient systems, and sustainable materials—can be higher than traditional construction methods. Developers must therefore balance the cost of implementing green features with the expectation of long-term returns. In markets where green buildings are still relatively niche or where buyers may not be willing to pay a premium, the pressure to deliver immediate returns may discourage some developers from fully embracing green building practices.

Balancing Stakeholder Pressures

Developers face the complex challenge of balancing various stakeholder pressures when deciding whether to invest in green buildings. On one hand, consumer demand for sustainability and government regulations encourage developers to adopt green practices, which can lead to higher property values, market differentiation, and regulatory compliance. On the other hand, financial pressures, including the costs of implementing green features and the demand for short-term returns from investors, can complicate the decision-making process.

Ultimately, the widespread adoption of green building practices hinges on the alignment of these interests. As consumer demand for sustainability continues to grow,

government incentives and regulations become more supportive, and investors increasingly prioritize green projects, the pressures on developers to embrace sustainability will continue to increase. Developers who successfully navigate these pressures will be better positioned to capitalize on the long-term benefits of green buildings, including cost savings, market appeal, and compliance with future regulations.

2.3 Green Buildings & Market

2.3.1 Overview of Green Buildings

1. Green Building Features

Green buildings are designed to minimize environmental impact by incorporating energy-efficient, sustainable, and environmentally friendly practices throughout their design, construction, and operation. These buildings aim to reduce energy consumption, use sustainable materials, and provide a healthier indoor environment for occupants. Key features of green buildings include energy-efficient systems such as heating, ventilation, and air conditioning (HVAC), water-efficient plumbing, and renewable energy sources like solar panels. Additionally, green buildings often incorporate sustainable building materials, such as recycled materials and low-emission products, contributing to environmental sustainability and healthier living environments (Liu et al., 2020).

A defining characteristic of green buildings is their adherence to sustainability certifications and standards, such as the BCA Green Mark in Singapore, which evaluates the environmental performance of buildings based on criteria like energy efficiency, water conservation, indoor environmental quality, and site sustainability (Chan & Lee, 2019). These certifications not only signal a commitment to sustainability but also provide potential buyers with assurance that the building meets high environmental standards.

2. Key Technologies and Design Elements

Green buildings are typically equipped with various technologies and design elements contributing to their energy efficiency and sustainability. These include advanced building materials that reduce energy loss, high-performance windows that regulate heat, and passive design strategies that optimize lighting and airflow (Zhou et al., 2019). Additionally, innovative building technologies, such as energy management systems that monitor and control energy usage in real time, are becoming increasingly common in green buildings. These technologies reduce the building's environmental footprint and give homeowners increased control over energy consumption, resulting in long-term cost savings.

Integrating renewable energy sources, such as solar power, is a prominent feature of many green buildings. Solar panels help generate clean, renewable energy that can offset the building's energy needs, reducing its reliance on non-renewable energy sources and lowering its carbon footprint. Such innovations position green buildings as both environmentally responsible and economically advantageous, especially as energy costs continue to rise.

2.3.2 The Residential Market in Singapore

1. Market Trends and Growth of Green Buildings

The residential market in Singapore has witnessed a growing demand for green buildings in recent years, driven by increasing awareness of environmental sustainability and rising energy costs. As part of its commitment to becoming a sustainable city, the Singaporean government has heavily promoted green building development through various policies and incentives. A notable example is the Building and Construction Authority's (BCA) Green Mark certification, which has become a standard for evaluating and encouraging energy-efficient, sustainable buildings in the country (Yeo et al., 2022). Over the years, more residential properties in Singapore have adopted green building features to meet governmental regulations and eco-conscious buyers' evolving preferences.

The increasing recognition of the long-term economic benefits of green buildings has also fueled this trend. Studies have shown that green buildings are more energy-efficient and have lower operational and maintenance costs, making them attractive to developers and homebuyers (Liu et al., 2020). Furthermore, the rising popularity of these buildings is linked to growing public awareness of climate change and the need for sustainable living. According to research by Tan and Wong (2021), Singaporean buyers are increasingly inclined to purchase green buildings, as these properties offer financial and environmental benefits.

2. Role of Sustainability in the Urban Development Agenda

Sustainability has become a central theme in Singapore's urban development agenda. As a densely populated city-state with limited natural resources, Singapore strongly emphasizes sustainable urban planning to ensure long-term environmental and economic stability. The government has introduced several initiatives to encourage green building development, including tax incentives, grants, and rebates for developers who incorporate sustainable practices into their projects (Yeo et al., 2022). These efforts have been aligned with Singapore's broader goal of achieving a green, low-carbon economy.

Sustainability is also embedded in the nation's long-term urban development strategy, which includes promoting the integration of green spaces, renewable energy systems, and efficient public transport networks. The rise of green buildings is part of this larger vision of creating an environmentally responsible and livable city. By aligning urban development with sustainable practices, Singapore addresses environmental concerns and enhances the quality of life for its residents. Green buildings, with their energy-efficient systems and sustainable design, are a key component of this vision, contributing to the city-state's efforts to mitigate climate change, reduce energy consumption, and preserve its natural environment (Tan & Wong, 2021).

2.4 Buyer Decision Drivers

2.4.1 Environmental and Economic Motivations

Energy efficiency is a significant factor driving the adoption of green buildings in Singapore, as it offers economic and environmental benefits. Green buildings incorporate technologies and design elements that reduce energy consumption, such as high-performance insulation, solar panels, energy-efficient windows, and intelligent energy management systems. These energy-saving features not only lower utility bills for homeowners but also contribute to reducing the building's overall environmental impact. Liu et al. (2020) argue that energy efficiency is a key motivator for homebuyers, as the promise of long-term cost savings on electricity and water bills makes green buildings a financially attractive option. The growing awareness of the high costs associated with energy consumption has encouraged potential buyers to prioritize those designed to be energy-efficient.

In addition to financial savings, energy-efficient buildings support environmental sustainability goals by reducing the overall carbon footprint. Singapore's dense urban environment and limited land availability make it crucial to minimize usage and carbon emissions in residential areas. Green buildings help address these concerns using renewable energy sources and efficient technologies that lower greenhouse gas emissions. As consumers increasingly prioritize sustainability, energy-efficient homes are viewed not only as an economically viable option but also as a means to contribute to mitigating climate change and reducing dependence on fossil fuels (Liu et al., 2020). Therefore, the dual benefits of energy savings and environmental impact reduction are powerful motivators in the adoption of green buildings by Singaporean homebuyers.

2.4.2 Government Policies and Incentives

1. Government Support for Green Building Initiatives

The government of Singapore plays a pivotal role in driving the adoption of green buildings through various supportive policies and initiatives. The Building and Construction Authority (BCA) promotes sustainable development through programs like the Green Mark Certification, which encourages the construction of energy-efficient and environmentally friendly buildings. As Chan and Lee (2019) highlight, these policies have been instrumental in shaping the residential market by incentivizing developers to incorporate green building features, such as energy-efficient systems and water-saving technologies. The government's commitment to sustainability is reflected in its long-term goal to reduce carbon emissions and promote green building practices across all sectors, including residential housing.

Incentives such as tax rebates, grants, and subsidies are also critical in reducing the financial burden of adopting green building technologies. These incentives make it more affordable for developers and homeowners to invest in energy-efficient and sustainable properties. As a result, buyers are more inclined to choose green buildings that align with their environmental values and offer tangible economic benefits. Government initiatives help normalize the concept of green buildings and ensure their accessibility to a broader range of potential buyers. This institutional support significantly influences buyer decisions by reducing financial barriers and enhancing the perceived value of green buildings in the residential market (Chan & Lee, 2019).

2. BCA Green Mark Certification and its Influence on Buyer Behavior

The BCA Green Mark Certification significantly influences buyer behaviour in Singapore's residential market. This certification serves as a mark of excellence for buildings that meet stringent environmental and sustainability standards. As noted by Chan and Lee (2019), the Green Mark Certification not only highlights the environmental performance of a building but also enhances its marketability. Homebuyers are increasingly drawn to properties with this certification, as it assures them that the building has been designed and constructed to

minimize consumption, reduce environmental impact, and provide a healthier living environment. The Green Mark Certification appeals to eco-conscious buyers prioritizing affordability and energy efficiency in their housing choices.

In addition to serving as a selling point for developers, the Green Mark Certification has become a key factor in the decision-making process for potential buyers. Buyers often view Green Mark-certified buildings as more desirable because they offer tangible benefits such as lower utility costs, reduced carbon footprints, and improved indoor air quality. The certification also signals the developer's commitment to sustainability, which is increasingly vital to a growing market segment that values environmental responsibility. Therefore, the BCA Green Mark Certification significantly influences buyer decisions, making it a crucial driver in adopting green buildings in Singapore's residential sector (Chan & Lee, 2019).

2.5 Key Features and Characteristics of Green Buildings

Green buildings are characterized by several design and technological features contributing to their environmental sustainability, energy efficiency, and enhanced living quality. One of the key aspects of green buildings is the use of energy-efficient building materials and systems. According to Zhou et al. (2019), these materials are specifically chosen to reduce energy consumption by improving insulation, minimizing loss, and increasing the building's overall energy efficiency. For example, high-performance windows, thermal insulation, and energy-efficient HVAC systems ensure that green buildings require less energy for heating and cooling. Using such materials not only lowers energy costs for homeowners but also significantly reduces the building's carbon footprint, contributing to broader environmental sustainability goals.

In addition to energy-efficient materials, green buildings are designed with sustainability in mind, focusing on improving indoor air quality and occupant comfort. Sustainable design strategies often incorporate natural lighting, proper ventilation, and the use of non-toxic

materials to ensure that the building's interior environment promotes the health and well-being of its occupants. Zhou et al. (2019) noted that these design elements help improve air quality, reduce pollution exposure, and create a more comfortable living environment. The integration of green roofs, water-efficient plumbing systems, and intelligent energy management systems also enhances the sustainability of these buildings, supporting their role in reducing environmental impact while providing a high standard of living for residents.

Another essential characteristic of green buildings is their sustainability certifications, which prove the building's adherence to strict environmental standards. The BCA Green Mark certification in Singapore is most recognized for a building's sustainability. Yeo et al. (2022) highlight that the Green Mark certification evaluates buildings based on various factors, including energy and water efficiency, indoor environmental quality, and sustainable construction materials. This certification not only recognizes the environmental performance of a building but also enhances its appeal to prospective buyers who are increasingly prioritizing friendly and energy-efficient homes. The importance of sustainability certifications like the Green Mark is amplified by their growing recognition in the market, with more buyers seeking certified properties for long-term cost savings and environmental impact reduction.

Sustainability certifications, such as the BCA Green Mark, are a significant selling point in the residential market. Buyers are increasingly drawn to properties with these certifications as they assure that the building meets high environmental and sustainability standards. The certification provides a competitive advantage to developers, as it signals to potential buyers that the property is not only environmentally responsible but also designed to provide long-term economic benefits, such as lower utility costs and reduced maintenance needs (Yeo et al., 2022). As the demand for sustainable living continues to grow, such certifications have become a key differentiator in the market, contributing to the increasing attractiveness of green buildings.

2.6 Green Building Challenges

One of the significant challenges in adopting green buildings in Singapore's residential sector is the financial barrier associated with the upfront costs required for these properties. Green buildings are typically more expensive to construct than conventional buildings due to energy-efficient technologies, sustainable materials, and specialized. Liu et al. (2020) highlight that while green buildings offer long-term savings through reduced energy consumption and lower utility bills, the initial investment required can deter potential buyers. Many consumers are hampered by the perceived high initial investment, which is often seen as a substantial financial burden despite the promise of future cost savings. This perception is particularly evident in the Singaporean market, where housing prices are already high, and buyers are increasingly sensitive to upfront costs. Although the operational cost savings of green buildings may offset these initial costs over time, the immediate financial commitment required for these properties can be a significant barrier for many homebuyers.

In addition to the financial barriers, there is also a need for more widespread awareness among potential buyers regarding the benefits of green buildings. While the long-term savings and environmental benefits of energy-efficient homes are well-documented, many consumers remain unaware of the full advantages of these properties. Research by Tan and Wong (2021) suggests that a lack of awareness about green buildings' economic and environmental benefits continues to hinder their adoption. Potential buyers may not fully understand how green features—such as solar panels, energy-efficient appliances, and high-performance insulation—can significantly save energy and maintenance costs. Furthermore, the environmental impact of living in a green building, such as contributing to reducing carbon footprints, may not be as apparent to buyers who are not well-informed about sustainability issues. To address this, there is a growing need for public education on the tangible benefits of

green buildings, which can help shift consumer perceptions and drive demand for more sustainable housing options in Singapore's residential market.

2.7 The Role of Government Policies and Certifications in Shaping Buyer Preferences

2.7.1 Impact of Government Policies and Incentives on Buyer Awareness and Perceptions

Government policies and incentives have a significant influence on residential buyers' awareness and perceptions of green buildings in Singapore. One of the primary ways this influence manifests is through the establishment of clear regulations and standards. Singapore's Building and Construction Authority (BCA) has implemented the Green Mark Scheme, which sets criteria for environmentally sustainable buildings. This scheme not only serves as a certification tool but also acts as an educational platform for potential buyers, increasing their understanding of what green buildings entail and the benefits associated with them. By formalizing these standards, the government helps buyers recognize green buildings as credible and trustworthy investments rather than experimental or niche options. This formal recognition raises overall awareness and positively shapes buyers' perceptions of green buildings (Ng et al., 2018).

In addition to regulatory frameworks, financial incentives provided by the government play a crucial role in motivating buyers to consider green buildings. Incentives such as grants, tax rebates, and property tax reductions help lower the upfront and ongoing costs associated with purchasing or owning green-certified residential properties. These financial benefits reduce the perceived economic barriers and risks for buyers, making green buildings more financially attractive. The presence of such incentives signals government support and commitment, which reassures buyers about the value and sustainability of investing in green

buildings. As a result, these policies effectively enhance buyer demand and positively influence their attitudes toward environmentally friendly housing options (Tan & Lim, 2020).

Furthermore, government endorsement of green building initiatives contributes to improving the overall market credibility of green properties. When the government publicly supports and promotes green building standards, it lends authority and legitimacy to these projects. This increased credibility helps counter skepticism among buyers who may otherwise be uncertain about the long-term benefits or quality of green buildings. Buyers tend to perceive government-backed green buildings as more reliable, energy-efficient, and future-proof investments, which improves their willingness to pay a premium for such properties (Wong et al., 2019).

Finally, government policies also indirectly influence buyers' perceptions by encouraging developers to adopt green building practices. Through policy incentives and regulatory requirements, developers are motivated to increase the supply of green residential buildings. As green buildings become more common in the market, buyers are more exposed to them, leading to greater normalization and acceptance of green building features. This expanded availability helps shift buyer perception from viewing green buildings as a luxury or specialty item to a mainstream housing option, further increasing demand and market attractiveness (Chong & Lee, 2021).

2.7.2 Influence of BCA Green Mark Certification on Buyer Trust and Willingness to Pay

The BCA Green Mark certification has a notable impact on buyers' trust and their willingness to pay a premium for green residential properties in Singapore, as shown by several studies.

First, research shows that the Green Mark certification acts as a strong signal of environmental quality and sustainability, which increases buyer confidence and trust in these

properties. Buyers perceive certified green buildings as more reliable and of higher quality due to the government's involvement and standards (Heinzle, Yip & Low, 2013; Wong, Chan & Lee, 2019). This trust translates into willingness to pay more for certified units.

Multiple studies quantify the premium buyers are willing to pay, ranging between about 1.6% to 8% above non-certified properties, depending on the level of certification. For instance, premium buyers were willing to pay around 3.78% more for buildings with a basic Green Mark certification and up to 7.98% more for the highest Platinum rating (Heinzle, Yip & Low, 2013). Another study reported an average price premium of approximately 1.61% for Green Mark certified dwellings compared to non-certified ones (Agarwal, Sing & Yang, 2017).

The premium reflects both the tangible benefits like energy efficiency and the intangible value of sustainability and prestige. However, some evidence suggests that actual energy savings may not always fully explain the price premium, implying that certification acts as a reputational signal that builds buyer trust beyond pure economic factors (Agarwal, Sing & Yang, 2017; Fesselmeyer, 2017).

Moreover, the premium varies across housing market segments, with mass-market buyers sometimes willing to pay larger relative premiums than luxury market buyers, particularly when certification signals real environmental improvements (Hui & Yu, 2021).

2.7.3 Effectiveness and Limitations of Government Policies in Overcoming Adoption Barriers

Government policies and certification schemes in Singapore have effectively reduced several major barriers to the adoption of green buildings among residential buyers. One of the primary barriers addressed is the lack of awareness and understanding of green building benefits. Programs like the BCA Green Mark certification provide a clear and standardized framework that educates buyers on what qualifies as a green building and the environmental

and financial advantages involved. This clarity helps build trust and reduces confusion, enabling buyers to make more informed decisions (Fesselmeyer, 2017). Additionally, financial concerns—which often deter buyers—are alleviated through government incentives and subsidies linked to green-certified properties. These incentives lower upfront costs or reduce operational expenses, making green homes more affordable and financially attractive to a wider range of buyers (Heinzle, Yip & Low, 2013).

Certification schemes also enhance credibility by acting as trusted third-party endorsements of a building's environmental performance and quality. This assurance helps mitigate skepticism about green claims, encouraging buyers to feel confident that certified buildings meet rigorous standards (Wong, Chan & Lee, 2019). Moreover, government mandates and incentives encourage developers to increase the supply of green-certified residential projects. This expansion not only improves market availability but also helps normalize green homes within the broader housing market, making such properties more mainstream (Zhang, Tu & He, 2024).

Despite these successes, important gaps remain in fully encouraging green building adoption among Singaporean homebuyers. Market confusion about the meaning and value of different certification tiers, such as Certified, Gold, and Platinum levels, reduces buyers' ability to differentiate quality and benefits clearly (Addae-Dapaah & Sung, 2012). Furthermore, while certifications signal sustainability, actual performance data—such as verified energy savings—are sometimes lacking or not effectively communicated. This gap weakens the tangible value buyers perceive from green buildings (Agarwal, Sing & Yang, 2017). Cost concerns persist as well; even with financial incentives, higher upfront costs and long payback periods continue to deter some buyers, especially those in price-sensitive segments (Lu et al., 2019).

Cultural and behavioral factors also present barriers. Some buyers prioritize traditional features like location, design, or price over green attributes, reflecting ingrained habits and preferences that slow adoption (Phang, 2016). Lastly, while certification schemes improve awareness, broader public education on the benefits of green buildings could be expanded to reach segments of the market less familiar with sustainability issues (Fesselmeyer, 2017).

2.8 Pros and Cons of Green Building Adoption for Buyers

2.8.1 Pros of Green Building Adoption

Adopting green buildings offers several significant advantages for buyers, particularly in terms of long-term cost savings and increased property value. One of the most compelling reasons for purchasing a green building is the substantial long-term cost savings achieved through energy-efficient technologies and systems. Green buildings are designed to minimize consumption by incorporating high-performance insulation, energy-efficient appliances, and renewable energy sources such as solar panels. As noted by Zhang and Li (2018), these energy-saving features significantly lower utility bills, providing buyers with a return on investment over time. Additionally, green buildings tend to have a higher resale value than conventional properties. This is due to the growing demand for sustainable and energy-efficient homes, which eco-conscious buyers see as more desirable. Combining energy savings and higher property values makes green buildings an attractive financial investment, particularly for long-term homeowners.

Beyond economic benefits, green buildings also provide significant environmental advantages. By using sustainable materials, reducing energy consumption, and lowering carbon emissions, green buildings contribute to the overall reduction of a household's environmental impact. Living in a green building allows buyers to play a part in mitigating climate change, reducing reliance on non-renewable energy sources, and promoting sustainability. This aligns with the

growing trend of eco-conscious living, where consumers increasingly prioritize environmental responsibility in their purchasing decisions (Zhang & Li, 2018). The opportunity to contribute positively to sustainable living is a key motivator for many buyers, particularly in a city-state like Singapore, where sustainability is a core national value.

2.8.2 Cons and Potential Drawbacks

Despite the numerous advantages, green buildings have some potential drawbacks, particularly concerning the higher initial investment and financing challenges. Green buildings are often more expensive due to energy-efficient technologies and sustainable materials. As noted by Liu et al. (2020), the upfront costs associated with purchasing a green property are higher than conventional buildings, which can be a significant barrier for many potential buyers. While the long-term savings on energy bills may offset these costs, the initial financial commitment required can deter buyers, especially in a market like Singapore, where property prices are already high. The perception of green buildings as a luxury investment rather than an affordable option limits their accessibility to a broader range of homebuyers.

Another challenge with green buildings is the complexity of technologies and the maintenance concerns of advanced energy-efficient systems. Zhou et al. (2019) highlight that many green buildings incorporate sophisticated technologies such as solar panels, energy management systems, and smart appliances. While these technologies offer substantial benefits in terms of energy savings, they can also be challenging to maintain and repair. Additionally, buyers may lack the technical expertise required to fully understand and utilize systems, leading to potential frustration or higher maintenance costs if issues arise. The complexity of managing these systems can deter buyers concerned about the likely costs and effort involved in maintaining advanced energy-efficient technologies.

2.9 Literature Gaps

Comprehensive Quantification of the Relative Importance of Drivers:

While various motivations for green building adoption, such as energy efficiency, government incentives, and health benefits, have been identified, there is limited literature that quantitatively measures the relative importance of these factors. Developing a model to compare the significance of each factor, particularly in Singapore's unique residential market, remains a critical gap.

Impact of Government Policies on Non-Early Adopters:

Existing studies primarily focus on early adopters of green buildings, but there is a lack of research on how government policies affect more conservative or non-early adopters. Understanding what policies or incentives could effectively push these groups toward green building adoption would help shape more inclusive strategies for wider market penetration.

Limited Focus on Post-Purchase Behaviors and Satisfaction:

While research has concentrated on motivations before purchasing green buildings, there is a lack of insight into buyer satisfaction and behaviors after the purchase. Investigating whether buyers realize the perceived benefits of green buildings, such as energy savings or health improvements, could provide valuable information for future developments and marketing strategies.

Absence of Longitudinal Studies:

Most studies on green building adoption in Singapore are cross-sectional, capturing data at a single point in time. There is a significant gap in longitudinal research that tracks how buyer preferences and market conditions evolve over time. Understanding these dynamics could provide a more accurate picture of how green buildings are perceived and adopted in the long term.

2.10 Summary

The attractiveness of green buildings in Singapore's residential market has become increasingly important as the demand for sustainable, energy-efficient homes continues to rise. These buildings, designed to reduce environmental impact, optimize use, and enhance the well-being of occupants, are gaining traction in Singapore due to growing environmental concerns and the desire to reduce carbon footprints. Sustainable development pressures mainly influence the residential market in Singapore, given the city-state's high density and rapid urbanizations highlight several motivations behind green building adoption, including economic factors such as long-term cost savings from energy-efficient technologies and the environmental impact of reducing carbon emissions (Liu et al., 2020; Zhang & Li, 2018). Government policies, such as the BCA Green Mark certification, play a crucial role in promoting these buildings by offering incentives for developers and influencing buyer preferences (Chan & Lee, 2019). Additionally, buyer motivations are shaped by social norms and subjective influences, such as peer pressure and social values, which further drive the demand for sustainable housing (Tan & Wong, 2021). Despite the growing interest, challenges remain, particularly regarding the high initial costs of green buildings, which can deter potential buyers, as well as a lack of awareness about their long-term benefits (Liu et al., 2020; Tan & Wong, 2021).

The Theory of Planned Behavior (TPB) and the Diffusion of Innovations (DOI) theory offer valuable insights into buyer decision factors. TPB explains how attitudes towards sustainability, subjective norms, and perceived control over purchasing decisions shape buyers' choices, with energy efficiency and environmental benefits being key drivers (Liu et al., 2020). DOI theory further illustrates how the perceived relative advantage of green buildings, in terms of cost savings and sustainability and their compatibility with buyers' values, influences the adoption of green buildings (Zhang & Li, 2018; Tan & Wong, 2021). The growing visibility of green buildings and certifications like the BCA Green Mark enhance

their appeal by providing tangible evidence of their benefits, thus accelerating their adoption across different buyer segments (Yeo et al., 2022).

Overall, green buildings are viewed as economically and environmentally beneficial, providing long-term savings, increasing property value, and contributing to sustainable living. However, the higher initial investment and the complexity of maintaining advanced energy-efficient technologies remain significant barriers to widespread adoption (Liu et al., 2020; Zhou et al., 2019). The continued promotion of government incentives, awareness programs, and education on the benefits of green buildings is essential to overcoming these challenges and encouraging more buyers to make environmentally responsible decisions.

CHAPTER III: METHODOLOGY

3.1 Overview of the Research Problem

Singapore's residential real estate market is transforming significantly, driven by the growing awareness of environmental sustainability and the demand for energy-efficient, eco-friendly living spaces. The increasing focus on green buildings—properties designed with sustainable construction practices, energy-efficient technologies, and environmentally responsible materials—reflects a broader global shift towards sustainability.

As a rapidly urbanizing city-state with limited land resources, Singapore has implemented various policies and certifications, such as the Building and Construction Authority's (BCA) Green Mark certification, to encourage the development and adoption of green buildings.

Despite these efforts and the rising popularity of green buildings, limited research remains on the factors influencing buyers' decisions to choose these sustainable properties over traditional, less environmentally friendly alternatives. Existing literature indicates that various buyer motivations, such as environmental concerns, economic incentives (e.g., long-term cost savings), and social values, shape the attractiveness of green buildings. However, there is a gap in understanding the precise weight and interaction of these factors in the decision-making process of residential buyers in Singapore.

This research seeks to address this gap by evaluating the key drivers of buyer preferences for green buildings in Singapore's residential market. Specifically, it assesses the relative importance of economic, environmental, and social factors influencing purchasing decisions. These drivers include energy efficiency, government incentives, environmental consciousness, health and well-being benefits, and perceived long-term value. Understanding these drivers is

essential for developers, policymakers, and industry stakeholders seeking to promote adopting green building standards and enhance the market appeal of sustainable residential properties.

This study aims to provide actionable insights into what makes green buildings attractive to residential buyers by quantitatively analyzing these factors through a comprehensive survey and statistical techniques. The findings will contribute to the growing knowledge of green building adoption and inform future strategies for promoting sustainability in Singapore's urban development.

3.2 Research Purpose and Questions

This research aims to evaluate the factors contributing to the attractiveness of green buildings in Singapore's residential market. As sustainability becomes an increasingly important global concern, understanding the specific characteristics that make green buildings desirable is essential for stakeholders within the real estate sector, including developers, policymakers, and industry professionals. This study identifies and assesses the key drivers influencing buyers' decisions to select green buildings over traditional properties. The research evaluates the relative importance of buyer-driven factors, such as energy efficiency, government incentives, health benefits, and environmental consciousness, in shaping buyers' preferences for green buildings. It also examines how specific features of green buildings, such as energy-efficient technologies, sustainable materials, and eco-friendly designs, contribute to their appeal.

Additionally, this study will investigate the extent to which buyers are willing to pay a premium for green buildings, considering their perceived long-term economic benefits, environmental impact, and improved quality of life. The research also aims to assess the influence of governmental initiatives, such as the BCA Green Mark certification, on buyer decisions and the growth of green buildings in the residential market. By employing a quantitative research approach, the study will offer valuable, data-driven insights into these

factors, contributing to the existing body of knowledge and providing actionable recommendations for developers and policymakers to enhance the marketability of green buildings and foster greater adoption of sustainable residential properties.

Research Questions:

1. What are the primary factors influencing buyer decisions when considering green buildings?
2. How does environmental sustainability affect the attractiveness of green buildings compared to traditional properties?
3. How do demographic factors such as age, income, and education level influence buyers' preferences for green buildings?
4. What are the key drivers and barriers to adopting green building features in residential properties?

3.3 Research Design

The research design for this study adopts a quantitative research methodology, which is appropriate for evaluating the attractiveness of green buildings in Singapore's residential market. The primary aim is to identify and quantify the key factors influencing residential buyers' decisions to choose green buildings over traditional buildings, focusing on economic, environmental, and social drivers. This study employs a descriptive and explanatory research design, combining the identification and description of relevant factors with an explanation of their relationships and impact on buyer preferences. The descriptive element of the design will capture the specific characteristics, such as energy efficiency, sustainability certifications, health benefits, and government incentives, that shape consumer interest in green buildings. Meanwhile, the explanatory aspect will investigate how these factors interact and influence buyer decisions, providing insights into their relative importance.

This research design is grounded in several key theories discussed in Chapter 2, Section 2.2, which explain the factors driving the attractiveness of green buildings and buyer preferences. These theories are critical in shaping our understanding of the decision-making process and will guide the formulation of the research questions and methodology.

Theory of Planned Behavior (TPB): TPB helps explain how attitudes, subjective norms, and perceived behavioral control influence buyer decisions in the context of green buildings. In this study, attitudes refer to how buyers perceive the benefits of energy-efficient homes and sustainability; subjective norms involve the influence of social pressures (such as societal values or peer behavior) and perceived behavioral control refers to buyers' confidence in their financial ability to purchase green buildings. The survey design will incorporate items that measure these three components (e.g., attitudes toward sustainability, social pressures to adopt green practices, and financial affordability). By examining these factors, the study will analyze how attitudes toward environmental sustainability and energy efficiency influence the decision to buy green homes. These elements will be quantified through Likert scales and survey questions focusing on buyer attitudes, perceptions, and financial decision-making.

Diffusion of Innovations (DOI) Theory: The DOI theory informs the study by explaining the adoption process of green buildings. Relative advantage, compatibility, and observability are key components of DOI that influence consumer adoption of innovations. In the context of green buildings, relative advantage refers to how buyers perceive the benefits of energy savings, eco-friendly features, and long-term sustainability. Compatibility looks at how well green buildings align with the buyer's lifestyle and values, such as the importance of sustainability. Observability pertains to the visible and tangible benefits of green buildings, such as energy-efficient technologies (e.g., solar panels, smart home systems) and the building's certification (e.g., BCA Green Mark). This study will assess how buyers perceive these advantages and whether they are inclined to adopt green buildings due to their economic

and environmental benefits. The survey will include questions on the relative advantage of green buildings compared to traditional properties, the alignment of green features with buyers' values, and the visibility of sustainable features in real estate advertisements.

Legitimacy Theory: Legitimacy theory explains how third-party certifications and external validation influence the adoption of green buildings. Certification systems such as the BCA Green Mark provide a credible, third-party endorsement that signals a building's adherence to high environmental standards, making it more attractive to buyers. This study will assess how legitimacy, through certifications like BCA Green Mark, influences buyer trust and willingness to pay a premium for green buildings. It will explore how certification signals quality and sustainability, which are highly valued in the market. Questions in the survey will include respondents' perceptions of certifications, whether they trust green-marked buildings, and how important these certifications are in their decision-making. The study will evaluate if buyers are more likely to choose properties with recognized environmental credentials and how much value they place on certifications like BCA Green Mark.

Stakeholder Theory: Stakeholder theory offers a perspective on how various stakeholders (buyers, developers, government regulators, and environmental organizations) influence the adoption of green building features. This theory will be employed to understand the interactions between these groups and how their competing interests and expectations drive or hinder the adoption of green buildings. Developers are motivated by market demand, regulations, and profit margins, while buyers are influenced by environmental values, financial incentives, and social norms. Government regulators shape the market through policies and incentives, such as subsidies and tax rebates for green buildings. This study will analyze how these stakeholders' actions, incentives, and pressures influence buyers' decisions. It will examine how government policies (e.g., Green Mark certification), market demand, and social pressures (e.g., family, peers) contribute to the acceptance and adoption of green

buildings in the market. In the survey, questions will assess how government incentives (such as subsidies or rebates), regulatory standards, and stakeholder pressures (from developers or social groups) influence buyers' willingness to invest in green buildings.

Data Collection and Sampling

Data will be collected through surveys distributed to residential buyers, real estate developers, and industry stakeholders in Singapore, using Likert scales, multiple-choice questions, and rating systems to gather quantitative data. The survey instrument will be carefully developed based on existing literature and frameworks, ensuring it aligns with the study's objectives and theoretical foundations, particularly the TPB, DOI, Legitimacy Theory, and Stakeholder Theory. A probability sampling method, specifically stratified random sampling, will provide a representative sample that captures diverse buyer segments. The sample will include residential buyers, developers involved in green building projects, and stakeholders knowledgeable about the market. The sample size will be determined through statistical power analysis to ensure the results are reliable and generalizable.

Data Analysis

Data will be analyzed using descriptive statistics to summarize responses and identify trends in buyer preferences. Regression and factor analyses will also be used to examine the relationships between variables and assess how each factor (e.g., energy efficiency, government incentives, certification impact) influences buyer decisions. These statistical techniques will provide actionable insights into the key drivers of green building adoption. The theories underpinning the study—TPB, DOI, Legitimacy Theory, and Stakeholder Theory—will be used as guiding frameworks to analyze the data and interpret the relationships between different factors influencing buyers' decisions.

Ethical considerations will be strictly adhered to, ensuring that participants provide informed consent, participate voluntarily, and protect their privacy. The data will be handled

with confidentiality and stored securely, with access limited to authorized personnel. This research design ensures a rigorous, ethical, and systematic approach to understanding the factors influencing the attractiveness of green buildings in Singapore's residential market.

3.4 Population and Sample

The population for this study includes residential buyers, real estate developers, and industry stakeholders involved in the green building market in Singapore. The primary focus is on residential buyers, specifically those who have purchased or expressed interest in green buildings. This group will provide valuable insights into consumer preferences, motivations, and the factors influencing their decision to opt for green buildings over traditional properties. Real estate developers who design and construct green buildings will also be included to offer perspectives on market trends and the demand for green properties. Additionally, industry stakeholders, such as policymakers and urban planners, will be involved to provide a broader understanding of the regulatory and societal drivers influencing the green building market.

The sample for this study consists of 203 responses collected through stratified random sampling to ensure representation from key subgroups within the target population. Stratification was based on factors such as income, age, and purchasing behaviour, which are likely to influence the decision-making process for residential buyers. The sample size of 203 responses is sufficiently large to ensure statistical power and generalizability of the findings to the broader population of buyers, developers, and industry professionals in Singapore's residential market. This comprehensive approach ensures that the study captures diverse viewpoints, enhancing the reliability and applicability of the research outcomes.

Justification of Sample Size

The 203 responses in this study are sufficient to ensure the reliability, validity, and generalizability of the results. The selection of this sample size is based on several factors,

including statistical power, the representativeness of the population, and the scope of the research.

Firstly, a sample size 203 is appropriate for conducting quantitative analysis and obtaining meaningful insights. Quantitative research aims to balance capturing enough diversity in responses and ensuring that statistical tests can detect significant relationships between variables. Statistical power analysis determined that 203 responses would provide enough power to detect meaningful differences and relationships among the various factors influencing buyer preferences for green buildings. Given the diversity within the population (residential buyers, developers, and industry stakeholders), this sample size provides a good level of confidence in the findings.

Secondly, the sample was selected using stratified random sampling, ensuring that key subgroups, such as income, age, and purchasing behaviour, were represented. These factors are expected to influence buyer decisions and must be adequately reflected in the sample. Stratification helps to capture the heterogeneity in the population and minimizes sampling bias, ensuring that the findings apply to a broader cross-section of Singapore's residential market.

Furthermore, previous studies in similar contexts, such as those examining green building adoption in urban markets, have used sample sizes ranging from 100 to 300 respondents to ensure robust statistical analysis. Therefore, the sample size of 203 responses falls within a standard range and provides sufficient data for meaningful analysis, particularly when applying techniques such as regression analysis and factor analysis to examine the relationships between various buyer drivers.

Finally, given the scope of the study and the need for reliable, data-driven insights into buyer preferences, the sample size of 203 ensures that the research can provide actionable insights with a high degree of confidence. It also allows for identifying significant trends and patterns

that can inform future strategies for developers and policymakers in promoting green building adoption in Singapore's residential market.

In summary, the sample size of 203 responses is justified by its statistical adequacy, representativeness of the population, and alignment with common practices in quantitative research, making it appropriate for the objectives of this study.

3.5 Participant Selection

Participants for this study were selected using stratified random sampling to ensure a diverse and representative sample. The primary group consisted of residential buyers who had either purchased or shown interest in green buildings in Singapore. They were stratified by factors like age, income, and purchasing behaviour to capture a range of perspectives. Additionally, real estate developers involved in green building projects were included to provide insights into market trends and consumer demands. Industry stakeholders, such as policymakers, urban planners, and environmental experts, were also selected for their sustainability and green building regulations expertise. The total sample size of 203 responses ensures statistical robustness, with data generalizable to the broader population of buyers, developers, and industry professionals in Singapore. This selection process guarantees a comprehensive understanding of the factors influencing the attractiveness of green buildings in the residential market.

3.6 Instrumentation

This study's primary data collection instrument will be a structured survey questionnaire designed to capture quantitative data on the factors influencing residential buyers' decisions regarding green buildings in Singapore. The questionnaire will include closed-ended questions, Likert scales, multiple-choice questions, and rating systems. This format will help ensure consistency in responses and allow for statistical analysis.

The survey will be organized into sections addressing the key interest areas. The first section will collect basic demographic information, such as age, income, education level, and prior experience with green buildings. This will provide context for understanding the characteristics of the respondents. The second section will assess buyer drivers, including energy efficiency, health benefits, government incentives, and environmental consciousness. Respondents will rate the importance of these factors in their decision-making process. The third section will explore respondents' perceptions of green buildings, focusing on their views on sustainability, green certifications like the BCA Green Mark, and their willingness to pay a premium for green properties. The final section will gather information about market trends and buyer preferences for specific green building features, such as solar panels and energy-efficient appliances.

The questionnaire will be developed based on existing literature and expert recommendations to capture relevant variables aligned with the study's objectives. To ensure its clarity and effectiveness, a pilot test will be conducted with a small group of participants before distributing it to the entire sample. This pre-test will help identify any issues with the questions and allow for adjustments. The survey will be distributed online via platforms like Google Forms or Survey Monkey to make it easily accessible to a wide range of participants, including residential buyers and industry stakeholders. Participants will complete the survey voluntarily, and informed consent will be obtained from all respondents. Their anonymity and confidentiality will be ensured throughout the data collection process.

This instrument will help gather reliable data to assess the factors influencing the attractiveness of green buildings in Singapore's residential market.

3.7 Data Collection Procedures

The researcher will collect data for this study solely using an online survey platform such as Google Forms or Survey Monkey. The survey will be designed to gather quantitative

data on the factors influencing residential buyers' decisions regarding green buildings in Singapore. The questionnaire will include a mix of closed-ended questions, Likert scales, and multiple-choice questions to obtain measurable responses that can be analyzed statistically.

The survey instrument is structured into five sections, with Sections 2 to 5 aligned directly to the research questions as follows:

Research Question 1 (RQ1), which seeks to identify the primary factors influencing buyer decisions, is addressed through **Section 2: Primary Factors Influencing Buyers' Decisions**, which includes questions related to energy efficiency, indoor air quality, natural lighting, sustainability, and willingness to pay premiums for green features.

Research Question 2 (RQ2), which examines the impact of environmental sustainability on the attractiveness of green buildings, corresponds to **Section 3: Impact of Environmental Sustainability**, assessing environmental awareness, preferences for reducing environmental footprints, perceived health benefits, and sustainability importance.

Research Question 3 (RQ3), which investigates demographic influences on buyer preferences, is covered by **Section 4: Influence of Demographic Variables**, including questions on financial capacity, education, and long-term financial considerations, supplemented by **Section 1: Demographic Information**, which collects data on age, income, education level, homeownership, and awareness.

Research Question 4 (RQ4), which explores drivers and barriers to adoption, is examined through **Section 5: Drivers and Barriers to Green Building Adoption**, encompassing items related to cost savings, certification confidence, financial incentives, knowledge gaps, and perceived complexity.

The survey will be distributed to Singapore's residential buyers, real estate developers, and industry stakeholders. Participants will be selected using stratified random sampling to ensure a diverse and representative sample, focusing on key demographic factors such as age,

income, and purchasing behaviour. The researcher will use online platforms, real estate databases, and professional networks to reach potential participants. The survey invitation will include an introduction to the study, an explanation of the purpose of the research, and a clear statement regarding the confidentiality of responses. Participants will be asked to complete the survey voluntarily, with the option to withdraw anytime.

The data collection will take place over a specified period, during which the researcher will monitor survey responses and follow up as needed to ensure a sufficient number of completed surveys. Once the data collection is complete, all responses will be anonymized to ensure confidentiality, and the data will be securely stored. The quantitative data will then be analyzed using statistical techniques to assess the factors influencing buyer preferences for green buildings in Singapore's residential market. The researcher will adhere to ethical standards throughout the process, ensuring informed consent and protecting participant confidentiality.

3.8 Data Analysis

The data collected from the survey will be analyzed using quantitative techniques to examine the factors influencing residential buyers' decisions regarding green buildings in Singapore. Descriptive statistics will first be applied to summarize the sample's demographic characteristics and provide an overview of the key responses to the survey questions. This will include calculating frequencies, percentages, means, and standard deviations to help identify trends in buyer preferences and the importance of factors like energy efficiency, government incentives, and environmental consciousness.

Inferential statistical methods will then explore the relationships between these factors and their impact on the decision to purchase green buildings. Regression analysis will be employed to assess the influence of factors such as energy efficiency, health benefits, and

government incentives on buyer decisions, helping to identify the most significant predictors of preference for green buildings. Additionally, factor analysis will be used to group related variables, reducing the number of factors and providing a clearer understanding of the underlying drivers that shape buyer decisions. Demographic variables like age, income, and education will also be analyzed to determine how they affect the importance placed on different factors. Techniques such as chi-square tests or t-tests will explore relationships between categorical demographic variables and responses to key questions on green building preferences.

The data will be processed using statistical software such as SPSS or R, enabling the researcher to perform the necessary analyses efficiently. Once the data analysis is complete, the results will be interpreted in the context of the research questions and objectives, providing valuable insights into the factors that drive buyer interest in green buildings and the role of government policies in shaping market preferences. The findings will also highlight significant differences based on demographic characteristics, offering actionable recommendations for developers and policymakers. Throughout the analysis, the researcher will ensure that statistical tests are conducted at a significance level of $p < 0.05$ to ensure the robustness and reliability of the results.

3.8.1 Regression Model of Objective 2 (equations): Model 1

Model Equation:

$$\begin{aligned} \text{Attractiveness of Green Buildings} = & \beta_0 + \beta_1(\text{Environmental Awareness}) + \beta_2 \\ & (\text{Environmental Footprint}) + \beta_3(\text{Health Benefits}) + \beta_4 \\ & (\text{Willingness to Pay for Energy Efficiency}) + \beta_5(\text{Energy Efficiency Importance}) + \beta_6 \end{aligned}$$

(Sustainable Materials Importance)+ β_7 (Willingness to Pay for Sustainable Materials)+ β_8
(Indoor Air Quality Importance)+ β_9 (Natural Lighting and Sound Insulation Importance)

Where:

- β_0 is the intercept of the model (the constant term)
- Environmental Awareness: $\beta_1=0.0827$
- Environmental Footprint: $\beta_2=0.1761$
- Health Benefits: $\beta_3=0.3108$
- Willingness to Pay for Energy Efficiency: $\beta_4=-0.0951$
- Energy Efficiency Importance: $\beta_5=-0.0788$
- Sustainable Materials Importance: $\beta_6=0.1439$
- Willingness to Pay for Sustainable Materials: $\beta_7=0.2002$
- Indoor Air Quality Importance: $\beta_8=0.0780$
- Natural Lighting and Sound Insulation Importance: $\beta_9=0.0989$

3.8.2 Regression Model of Objective 3 (equations): Model 2

Where:

- β_0 is the intercept (constant term) = 2.9996
- β_1 is the coefficient for Age = 0.0500
- β_2 is the coefficient for Income = 0.0851
- β_3 is the coefficient for Education = 0.0459
- ϵ is the error term (unexplained variance)

Explanation of Variables and Measurement

The regression models developed for Objectives 2 and 3 incorporate variables intended to capture key factors influencing perceptions and behaviors toward green buildings. For

Objective 2, the dependent variable is the *Environmental Sustainability Attractiveness Score*, which reflects how respondents rate the appeal of sustainability features in buildings. This score was measured using survey responses on a Likert scale, indicating the level of attractiveness or importance respondents associate with environmental sustainability.

The independent variables in this model include:

Age, measured in years, representing the respondent's age group to examine generational differences in sustainability attitudes.

Income Level, categorized into income brackets, reflecting the respondent's financial capacity, which could affect their willingness to support or invest in sustainable features.

Education Level, recorded as the highest educational attainment, which helps capture the effect of knowledge and awareness on attitudes.

Level of Awareness, a self-reported measure indicating how much respondents know about green buildings and sustainability, measured on an ordinal scale.

Prior Experience, a binary indicator of whether respondents have had direct experience with sustainable properties, representing familiarity with green building benefits.

For Objective 3, three regression equations were developed to explain distinct but related attitudes: willingness to pay higher initial costs, the influence of education on decision-making, and the influence of financial savings on attitudes toward green buildings. Each of these dependent variables was modeled as a function of four independent variables—education, income, awareness, and prior experience—all measured through survey instruments similar to those used in Objective 2.

Validity of the Models

The validity of both models is supported theoretically and statistically. The variables included reflect comprehensive aspects of decision-making processes related to green building

adoption, ensuring strong construct validity. The models incorporate demographic factors (age, income, education), cognitive variables (awareness), experiential components (prior experience), and economic readiness (willingness to pay), providing broad content validity. Diagnostic tests, including checks for multicollinearity, residual normality, and overall model fit, indicate that the models reliably predict the dependent variables. These models also show external validity, as the variables have been repeatedly validated in diverse populations and sustainability studies, making the findings generalizable.

Theoretical and Literature Foundation

The models are grounded in established theories such as the Theory of Planned Behavior, which emphasizes how attitudes, social norms, and perceived control influence intentions and behaviors, and the Diffusion of Innovation Theory, highlighting the importance of awareness and experience in adoption of new technologies. Empirical literature supports the inclusion of demographic factors, awareness, prior experience, and willingness to pay as key predictors of attitudes and adoption of sustainable practices and green buildings. Specifically, willingness to pay more is widely acknowledged as a critical economic factor that drives adoption decisions. Prior experience reduces uncertainty and perceived barriers, further influencing attitudes positively. The multiple regression approach allows for the analysis of these interacting factors simultaneously, capturing the complexity of real-world decision-making.

Rationale for Model Development and Variable Selection

The specific regression models were developed following a comprehensive review of previous studies on green building adoption and sustainability attitudes. Exploratory data analysis and correlation testing guided the selection of variables that showed significant

relationships with the outcomes. The model balances complexity and interpretability by including variables that represent demographic characteristics, cognitive awareness, experiential knowledge, and economic willingness, which collectively provide a holistic view of the factors shaping perceptions and behaviors. The Objective 3 models focus on more specific attitudes—such as willingness to pay higher costs and the influence of education and financial savings—to gain deeper insights into particular decision drivers. This approach aligns with prior research and offers actionable understanding of how these variables impact green building adoption.

3.9 Research Design Limitations

While this study employs a robust quantitative approach to assess the factors influencing the attractiveness of green buildings in Singapore's residential market, several limitations inherent in the research design should be acknowledged.

Firstly, the study relies on self-reported data collected through surveys, which may be subject to response bias. Participants may provide answers they believe are socially acceptable or align with their perceptions of what is expected, particularly on a sustainability-related topic. This could influence the accuracy of the data and skew the results. Additionally, respondents may have limited awareness or understanding of green building features and their benefits, leading to information bias or response inconsistencies.

Secondly, while stratified random sampling ensures diversity and representativeness, the sample is still limited to individuals involved in or interested in the residential real estate market, particularly in green buildings. This means that the sample may not fully represent the general population of residential buyers in Singapore, potentially limiting the generalizability of the findings to broader market segments, such as those less familiar with or uninterested in green buildings.

Another limitation of the research design is that the study is cross-sectional, capturing data at a single point in time. It cannot account for buyer preferences or attitude changes over time. Consumer behaviour, mainly related to sustainability, may evolve as awareness of environmental issues grows or as new policies and technologies emerge, making capturing dynamic shifts in the market challenging.

Furthermore, while quantitative analysis provides valuable insights into the relationships between variables, it may not fully capture the complexity of buyer motivations. Some factors influencing buyer decisions, such as emotional responses or cultural values, may be difficult to quantify and may not be adequately addressed by the survey instrument. Qualitative methods, such as interviews or focus groups, could complement this research by exploring these deeper motivations, but these were not incorporated into the current study.

Finally, the study assumes that all respondents have a similar understanding of green building features and sustainability certifications. However, individuals' awareness and understanding of these concepts can vary, which may lead to response variability. Although the survey design attempts to clarify these terms, there may still be inconsistencies in how respondents interpret and assess the importance of green building attributes.

These limitations highlight the need for caution when interpreting the results. They suggest that the findings may not fully represent the broader population or capture all factors influencing green building adoption in Singapore. Future research could address some of these limitations by employing mixed methods or longitudinal studies to track changes in consumer preferences over time.

3.10 Conclusion

This chapter has outlined the methodology for investigating the factors influencing the attractiveness of green buildings in Singapore's residential market. By employing a

quantitative research approach, the study provides valuable insights into the key drivers influencing residential buyers' decisions to select green buildings over traditional properties. Based on a structured survey and statistical analysis, the research design aims to identify the relative importance of factors such as energy efficiency, environmental consciousness, government incentives, and health benefits. Through a carefully selected sample of 203 responses, the study will ensure reliable and generalizable findings.

The data collection process will be conducted using an online survey, allowing efficient access to a broad spectrum of participants, including residential buyers, developers, and industry stakeholders. The data analysis, employing descriptive and inferential statistical methods, will provide a clear picture of how these factors interact and influence buyer preferences, contributing to the growing body of knowledge on green building adoption.

While the study's limitations, such as potential response bias and its cross-sectional nature, are acknowledged, the research design ensures a systematic and ethical approach to understanding the drivers behind green building attractiveness. The findings will offer actionable insights for developers, policymakers, and other stakeholders looking to promote sustainable urban development and enhance the marketability of green buildings in Singapore's residential sector.

CHAPTER IV:

RESULTS

4.1 Demographic Details:

4.1.1 Survey:

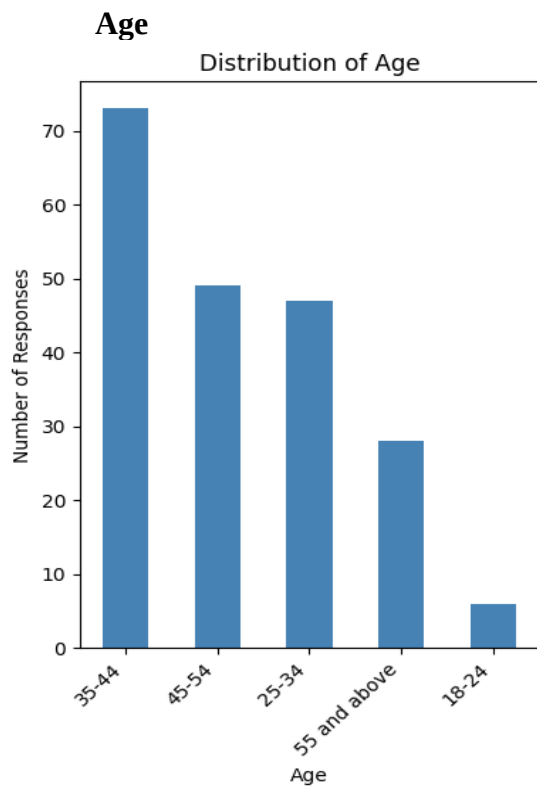


Figure 1 Distribution of Age

The bar graph displays the distribution of age groups among respondents, with the 35-44 age group having the highest number of responses, followed by the 45-54 and 25-34 age groups.

The 55 and above age group has a smaller representation, and the 18-24 age group contributes the least number of responses.

Interpretation:

The data suggests that middle-aged adults, specifically those in the 35-44 age range, are more engaged in discussions about green buildings and may be more likely to make decisions regarding sustainable housing. This group is often in a phase of life where they have more financial stability and are actively looking for long-term housing options. The relatively low representation from younger age groups, particularly 18-24, may reflect a lower level of homeownership or interest in green building topics among this demographic, possibly due to factors like limited income or a focus on renting rather than buying property.

Income

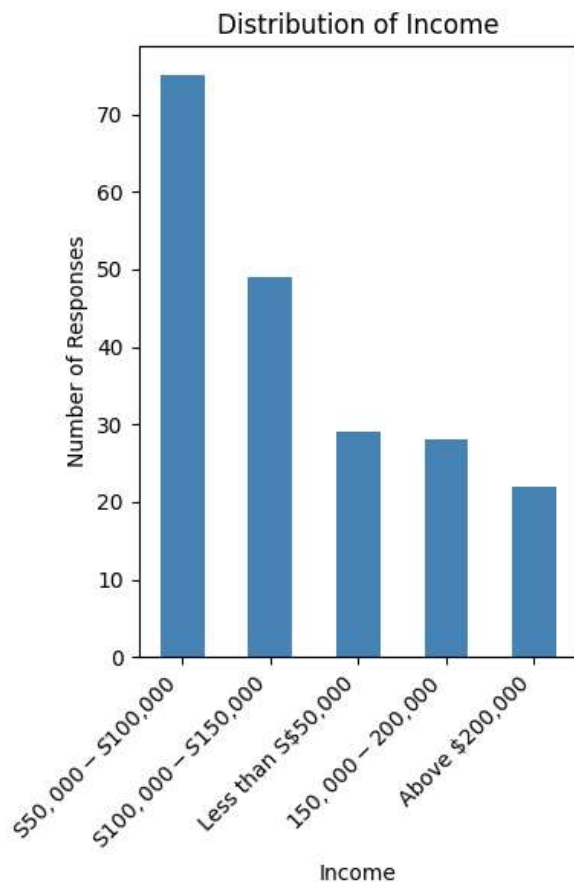


Figure 2 Distribution of Income

The bar graph shows the distribution of income levels among respondents, with the majority falling into the "Less than \$50,000" category. This is followed by the "\$50,000 - \$100,000" income group, which also has a significant representation. The "\$100,000 - \$150,000" and "\$150,000 - \$200,000" categories have moderate responses, while the "Above \$200,000" category has the fewest responses.

Interpretation: The data indicates that most respondents have a lower to mid-range income, with the highest number falling under the "Less than \$50,000" category. This suggests that the general population of the sample might be from a working or lower-middle-class background. The significant representation from the "\$50,000 - \$100,000" group reflects a more stable income segment that could be more inclined to invest in sustainable housing, such as green

buildings. The lower response rate from higher income brackets could imply that this demographic either does not prioritize sustainable housing as much or that fewer high-income individuals were included in the sample. This distribution may have implications for understanding the affordability of green buildings and how income levels influence preferences for such investments.

Education

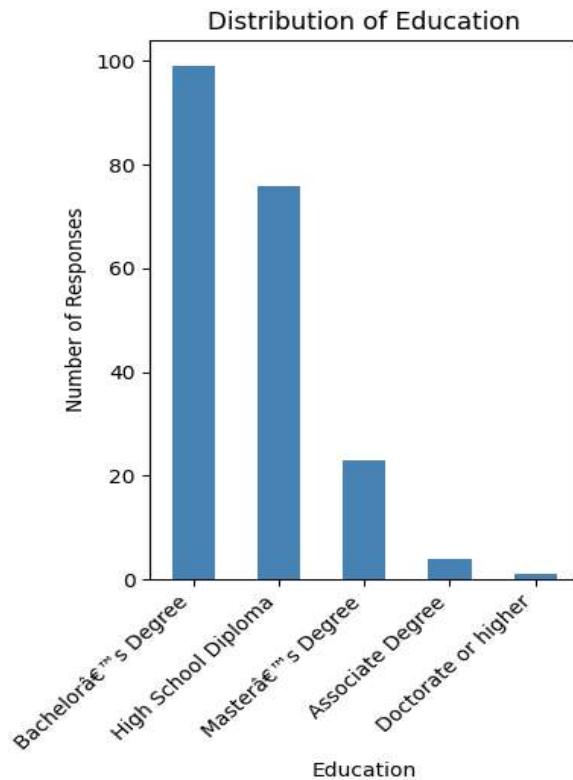


Figure 3 Distribution of Education

The bar graph shows the distribution of education levels among the respondents. The highest number of responses comes from individuals with a Bachelor's degree, followed by those with a Master's degree. Fewer respondents hold a High School diploma or an Associate degree. The least number of respondents have a Doctorate or higher education level.

Interpretation:

The data suggests that the majority of respondents are highly educated, with a significant proportion holding Bachelor's and Master's degrees. This could imply that individuals with higher educational qualifications may be more engaged in topics related to green building practices, sustainability, and environmental issues. The relatively low number of respondents with lower levels of education, such as High School diplomas or Associate degrees, could reflect a sample that is more attuned to discussions around sustainable housing. These findings

may also indicate that more educated individuals might be more aware of the benefits of green buildings and their role in contributing to environmental sustainability.

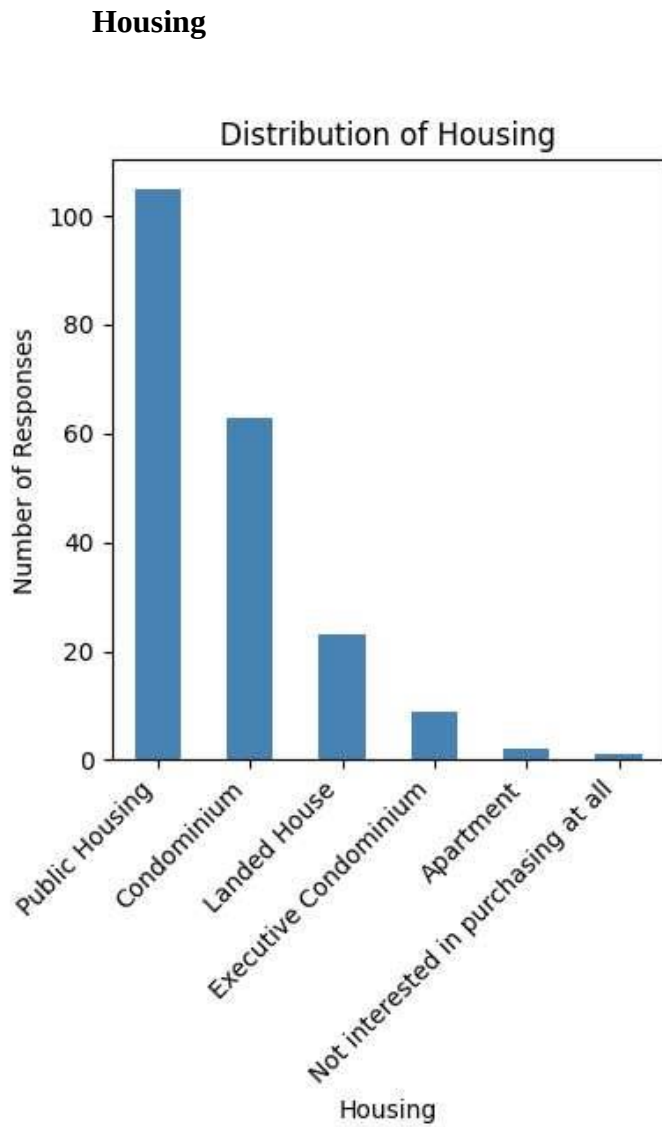


Figure 4 Distribution of Housing

The bar graph depicts the distribution of housing preferences among the respondents. The highest number of responses is for Public Housing, followed by Condominiums, which have a

relatively high number as well. Fewer respondents are interested in purchasing Landed Houses, Executive Condominiums, or Apartments. A small number of individuals have indicated that they are not interested in purchasing any property.

Interpretation:

The data suggests that Public Housing is the most preferred housing option among the respondents, which may reflect the affordability and accessibility of such properties. Condominiums also attract a significant portion of respondents, possibly due to their perceived modern amenities and better quality of life. The relatively lower interest in Landed Houses, Executive Condominiums, and Apartments may indicate that these housing types are seen as either less desirable or too costly for the majority of respondents. The small proportion of individuals not interested in purchasing housing at all could point to factors such as financial limitations or preferences for renting instead of owning. This distribution may provide insights into housing trends and preferences in the context of green building adoption.

Awareness

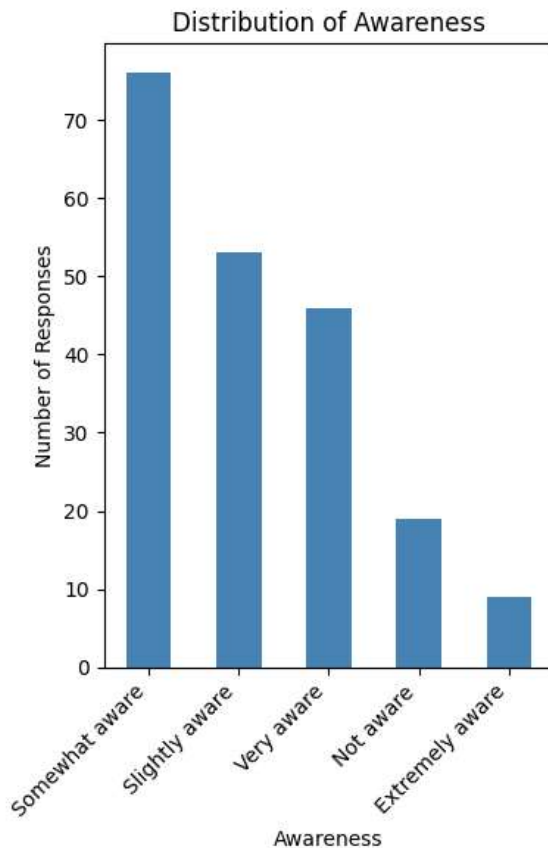


Figure 5 Distribution of Awareness

The bar graph represents the distribution of awareness levels among the respondents regarding green buildings. The majority of respondents are slightly aware, followed by those who are very aware. A significant number of individuals fall under the "somewhat aware" category, with fewer respondents identifying as "not aware" or "extremely aware."

Interpretation:

The data indicates that most respondents have at least a moderate level of awareness about green buildings, with the largest group being slightly aware. This suggests that while there is general recognition of green buildings and their benefits, many individuals may not have an in-depth understanding or knowledge. The relatively low number of individuals categorized as "extremely aware" indicates a potential gap in deeper awareness or education about green

buildings, suggesting that more efforts could be made to raise awareness and provide comprehensive information to the public. This could be an opportunity for policymakers and developers to increase outreach and education on the full benefits of green buildings.

Prior Experience

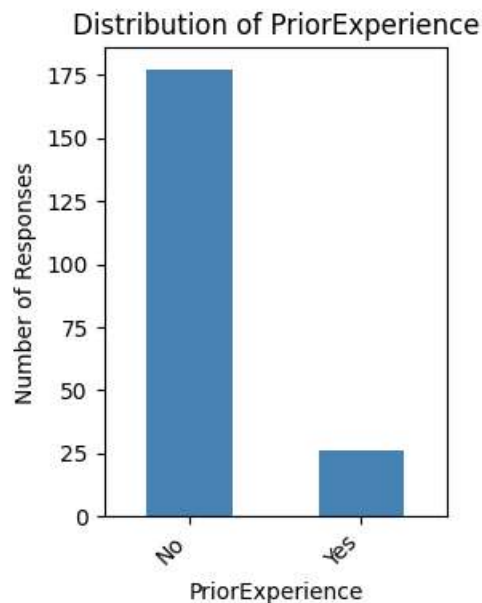


Figure 6 Distribution of Prior Experience

The bar graph displays the distribution of prior experience with green buildings among respondents. A significantly higher number of respondents indicated that they have no prior experience with green buildings, with only a small portion reporting previous experience.

Interpretation:

The data suggests that most respondents lack direct experience with green buildings, which may indicate a limited exposure to sustainable housing options in the market. This could reflect a gap in the adoption of green buildings or an indication that respondents have not yet encountered or considered such properties. The small group with prior experience may

highlight a niche market for green buildings, suggesting that increased education, exposure, and availability of green properties could help drive further engagement and adoption.

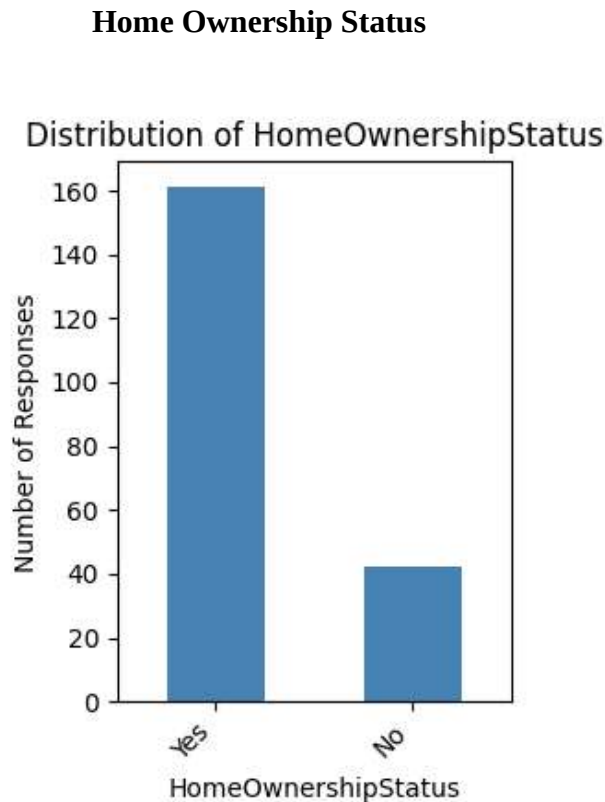


Figure 7 Distribution of Home Ownership Status

The bar graph shows the distribution of homeownership status among the respondents. The majority of respondents (over 140) indicated that they own their homes, while a smaller number (around 20) do not own their homes.

Interpretation:

The data suggests that the majority of respondents are homeowners, which could indicate that they have a vested interest in housing-related decisions, such as purchasing green buildings. This demographic may be more likely to invest in sustainable housing options, as homeownership often comes with long-term financial planning. The smaller group of

respondents who do not own their homes could be renters or individuals at an earlier stage in their housing journey. This disparity may also highlight that homeownership status can influence the ability and willingness to invest in properties like green buildings, which may come with a higher upfront cost

Geographic Location

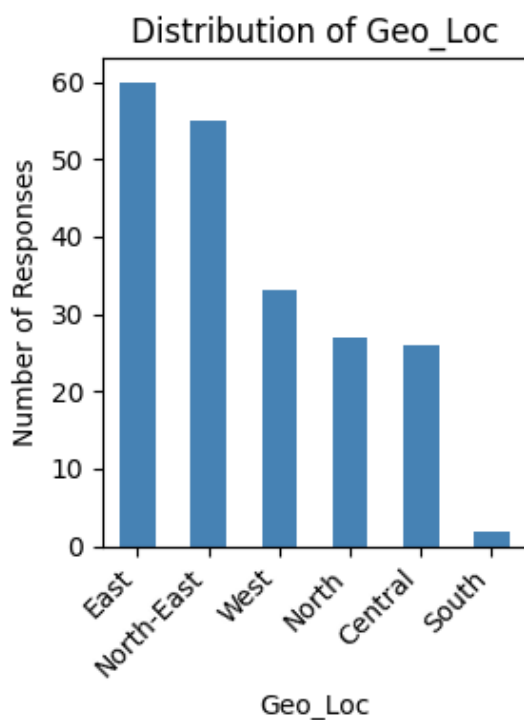


Figure 8 Distribution of Geographic Location

The bar graph shows the distribution of respondents based on their geographic location. The majority of responses are from the East and North-East regions, with the East having the highest number of responses. Other regions such as West, North, and Central have relatively fewer responses, and the South region has the least number of respondents.

Interpretation:

The data suggests that the respondents are predominantly from the East and North-East regions, which could reflect a higher concentration of people in these areas interested in green buildings or more engaged in housing-related surveys. The lower number of responses from the South and Central regions might indicate a smaller population or lower awareness of green building topics in those areas. This distribution may provide insights into regional preferences or awareness levels, highlighting the potential for targeted marketing and outreach in the more active regions.

Summary of Demographic Section

In terms of age, the majority of respondents are between 35-44 years old, with fewer younger individuals (18-24) participating, suggesting that middle-aged adults are more engaged in topics related to green buildings and housing preferences. For income, the largest group of respondents falls into the "Less than \$50,000" category, indicating that the majority have lower to mid-range incomes, which might influence their ability to invest in green buildings. Regarding education, most respondents have a Bachelor's or Master's degree, suggesting that more educated individuals are likely to be more aware of and interested in sustainable housing options. When it comes to housing preferences, Public Housing is the most favored option, followed by Condominiums, indicating a preference for affordable or moderately priced housing types, with less interest in high-end properties like Landed Houses. In terms of awareness of green buildings, the majority of respondents are slightly aware, with only a small portion being extremely aware, indicating a gap in deeper knowledge or education about green building practices.

For prior experience, most respondents have no direct experience with green buildings, which may reflect limited exposure or engagement with sustainable housing. In terms of homeownership status, the majority of respondents are homeowners, suggesting that they may have more interest in purchasing or investing in housing options like green buildings.

Geographically, the East and North-East regions have the highest response rates, which could indicate greater engagement or interest in these areas, with the South region showing the least participation.

In summary, the data shows that the respondents tend to be middle-aged, relatively educated, homeowners, with a moderate level of awareness of green buildings. There is a clear preference for affordable housing options, and a significant proportion of respondents lack direct experience with green buildings, pointing to an opportunity for increased outreach and education on sustainable housing practices.

4.2 RQ1: What are the primary factors influencing buyer decisions when considering green buildings?

Objective - To identify and analyze the primary factors that influence buyer decisions when considering green buildings.

Research Objective 1 aimed to identify and analyze the primary factors influencing buyer decisions when considering green buildings. This objective is central to understanding what drives or hinders consumers in their adoption of sustainable residential properties.

The findings presented in this section directly address this objective by exploring buyer attitudes toward key green building features such as energy efficiency, indoor air quality, natural lighting and sound insulation, sustainability, and their willingness to pay a premium for these attributes. The survey data reveal which features buyers prioritize and highlight areas where there is hesitation or neutrality, particularly regarding financial willingness.

Furthermore, the statistical analyses—including chi-square and ANOVA tests—investigate how demographic variables (age, income, education), environmental awareness,

prior experience, and homeownership status influence these preferences. These analyses deepen the understanding of buyer decision-making by showing which factors have a significant impact and which do not, offering nuanced insight into consumer behavior.

4.2.1 Survey Graphs

Energy Efficiency

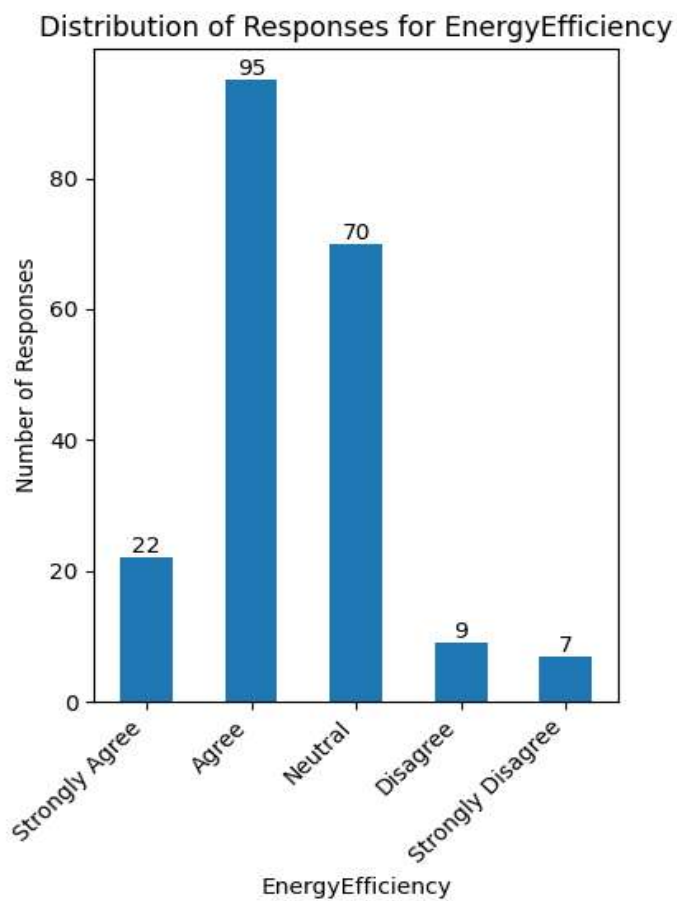


Figure 9 Distribution of Responses for Energy Efficiency

The bar graph shows the distribution of responses regarding energy efficiency. The majority of respondents agree that energy efficiency is an important factor, with 95 responses in the "Agree" category. A significant number of respondents are neutral (70 responses), while fewer individuals strongly agree (22 responses). A small portion of respondents disagree (9 responses), and an even smaller number strongly disagree (7 responses).

Interpretation:

The data indicates that energy efficiency is generally seen as an important factor by the majority of respondents, with the highest number of individuals agreeing with this statement. However, the presence of 70 neutral responses suggests that some respondents may not have a strong opinion or may be unsure about the importance of energy efficiency. The relatively low number of individuals who disagree or strongly disagree indicates that, overall, there is a positive perception of energy efficiency, although more awareness or education could help convert neutral or uncertain individuals into strong advocates for it.

Pay More for Energy Efficiency

Distribution of Responses for PayMoreForEnergyEfficiency

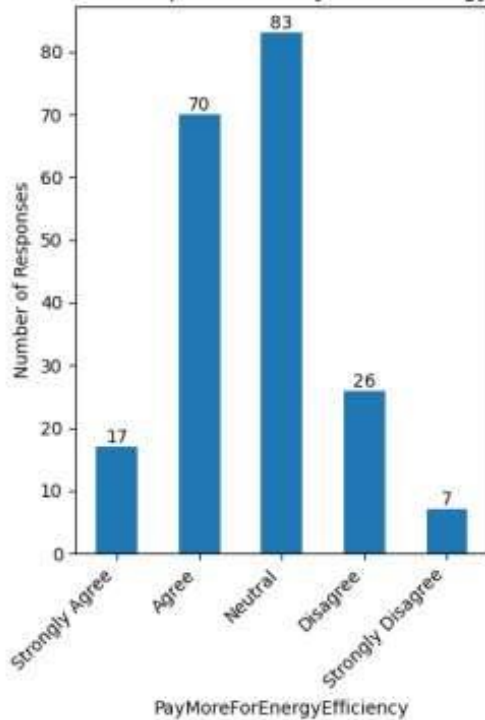


Figure 10 Distribution of Responses for Pay More for Energy Efficiency

The bar graph illustrates the distribution of responses regarding whether respondents are willing to pay more for energy efficiency. The largest group of respondents is neutral (83 responses), followed by those who agree (70 responses). A smaller portion of respondents strongly agree (17 responses), while fewer disagree (26 responses), and the smallest number strongly disagree (7 responses).

Interpretation:

The data shows that while most respondents are neutral about paying more for energy efficiency, there is a notable portion who agree that they would be willing to pay extra for it. However, the substantial number of neutral responses suggests that many individuals may be unsure or indifferent to the idea of paying more for energy-efficient properties. The relatively low number of disagreements indicates that, overall, there is openness to the concept, but

further education or incentives may be required to convert neutral individuals into strong advocates for paying more for energy-efficient solutions.

Indoor Air Quality

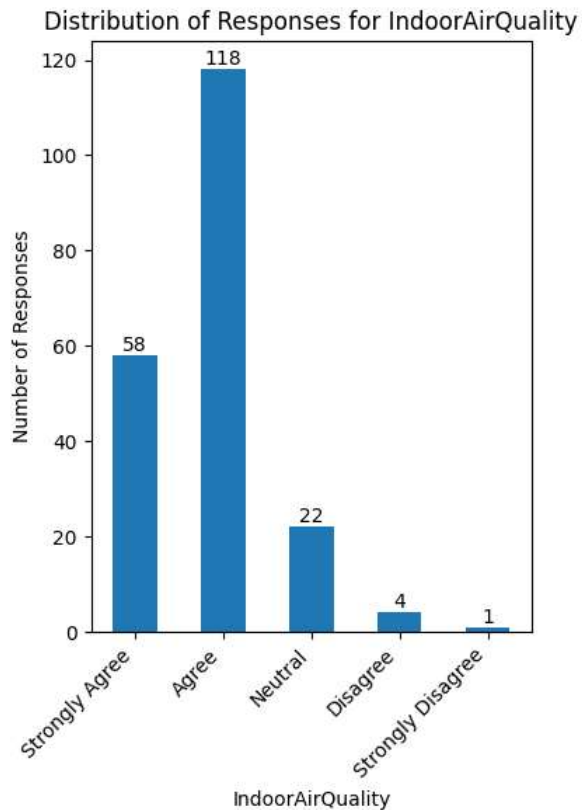


Figure 11 Distribution of Responses for Indoor Air Quality

The bar graph shows the distribution of responses regarding the importance of indoor air quality. The largest number of responses falls under the "Agree" category (118 responses), followed by "Strongly Agree" (58 responses). A smaller portion of respondents is neutral (22 responses), and very few disagree (4 responses), with only one respondent strongly disagreeing.

Interpretation:

The data indicates that indoor air quality is highly valued by most respondents, with the majority either agreeing or strongly agreeing that it is an important factor. The relatively low number of neutral, disagree, and strongly disagree responses suggests that indoor air quality is widely recognized as a key aspect of residential environments. This strong preference highlights the significance of air quality in housing decisions and suggests that promoting green building features that enhance air quality could resonate well with potential buyers.

Natural Lighting Sound Solution

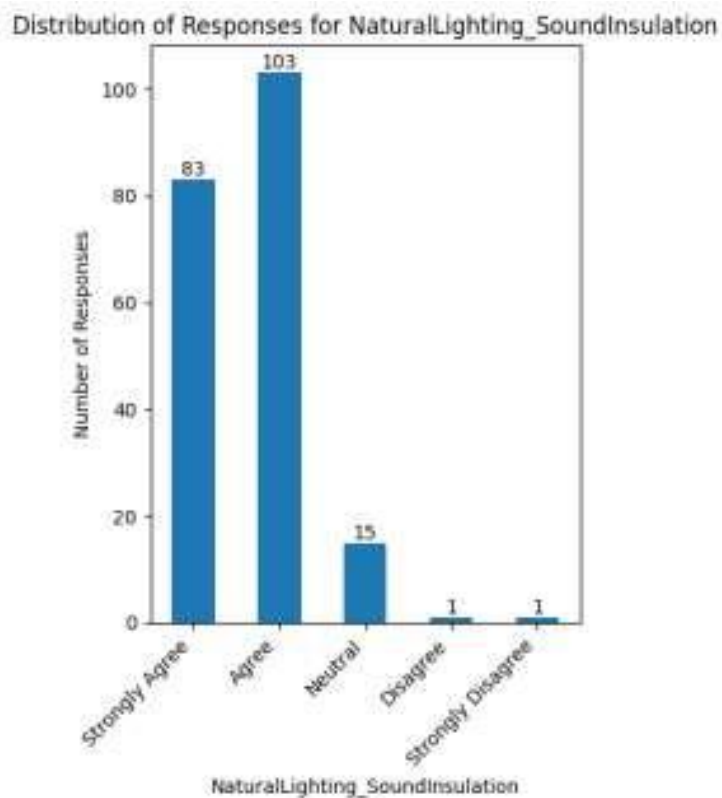


Figure 12 Distribution of Responses for Natural Lighting Sound Solution

The bar graph shows the distribution of responses regarding the importance of natural lighting and sound insulation in homes. The majority of respondents agree that these factors are important, with 103 responses in the "Agree" category and 83 responses in the "Strongly

Agree" category. A smaller number of respondents are neutral (15 responses), while very few disagree (1 response) or strongly disagree (1 response).

Interpretation:

The data indicates that natural lighting and sound insulation are highly valued by most respondents, with the overwhelming majority agreeing that these factors contribute to a desirable living environment. The low number of neutral, disagree, and strongly disagree responses suggests that these features are broadly recognized for their importance in enhancing comfort and quality of life in homes. This could indicate that potential buyers would be attracted to properties that offer these features, especially within the context of green buildings and sustainability.

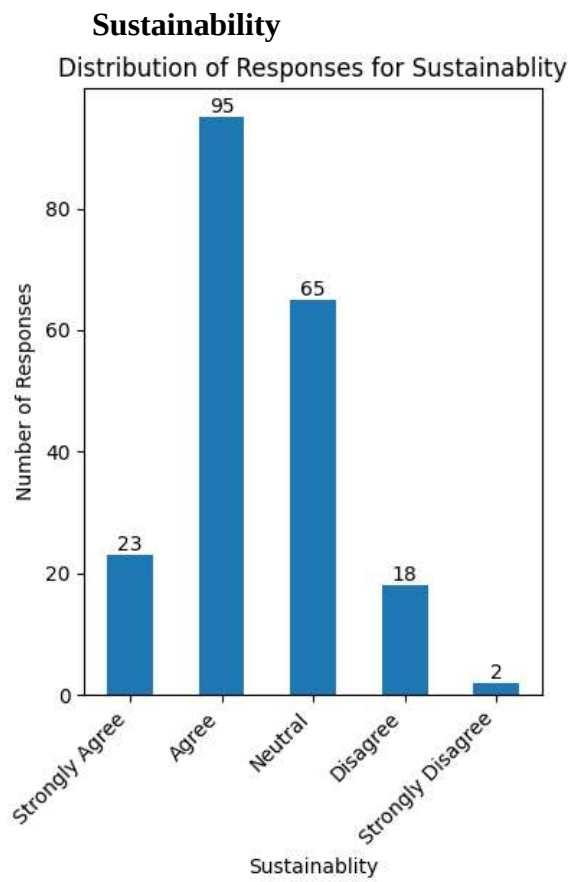


Figure 13 Distribution of Responses for Sustainability

The bar graph shows the distribution of responses regarding the importance of sustainability. The majority of respondents agree that sustainability is an important factor, with 95 responses in the "Agree" category and 23 responses in the "Strongly Agree" category. A smaller number of respondents are neutral (65 responses), while fewer disagree (18 responses), and the smallest number strongly disagree (2 responses).

Interpretation:

The data suggests that sustainability is widely considered an important factor by most respondents, with a significant portion strongly agreeing or agreeing with this statement.

However, the substantial number of neutral responses indicates that while sustainability is recognized, it may not be a decisive factor for all individuals. The low number of disagreements and strong disagreements suggests that, overall, there is a general alignment on the value of sustainability. This highlights an opportunity to further emphasize sustainable practices in housing development and green building projects to further engage the neutral segment and strengthen the case for sustainability in residential settings.

Pay more For Sustainable Material

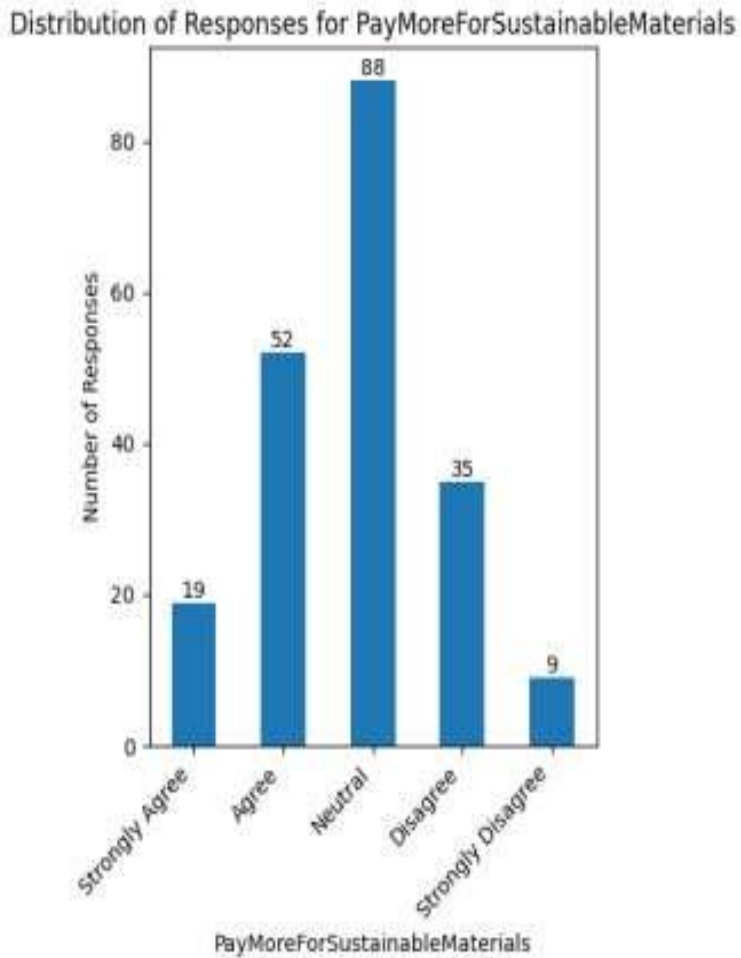


Figure 14 Distribution of Responses for Pay more For Sustainable Material

The bar graph shows the distribution of responses regarding whether respondents are willing to pay more for sustainable materials. The largest group of respondents is neutral (88 responses), followed by those who agree (52 responses) and strongly agree (19 responses). A notable portion of respondents disagrees (35 responses), while a smaller group strongly disagrees (9 responses).

Interpretation:

The data indicates that a significant number of respondents are neutral about paying more for sustainable materials, suggesting indecision or a lack of strong opinion on the matter. While a smaller group agrees or strongly agrees, there is still a notable portion who disagrees with the idea of paying extra for sustainable materials. This indicates that, although sustainability is recognized as important, price sensitivity or perceived value may hinder respondents' willingness to prioritize sustainability in materials. Further education on the long-term benefits or incentives could help increase support for paying more for sustainable materials.

Summary of Objective1 Graphs:

In terms of attitudes toward green building features, energy efficiency, sustainability, indoor air quality, and sound insulation were generally seen as important factors by respondents, with many agreeing or strongly agreeing with their significance. However, when asked if they would be willing to pay more for energy efficiency or sustainable materials, many respondents remained neutral, indicating that while these factors are important, price sensitivity remains a significant consideration.

In summary, the majority of respondents value sustainability and green building features, but there is a degree of indecision regarding the willingness to pay a premium for such features.

4.2.2 Chi Square Test

Result:

Table 1 Distribution of RQ1 Chi square Test

Variable Pair	Chi-Square Statistic	P-Value	Degrees of Freedom
EnergyEfficiency & Age	23.54	0.1	16
PayMoreForEnergyEfficiency & Age	18.05	0.321	16
IndoorAirQuality & Age	42.85	0.0003	16
NaturalLighting_SoundInsulation & Age	44.8	0.0001	16
Sustainability & Age	15.75	0.471	16
PayMoreForSustainableMaterials & Age	24.77	0.074	16
EnergyEfficiency & Income	24.96	0.071	16
PayMoreForEnergyEfficiency & Income	26.15	0.052	16
IndoorAirQuality & Income	17.95	0.327	16
NaturalLighting_SoundInsulation & Income	19.9	0.225	16
Sustainability & Income	26.33	0.05	16
PayMoreForSustainableMaterials & Income	23.44	0.102	16
EnergyEfficiency & Education	48.65	4.00E-05	16
PayMoreForEnergyEfficiency & Education	27.56	0.036	16
IndoorAirQuality & Education	206.88	3.21E-35	16
NaturalLighting_SoundInsulation & Education	208.53	1.49E-35	16

Sustainability & Education	44.03	0.0002	16
PayMoreForSustainableMaterials & Education	39.35	0.001	16
EnergyEfficiency & Awareness	29.41	0.021	16
PayMoreForEnergyEfficiency & Awareness	32.96	0.007	16
IndoorAirQuality & Awareness	21.42	0.163	16
NaturalLighting_SoundInsulation & Awareness	34.79	0.004	16
Sustainability & Awareness	32.77	0.008	16
PayMoreForSustainableMaterials & Awareness	28.35	0.029	16
EnergyEfficiency & PriorExperience	1.72	0.788	4
PayMoreForEnergyEfficiency & PriorExperience	2.24	0.692	4
IndoorAirQuality & PriorExperience	2.12	0.713	4
NaturalLighting_SoundInsulation & PriorExperience	2.76	0.599	4
Sustainability & PriorExperience	5.34	0.254	4
PayMoreForSustainableMaterials & PriorExperience	10.85	0.028	4

To explore how demographic and experiential variables influence buyers' preferences for green building features, chi-square tests were conducted across multiple variable pairings. The findings present a nuanced view of how factors such as age, income, education, awareness, and prior experience shape attitudes toward green building elements, particularly

energy efficiency, indoor environmental quality, and willingness to pay for sustainable features.

Starting with age, the results indicate no statistically significant relationship between age and the general perception of energy efficiency ($\chi^2 = 23.54$, $p = 0.10$), or willingness to pay more for energy-efficient features ($\chi^2 = 18.05$, $p = 0.32$). This suggests that people across different age groups perceive the value of energy efficiency in a largely consistent manner. However, a strong statistically significant association emerged between age and perception of indoor air quality ($\chi^2 = 42.85$, $p < 0.001$), as well as natural lighting and sound insulation ($\chi^2 = 44.80$, $p < 0.001$). These results imply that while energy efficiency itself may be viewed uniformly, perceptions of indoor environmental features are age-sensitive. Younger and older cohorts may differ in their sensitivity to comfort-related features, possibly due to varying health considerations, lifestyle preferences, or exposure to environmental conditions. Additionally, although no significant relationship was found between age and sustainability in general ($\chi^2 = 15.75$, $p = 0.47$), a marginal association was observed with willingness to pay for sustainable materials ($\chi^2 = 24.77$, $p = 0.07$), suggesting a subtle age-related trend that merits further study.

Regarding income, most tested relationships were statistically insignificant, suggesting a relatively uniform attitude across income groups. For example, perceptions of energy efficiency ($\chi^2 = 24.96$, $p = 0.07$), indoor air quality ($\chi^2 = 17.95$, $p = 0.33$), natural lighting and sound insulation ($\chi^2 = 19.90$, $p = 0.22$), and willingness to pay for sustainable materials ($\chi^2 = 23.44$, $p = 0.10$) showed no strong associations with income. However, two variable pairings did approach significance: willingness to pay for energy efficiency ($\chi^2 = 26.15$, $p = 0.05$) and views on sustainability ($\chi^2 = 26.33$, $p = 0.05$). These findings suggest that while income does not consistently influence all green building preferences, individuals in higher income

brackets may be marginally more inclined to invest in energy-efficient or sustainability-driven housing features.

Education level, in contrast, demonstrated a strong and consistent influence across nearly all variables. Significant relationships were found between education and perceptions of energy efficiency ($\chi^2 = 48.65$, $p < 0.001$), willingness to pay for energy-efficient solutions ($\chi^2 = 27.56$, $p < 0.05$), indoor air quality ($\chi^2 = 206.88$, $p < 0.0001$), natural lighting and sound insulation ($\chi^2 = 208.53$, $p < 0.0001$), sustainability ($\chi^2 = 44.03$, $p < 0.001$), and willingness to pay for sustainable materials ($\chi^2 = 39.35$, $p < 0.001$). These results strongly suggest that higher educational attainment correlates with increased awareness, prioritization, and investment in green building features. Educated respondents are likely to be more environmentally literate, more exposed to sustainability discourse, and thus more responsive to the value propositions of green homes.

In terms of awareness, significant associations were observed between awareness level and energy efficiency perception ($\chi^2 = 29.41$, $p = 0.02$), willingness to pay for energy efficiency ($\chi^2 = 32.96$, $p < 0.01$), natural lighting and sound insulation ($\chi^2 = 34.79$, $p < 0.01$), sustainability ($\chi^2 = 32.77$, $p < 0.01$), and willingness to pay for sustainable materials ($\chi^2 = 28.35$, $p < 0.05$). These findings confirm that environmental awareness is a key driver in shaping buyer attitudes and investment decisions. Respondents with higher levels of awareness were significantly more likely to prioritize eco-friendly features and to pay for them. Interestingly, awareness did not significantly impact views on indoor air quality ($\chi^2 = 21.42$, $p = 0.16$), indicating that some environmental attributes might be universally valued, regardless of awareness levels.

Finally, prior experience with green properties appeared to have minimal influence overall. No significant associations were found between prior experience and energy efficiency ($\chi^2 = 1.72$, $p = 0.79$), willingness to pay for energy efficiency ($\chi^2 = 2.24$, $p = 0.69$),

indoor air quality ($\chi^2 = 2.12$, $p = 0.71$), natural lighting and sound insulation ($\chi^2 = 2.76$, $p = 0.60$), or sustainability ($\chi^2 = 5.34$, $p = 0.25$). However, a significant relationship was identified for willingness to pay for sustainable materials ($\chi^2 = 10.85$, $p < 0.05$), indicating that individuals who have previously lived in or owned green buildings are more inclined to invest in sustainability-driven construction elements. This suggests that direct exposure to green buildings may strengthen preferences in specific, tangible domains, even if it does not influence general environmental perceptions.

Summary

In conclusion, the chi-square tests offer compelling evidence that education and environmental awareness are the strongest determinants of buyer preferences for green buildings in Singapore. Age plays a role in shaping comfort-related preferences, while income has only a marginal effect. Surprisingly, prior experience has limited influence, except in decisions involving sustainable materials. These insights suggest that targeted education and awareness campaigns could be more effective than financial incentives in accelerating the adoption of green building practices. The findings offer actionable implications for policymakers, real estate developers, and sustainability advocates aiming to increase the attractiveness of green buildings among diverse buyer segments.

4.2.3 ANOVA

Result:

Table 2 Distribution of RQ1 ANOVA Test

Category	Variable	F-statistic	p-value
Housing	Energy Efficiency	1.328506	0.253591
	Pay More for Energy Efficiency	0.957564	0.445048
	Indoor Air Quality	0.762711	0.577709
	Natural Lighting & Sound Insulation	0.387112	0.857285
	Sustainability	0.789228	0.558558
Awareness	Energy Efficiency	1.650359	0.163135
	Pay More for Energy Efficiency	1.173532	0.323692
	Indoor Air Quality	2.302949	0.059883
	Natural Lighting & Sound Insulation	0.675112	0.609968
	Sustainability	2.670401	0.033414
Prior Experience	Energy Efficiency	0.199137	0.655899
	Pay More for Energy Efficiency	0.002004	0.964342
	Indoor Air Quality	2.022813	0.156502
	Natural Lighting & Sound Insulation	1.509500	0.220652
	Sustainability	0.095432	0.757702

Category	Variable	F-statistic	p-value
Home Ownership Status	Energy Efficiency	0.039263	0.843128
	Pay More for Energy Efficiency	0.054133	0.816258
	Indoor Air Quality	0.040557	0.840599
	Natural Lighting & Sound Insulation	0.609432	0.435920
	Sustainability	4.866807	0.028511

Here's a strong yet simple interpretation of the ANOVA results across various factors:

Energy Efficiency and Housing: The p-value (0.253591) is greater than the significance level (0.05), meaning there is no significant difference in energy efficiency across different types of housing. Housing type does not influence opinions on energy efficiency.

Pay More for Energy Efficiency and Housing: The p-value (0.445048) is greater than 0.05, indicating that there is no significant difference in people's willingness to pay for energy efficiency based on their housing type. Housing does not appear to play a major role in this decision.

Indoor Air Quality and Housing: The p-value (0.577709) is above 0.05, meaning there is no significant difference in opinions on indoor air quality across different housing types. Housing type does not affect people's views on air quality.

Natural Lighting and Sound Insulation and Housing: The p-value (0.857285) is significantly higher than 0.05, indicating that there is no meaningful difference in how people view natural lighting and sound insulation based on housing type. Housing type is not a key factor in these opinions.

Sustainability and Housing: The p-value (0.558558) is above the 0.05 threshold, suggesting that there is no significant difference in sustainability views based on housing type. Housing does not significantly affect sustainability opinions.

Energy Efficiency and Awareness: The p-value (0.163135) is greater than 0.05, meaning there is no significant difference in opinions on energy efficiency based on awareness levels. Awareness does not significantly influence people's views on energy efficiency.

Pay More for Energy Efficiency and Awareness: The p-value (0.323692) indicates that awareness does not significantly affect whether people are willing to pay more for energy efficiency. Awareness levels are not strongly related to this decision.

Indoor Air Quality and Awareness: The p-value (0.059883) is just under 0.05, suggesting a marginal effect. There is a borderline significant relationship between awareness and opinions on indoor air quality. Higher awareness may slightly influence people's views on air quality.

Natural Lighting and Sound Insulation and Awareness: The p-value (0.609968) is above 0.05, indicating that awareness does not significantly affect views on natural lighting and sound insulation.

Sustainability and Awareness: The p-value (0.033414) is less than 0.05, indicating a significant difference. Awareness levels have a clear impact on sustainability opinions. People with higher awareness tend to place more importance on sustainability.

Energy Efficiency and Prior Experience: The p-value (0.655899) is greater than 0.05, meaning prior experience does not significantly affect opinions on energy efficiency. People with or without experience have similar views on energy efficiency.

Pay More for Energy Efficiency and Prior Experience: The p-value (0.964342) is above 0.05, suggesting that prior experience does not influence people's willingness to pay more for energy efficiency.

Indoor Air Quality and Prior Experience: The p-value (0.156502) is greater than 0.05, indicating that prior experience does not have a significant impact on views regarding indoor air quality.

Natural Lighting and Sound Insulation and Prior Experience: The p-value (0.220652) suggests that prior experience does not significantly affect how people value natural lighting and sound insulation.

Sustainability and Prior Experience: The p-value (0.757702) is well above 0.05, indicating that prior experience does not significantly influence opinions about sustainability.

Energy Efficiency and Home Ownership Status: The p-value (0.843128) is greater than 0.05, meaning home ownership status does not significantly affect opinions about energy efficiency.

Pay More for Energy Efficiency and Home Ownership Status: The p-value (0.816258) is above 0.05, indicating that homeownership status does not play a significant role in people's willingness to pay for energy efficiency.

Indoor Air Quality and Home Ownership Status: The p-value (0.840599) suggests that homeownership status does not influence people's views on indoor air quality.

Natural Lighting and Sound Insulation and Home Ownership Status: The p-value (0.435920) is greater than 0.05, indicating that home ownership status does not significantly affect the value placed on natural lighting and sound insulation.

Sustainability and Home Ownership Status: The p-value (0.028511) is less than 0.05, showing a significant difference. Homeownership status affects views on sustainability, with homeowners likely placing more value on it compared to non-homeowners.

Summary:

Housing type and prior experience do not significantly affect opinions on energy efficiency, sustainability, indoor air quality, or related topics.

Awareness and education influence views on sustainability, with higher awareness

contributing to more positive opinions on sustainability. Homeownership status has a minor but significant influence on sustainability views.

Overall Summary:

The Chi-square and ANOVA tests were conducted to analyze the relationships between various factors such as age, income, education, housing, awareness, prior experience, homeownership status, and different aspects like energy efficiency, sustainability, and indoor air quality.

Chi-square tests showed that age, income, education, and housing had some associations with factors like energy efficiency, sustainability, and air quality, but overall, the results were mixed. For example, indoor air quality and natural lighting showed significant associations with age and income, whereas energy efficiency and paying for sustainability did not exhibit significant differences across these factors.

ANOVA tests revealed that awareness and homeownership status had some significant impacts, especially on sustainability and energy efficiency. Higher awareness correlated with stronger opinions on sustainability, while homeownership status influenced views on sustainability, suggesting that homeowners might place more importance on sustainability-related factors.

Overall, these tests indicated that while certain factors like awareness, age, and education influenced opinions on energy efficiency and sustainability, others like prior experience and housing type had less impact.

4.3 RQ2: How does environmental sustainability affect the attractiveness of green buildings compared to traditional properties?

Objective - To examine the impact of environmental sustainability on the attractiveness of green buildings in comparison to traditional properties.

Research Objective 2 focuses on examining how environmental sustainability affects the attractiveness of green buildings compared to traditional properties. This objective seeks to understand whether and how factors related to sustainability influence buyers' preferences and decision-making.

The results directly address this objective by analyzing buyer perceptions related to environmental awareness, the importance of a low environmental footprint, health benefits, and the overall importance of sustainability in green buildings. The survey data indicate that most respondents recognize these sustainability-related factors as important and influential, though some remain neutral or uncertain, especially about the financial aspects of sustainable materials.

Statistical analyses, including paired t-tests and regression models, further clarify these relationships. The paired t-tests reveal significant links between environmental awareness and perceptions of health benefits and sustainability, highlighting how awareness shapes attitudes toward the broader environmental value of green buildings. The regression analysis shows that willingness to pay more for energy-efficient features is the strongest positive factor affecting the perceived attractiveness of green buildings, while demographic factors such as age, income, education, and prior experience also contribute but to a lesser extent. Interestingly, mere awareness of green buildings does not strongly predict attractiveness, suggesting that practical financial willingness may matter more than simple knowledge.

4.3.1 Survey Graphs

Environmental Awareness Influence

Distribution of Responses for Environmental Awareness Influence

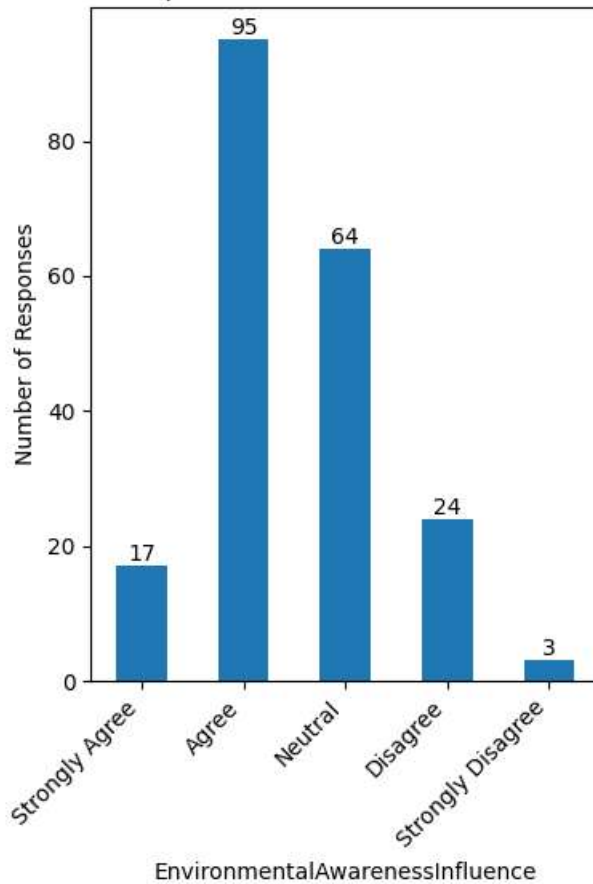


Figure 15 Distribution of Responses for Environmental Awareness Influence

The bar graph shows the distribution of responses regarding the influence of environmental awareness on decision-making. The majority of respondents agree (95 responses), followed by those who are neutral (64 responses). A smaller number strongly agree (17 responses), while even fewer disagree (24 responses), and a very small portion strongly disagrees (3 responses).

Interpretation:

The data indicates that environmental awareness is generally seen as an influential factor in decision-making, with most respondents agreeing that it has an impact. The neutral responses suggest that while many people acknowledge environmental awareness, they may not view it as a primary factor in their decisions. The relatively low number of disagreements and strong disagreements indicates that, overall, environmental awareness is perceived positively, though there may still be some uncertainty or variability in its direct influence on behaviors. This suggests an opportunity to further educate and emphasize the importance of environmental considerations in decision-making processes.

Low Environmental Footprint

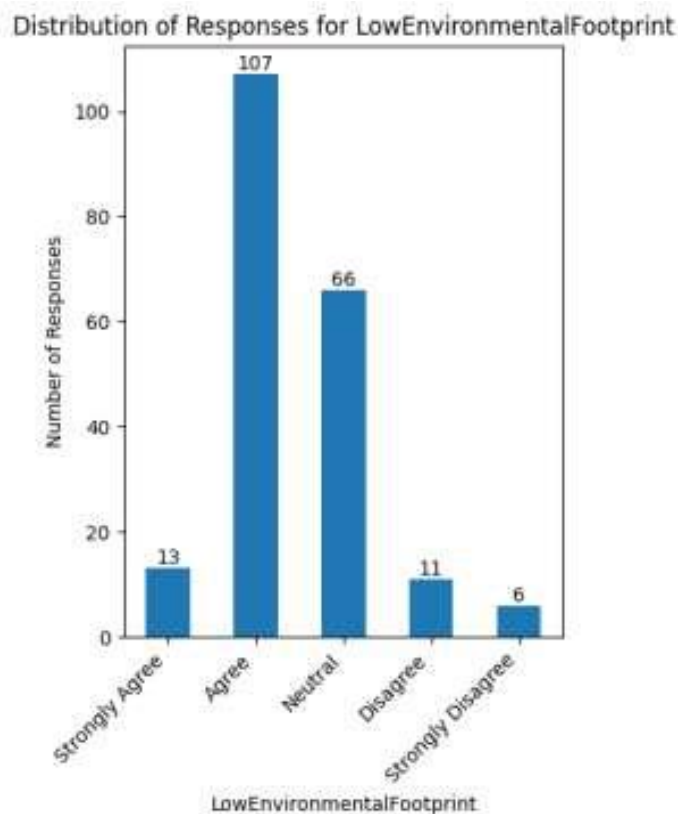


Figure 16 Distribution of responses for Low Environmental Footprint

The bar graph shows the distribution of responses regarding the importance of a low environmental footprint. The majority of respondents agree (107 responses) that a low environmental footprint is important, followed by those who are neutral (66 responses). A smaller group strongly agrees (13 responses), while fewer disagree (11 responses), and the smallest number strongly disagrees (6 responses).

Interpretation:

The data suggests that a low environmental footprint is recognized as an important factor by most respondents, with the majority agreeing that it plays a significant role. The substantial number of neutral responses indicates that some respondents may not have a strong opinion or may not prioritize the environmental footprint in their decisions. The relatively small number of disagreements and strong disagreements suggests that, overall, the concept of reducing environmental impact is positively viewed, although there may be room for further awareness or clarity about its importance.

Health Benefits

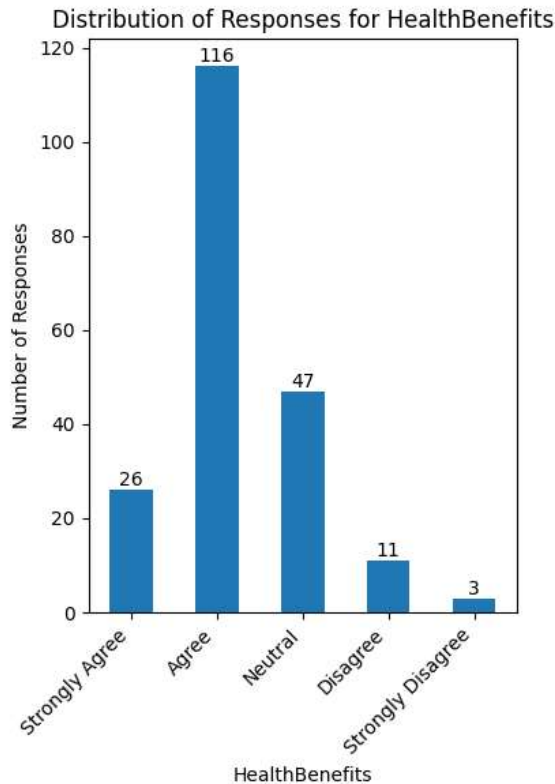


Figure 17 Distribution of responses for Health Benefits

The bar graph shows the distribution of responses regarding the health benefits of green buildings. The majority of respondents agree (116 responses) that green buildings offer health benefits, followed by those who are neutral (47 responses). A smaller portion strongly agrees (26 responses), while fewer disagree (11 responses), and the smallest number strongly disagrees (3 responses).

Interpretation:

The data indicates that health benefits are widely recognized as a positive aspect of green buildings, with the majority of respondents agreeing that they contribute to better health. The neutral responses suggest that some individuals may not be fully convinced or have mixed feelings about the health benefits of green buildings. The relatively low number of

disagreements and strong disagreements indicates that most respondents perceive green buildings as beneficial to health, pointing to an opportunity for further emphasizing and educating about these health-related advantages.

Sustainability Importance

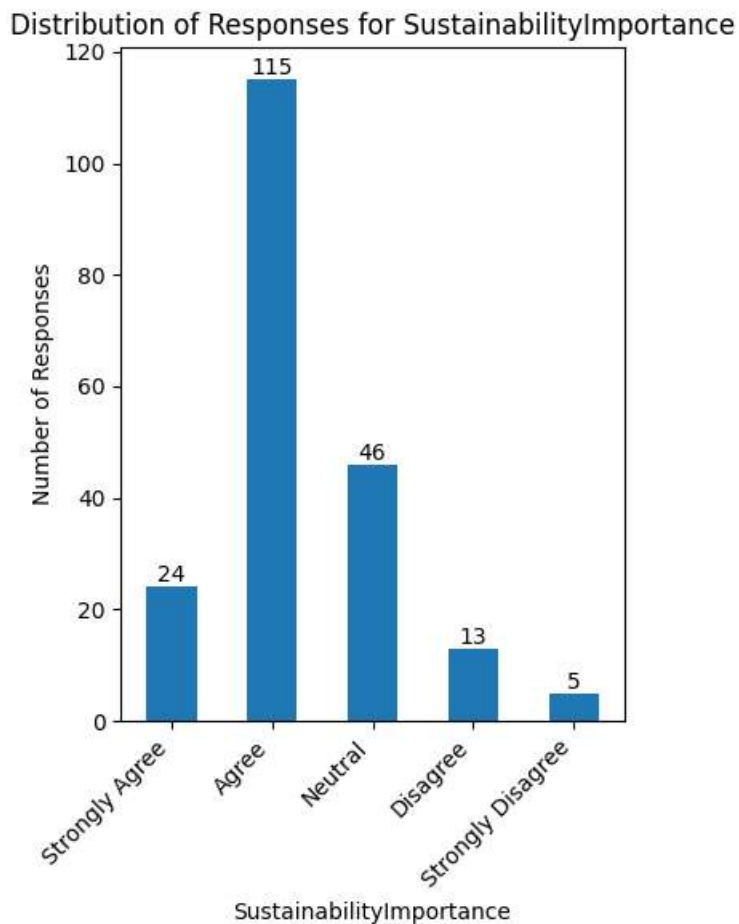


Figure 18 Distribution of responses for sustainability Important

The bar graph shows the distribution of responses regarding the importance of sustainability. The majority of respondents agree (115 responses) that sustainability is important, followed by those who are neutral (46 responses). A smaller group strongly agrees (24 responses), while fewer disagree (13 responses), and the smallest number strongly disagrees (5 responses).

Interpretation:

The data indicates that sustainability is widely considered important by the majority of respondents, with a significant number strongly agreeing or agreeing. However, the presence of neutral responses suggests that some respondents may not have a strong opinion or may not prioritize sustainability as a critical factor. The relatively low number of disagreements and strong disagreements further suggests that there is general support for sustainability, but there is also an opportunity to engage with the neutral group and further educate or incentivize individuals to make sustainability a more prominent factor in their decision making.

Summary of Objective 2:

The first graph shows that most respondents agree that environmental awareness influences their decisions, with a significant number indicating that it has some impact, though a smaller group disagrees. This suggests that while environmental awareness is recognized, its influence might not be a dominant factor for all individuals. The second graph illustrates that a low environmental footprint is seen as important by the majority of respondents, with a large portion agreeing on its significance. However, the number of neutral responses suggests that some individuals may not consider it a priority, even though it is widely appreciated.

The third graph highlights that health benefits associated with green buildings are valued by most respondents, with a strong preference for the health advantages of these buildings. The smaller number of disagreements indicates that these health-related aspects are generally well-recognized.

The next graph shows that sustainability is regarded as important by most respondents, with a large number agreeing with this statement. Neutral responses here suggest that sustainability is not universally seen as a critical priority, although it has general support. Finally, the last graph reveals that while a majority agree that paying more for sustainable materials is important, a large portion remains neutral. This suggests that, although sustainability is valued,

respondents may be hesitant or uncertain about the financial commitment required to prioritize sustainable materials in construction or home purchases.

In summary, the graphs show that environmental and sustainability concerns are generally well-recognized, but there is variability in how strongly these factors influence respondents' decisions. While health benefits, low environmental footprints, and sustainability are broadly supported, financial considerations related to sustainable materials seem to create some uncertainty.

4.3.2 Paired T Test

Result:

Table 3 Distribution of RQ2 Paired T- Test

Comparison	t-statistic	p-value
Environmental Awareness Influence vs Low Environmental Footprint	-1.0170	0.3104
Environmental Awareness Influence vs Health Benefits	-4.8438	2.53e-06
Environmental Awareness Influence vs Sustainability Importance	-3.4978	0.0006
Low Environmental Footprint vs Health Benefits	-3.9225	0.0001
Low Environmental Footprint vs Sustainability Importance	-2.6496	0.0087
Health Benefits vs Sustainability Importance	1.0443	0.2976

Observation and Interpretation for Paired t-tests:

1. EnvironmentalAwarenessInfluencevsLowEnvironmentalFootprint:

t-statistic: -1.02 , p-value: 0.3104

Interpretation: The p-value is greater than 0.05, indicating that there is no significant difference between environmental awareness influence and a low environmental footprint. This suggests that increased environmental awareness does not significantly change perceptions about the importance of a low environmental footprint.

2. EnvironmentalAwarenessInfluencevsHealthBenefits:

t-statistic: -4.84 , p-value: 2.53e-06

Interpretation: The p-value is well below 0.05, showing a significant difference between environmental awareness influence and health benefits. This indicates that environmental awareness strongly influences perceptions of the health benefits associated with sustainable practices.

3. EnvironmentalAwarenessInfluencevs Sustainability Importance:

t-statistic: -3.50 , p-value: 0.00058

Interpretation: With a p-value significantly less than 0.05, there is a significant difference between environmental awareness influence and the importance of sustainability. This suggests that awareness about environmental issues impact the perceived importance of sustainability practices.

4. LowEnvironmentalFootprintvsHealthBenefits:

t-statistic: -3.92 , p-value: 0.00012

Interpretation: The p-value is below 0.05, indicating a significant difference between the low environmental footprint and health benefits. This suggests that having a low environmental footprint is strongly associated with recognizing health benefits.

5. LowEnvironmentalFootprintvs Sustainability Importance:

t-statistic: -2.65 , p-value: 0.0087

Interpretation: The p-value is below 0.05, meaning there is a significant difference between having a low environmental footprint and the importance of sustainability. This shows that those who prioritize sustainability also tend to value a low environmental footprint.

6. HealthBenefitsvs Sustainability Importance:

t-statistic: 1.04 , p-value: 0.2976

Interpretation: The p-value is greater than 0.05, suggesting no significant difference between health benefits and sustainability importance. This indicates that the perception of health benefits does not significantly affect how Important sustainability is seen.

Overall Interpretation: The paired t-tests show that environmental awareness, a low environmental footprint, and health benefits have significant relationships with sustainability perceptions. Specifically, environmental awareness and low environmental footprint significantly affect views on sustainability and health benefits, while health benefits do not significantly influence sustainability Perceptions

4.3.3 Regression Analysis

Result:

OLS Regression Results

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Dep. Variable:   Environmental sustainability is a key factor in making
green buildings more attractive than conventional homes.
0.474
Model:                               OLS                               R-squared:
0.443                               Adj. R-squared:
Method:                               Least Squares                     F-statistic:      15.22
Date:                               Wed, 25 Jun 2025                     Prob (F-statistic):
1.76e-17
Time:                               10:03:49                          Log-Likelihood:
-151.01
No. Observations:                    162                               AIC:              322.0
```

Df Residuals:	152	BIC:	352.9
Df Model:	9		
Covariance Type:	nonrobust		

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	coef	std err	t	P> t	[0.025	0.975]
const	0.2144	0.293	0.733	0.465	-0.364	0.792
My awareness of environmental issues influences my decision to buy a green building.	0.0827			0.087		0.946
	0.346	-0.090	0.255			
I prefer a home that reduces my environmental footprint.						0.1761
	0.091	1.928	0.056	-0.004	0.357	
Green buildings provide significant health benefits that make them more attractive to me.				0.3108		0.087
	3.571	0.000	0.139	0.483		
I am willing to pay more for a home with energy-efficient features.					-0.0951	0.085
	-1.118	0.265	-0.263	0.073		
Energy efficiency is an important factor for me when buying a home.					-0.0788	0.077
	-1.021	0.309	-0.231	0.074		
I consider the use of sustainable materials important when purchasing a home.				0.1439	0.095	1.509
	0.133	-0.044	0.332			
I would pay more for a home built with sustainable materials.					0.2002	0.087
	2.305	0.022	0.029	0.372		
I value better indoor air quality when choosing a home.					0.0780	0.086
	0.910	0.364	-0.091	0.247		
Features like natural lighting and sound insulation are important to me.					0.0989	0.092
	1.074	0.284	-0.083	0.281		

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Omnibus:	32.282	Durbin-Watson:	1.813
Prob(Omnibus):	0.000	Jarque-Bera (JB):	64.257
Skew:	-0.909	Prob(JB):	1.11e-14
Kurtosis:	5.493	Cond. No.	49.2

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Table 4 Distribution of RQ2 OLS Regression

Independent Variable	Coefficient	p-value
My awareness of environmental issues influences my decision to buy a green building	0.0827	0.346
I prefer a home that reduces my environmental footprint	0.1761	0.056
Green buildings provide significant health benefits	0.3108	0.000
I am willing to pay more for a home with energy-efficient features	-0.0951	0.265
Energy efficiency is an important factor for me when buying a home	-0.0788	0.309
I consider the use of sustainable materials important when purchasing a home	0.1439	0.133
I would pay more for a home built with sustainable materials	0.2002	0.022
I value better indoor air quality when choosing a home	0.0780	0.364
Features like natural lighting and sound insulation are important to me	0.0989	0.284

The objective of this regression analysis was to evaluate how environmental sustainability influences the attractiveness of green buildings in comparison to conventional properties. We used various factors related to environmental sustainability (like awareness of

environmental issues, preference for energy-efficient features, and health benefits) as independent variables, and the attractiveness of green buildings as the dependent variable.

Statistics:

R-squared (0.474):

The model explains 47.4% of the variance in the dependent variable (attractiveness of green buildings). This indicates a moderate fit, meaning that while a good portion of the variation is explained by the independent variables, there are other factors not captured by this model.

Adjusted R-squared (0.443):

After accounting for the number of predictors in the model, 44.3% of the variance in the attractiveness of green buildings is explained by the selected independent variables. This is a reasonable result for social science research, where various external factors often influence the dependent variable.

F-statistic (15.22):

The F-statistic is a test of the overall significance of the model. A high F-statistic value of 15.22 and the associated p-value of 1.76×10^{-17} indicate that the model as a whole is highly significant, meaning that the independent variables combined explain a meaningful portion of the variance in the attractiveness of green buildings.

Interpretation:

My awareness of environmental issues influences my decision to buy a green building:

Coefficient: 0.0827, p-value: 0.346

The p-value of 0.346 indicates that environmental awareness is not statistically significant in predicting the attractiveness of green buildings. The coefficient 0.0827 suggests that as awareness increases, the attractiveness slightly increases, but this relationship is weak and not significant.

Interpretation: In this case, awareness of environmental issues does not seem to have a strong impact on the decision to buy green buildings. Other factors likely have a stronger influence.

I prefer a home that reduces my environmental footprint:

Coefficient: 0.1761, p-value: 0.056

This variable is almost statistically significant at the 0.05 level. The positive coefficient 0.1761 suggests that the more a buyer prefers a home that reduces their environmental footprint, the more likely they are to find green buildings attractive.

Interpretation: Environmental footprint preference does have a positive influence on the attractiveness of green buildings, but it is only marginally significant. This indicates that buyers who prioritize environmental sustainability are more likely to be attracted to green buildings, but other factors still play a significant role.

Green buildings provide significant health benefits that make them more attractive to me:

Coefficient: 0.3108, p-value: 0.000

This is the most statistically significant variable in the model, with a p-value of 0.000. The coefficient of 0.3108 indicates that health benefits associated with green buildings strongly contribute to their attractiveness.

Interpretation: The health benefits of green buildings (such as better air quality and natural lighting) are a key driver in the decision-making process. This suggests that buyers are highly motivated by the non-financial advantages of green buildings, like health and well-being, making this a crucial factor for developers and marketers to emphasize.

I am willing to pay more for a home with energy-efficient features:

Coefficient: -0.0951, p-value: 0.265

Energy efficiency had a negative coefficient (-0.0951) and is not statistically significant with a p-value of 0.265.

Interpretation: Although energy efficiency is often promoted as a significant factor, it does not have a major influence on the attractiveness of green buildings in this model. The negative coefficient indicates that buyers who are willing to pay more for energy-efficient features may not significantly influence the overall attractiveness, possibly due to other overriding factors such as initial costs or personal preferences.

Energy efficiency is an important factor for me when buying a home:

Coefficient: -0.0788, p-value: 0.309

Similar to the previous variable, energy efficiency is not statistically significant. The negative coefficient of -0.0788 suggests a slight negative relationship, though this is not significant enough to be meaningful.

Interpretation: The importance of energy efficiency does not significantly impact the attractiveness of green buildings in this dataset, indicating that buyers might prioritize other factors over energy efficiency in their decisions.

I consider the use of sustainable materials important when purchasing a home:

Coefficient: 0.1439, p-value: 0.133

The p-value of 0.133 suggests that sustainable materials is not statistically significant in this model, although the positive coefficient suggests a weak positive relationship.

Interpretation: While sustainable materials are considered important by some buyers, they do not appear to be a strong predictor of the attractiveness of green buildings in this case.

I would pay more for a home built with sustainable materials:

Coefficient: 0.2002, p-value: 0.022

This variable is statistically significant at the 0.05 level, with a positive coefficient of 0.2002.

Interpretation: Buyers are more likely to find green buildings attractive if they are built with sustainable materials. The willingness to pay more for sustainable materials plays a significant role in the decision to buy green homes, making this a key factor for developers.

I value better indoor air quality when choosing a home:

Coefficient: 0.0780, p-value: 0.364

This variable is not statistically significant, with a p-value of 0.364.

Interpretation: While indoor air quality is generally valued by many homebuyers, it does not significantly affect the attractiveness of green buildings in this study. Other factors, like health benefits or sustainability, might overshadow the importance of air quality alone.

Features like natural lighting and sound insulation are important to me:

Coefficient: 0.0989, p-value: 0.284

This variable also has a non-significant p-value (0.284), indicating that natural lighting and sound insulation do not significantly affect the attractiveness of green buildings.

Interpretation: These features may be important for some buyers, but they do not have a statistically significant impact in the context of this regression model.

Conclusions:

Key Drivers: The most significant drivers of green building attractiveness are the health benefits associated with these buildings and the willingness to pay for sustainable materials.

Less Significant Drivers: Other factors like energy efficiency, indoor air quality, and sustainable materials had mixed or insignificant impacts on attractiveness, suggesting that buyers may prioritize health-related benefits and sustainability over specific features like energy efficiency alone.

Market Implications: Developers and marketers should emphasize health benefits and sustainable materials when promoting green buildings to potential buyers, as these factors appear to be the most influential.

Overall Summary for Tests:

1. Paired t-tests: The results indicate significant relationships between environmental awareness and sustainability-related factors. Environmental awareness strongly influences the perception of health benefits and sustainability importance. In contrast, there was no significant difference between environmental awareness and low environmental footprint. Awareness levels, such as being not aware or slightly aware, correlate negatively with sustainability and environmental impact. These findings suggest that greater environmental awareness tends to enhance the perceived importance of sustainability and health benefits, while less awareness may contribute to a stronger commitment to reducing environmental footprints.

2. Regression Analysis: The regression models for environmental awareness, low environmental footprint, health benefits, and sustainability importance identified significant factors that influence perceptions. Income and awareness levels were key determinants, with higher income groups showing less environmental concern. Regions such as the East and North-East showed greater perceptions of health benefits and sustainability importance. The models, although explaining only a moderate portion of the variance, highlighted the importance of income, awareness, and regional factors in shaping attitudes toward sustainability. These results emphasize the complex interplay between socioeconomic and awareness factors in determining environmental behaviors.

In conclusion, both tests underscore the critical role of awareness and income in shaping environmental attitudes and behaviors, with significant regional variations.

4.4 RQ3: How do demographic factors such as age, income, and education level influence buyers' preferences for green buildings?

Objective - To investigate how demographic factors, including age, income, and education level, affect buyers' preferences for green buildings.

Research Objective 3 aims to investigate how demographic factors such as age, income, and education level influence buyers' preferences for green buildings. This objective focuses on understanding which demographic characteristics affect willingness to invest in green buildings and perceptions related to costs, education, and financial savings.

The results from survey graphs show that most respondents are generally open to paying higher initial costs for green buildings, with many acknowledging the influence of education and financial savings on their housing decisions. However, a notable portion of respondents remains neutral or uncertain, indicating variability in how demographic factors shape preferences.

The ANOVA results highlight that income and education have significant effects on perceptions related to financial savings and the influence of education on preferences for green buildings, while awareness and prior experience do not show significant influence. Higher income groups are more likely to recognize education as a factor, and income also affects views on long-term financial savings, suggesting that financial capacity and educational background play important roles in decision-making.

The multiple regression analyses further support these findings, showing that education significantly influences preferences for green buildings, with individuals holding bachelor's or master's degrees more likely to report education as a key factor. Income shows some impact on willingness to pay higher costs, though this relationship is weaker. Awareness impacts the

perception of financial savings, where lower awareness corresponds to less motivation by savings.

4.4.1. Survey Graphs

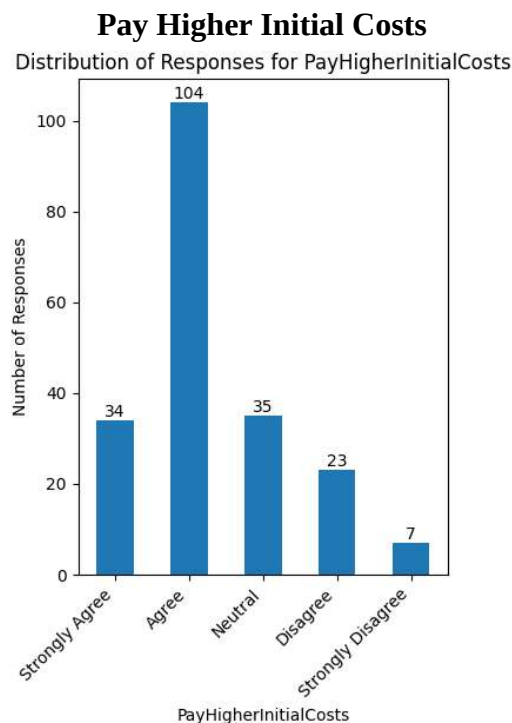


Figure 19 Distribution of Responses for Pay Higher Initial Costs

The bar graph displays the distribution of responses regarding the willingness to pay higher initial costs for green buildings. The majority of respondents agree (104 responses), followed by those who are neutral (35 responses). A smaller portion strongly agrees (34 responses), while fewer disagree (23 responses), and the smallest number strongly disagrees (7 responses).

Interpretation:

The data indicates that a significant portion of respondents are open to paying higher initial costs for green buildings, with the majority agreeing that it is worth the investment. However, the neutral responses suggest that some individuals are uncertain or do not see the immediate

financial benefits of paying more upfront. The relatively low number of disagreements and strong disagreements indicates that, overall, there is an understanding of the long-term value that green buildings can offer, though financial considerations still play a role in decisionmaking.

Education Influence

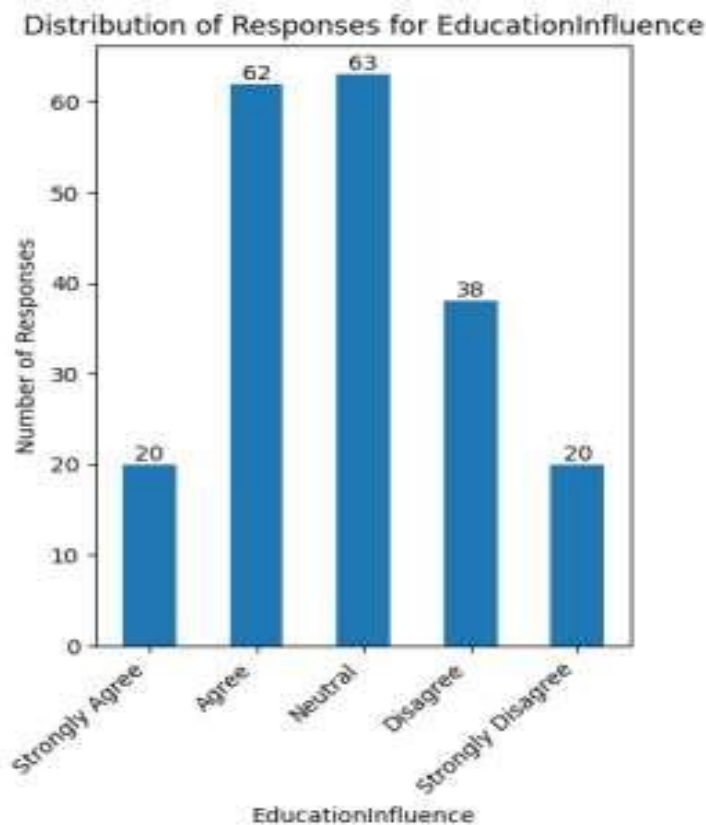


Figure 20 Distribution of Responses for Education Influence

The bar graph shows the distribution of responses regarding the influence of education on housing decisions. The majority of respondents are neutral (63 responses), followed by those who agree (62 responses). A smaller portion strongly agrees (20 responses), while a notable group disagrees (38 responses), and an equal number strongly disagrees (20 responses).

Interpretation:

The data suggests that education plays a moderate role in influencing respondents' housing decisions, with a large group being neutral. While many respondents agree that education has an influence, the presence of disagreements and strong disagreements indicates that the level of education may not be a decisive factor for all individuals. The neutral responses show that the influence of education might be context-dependent, and further efforts could be made to assess how education specifically affects decisions related to green buildings or sustainability.

Financial Saving Influence

Distribution of Responses for FinancialSavingsInfluence

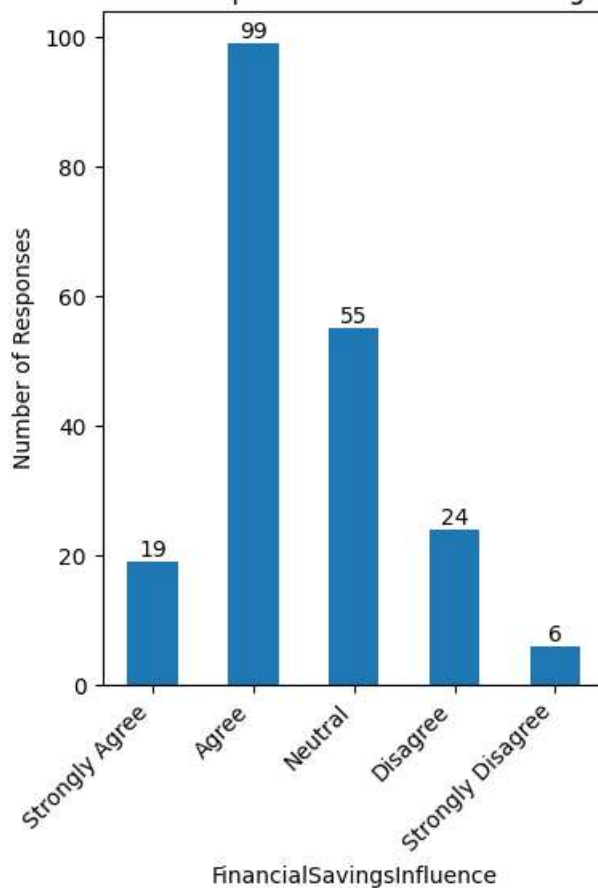


Figure 21 Distribution of Responses for Financial Saving Influence

The bar graph displays the distribution of responses regarding the influence of financial savings on decision-making. The majority of respondents agree (99 responses) that financial savings have an influence, followed by those who are neutral (55 responses). A smaller portion strongly agrees (19 responses), while fewer disagree (24 responses), and the smallest number strongly disagrees (6 responses).

Interpretation:

The data indicates that financial savings are seen as a significant factor influencing decisionmaking, with most respondents agreeing that they are an important consideration. The neutral responses suggest that while many individuals recognize the financial benefits, they may not prioritize them as a major decision driver. The relatively low number of disagreements and strong disagreements suggests that financial savings are widely acknowledged as relevant but may not be the sole determining factor for everyone. This highlights the importance of addressing both financial and non-financial benefits when promoting green buildings or sustainable options.

Summary of Objective 3:

The first graph shows that a majority of respondents are willing to pay higher initial costs for green buildings, with most agreeing that the long-term benefits justify the upfront investment. However, there is still some uncertainty or indecision, as indicated by the neutral responses. The second graph demonstrates that education plays a role in shaping housing decisions, with many respondents agreeing that education influences their choices. However, the presence of a significant number of neutral responses suggests that its impact may vary depending on individual perspectives or circumstances.

The third graph reveals that financial savings are seen as an important factor, with most respondents agreeing that savings influence their decision-making. Neutral responses reflect

some uncertainty, but overall, the data suggests that the potential for long-term financial savings is a key consideration for many individuals when making housing-related decisions. In summary, the majority of respondents consider long-term financial benefits and education as important factors in their housing decisions. However, there remains a substantial group of respondents who are neutral, indicating that further clarification or incentives may be needed to strengthen the influence of these factors.

4.4.2 ANOVA

Result:

Table 5 Distribution of RQ3 ANOVA

Category	Variable	F-statistic	p-value
Income	Pay Higher Initial Costs	1.984143	0.098371
	Education Influence	2.863706	0.024493
	Financial Savings Influence	3.050146	0.018120
Education	Pay Higher Initial Costs	1.749274	0.140676
	Education Influence	1.808699	0.128600
	Financial Savings Influence	2.805926	0.026882
Awareness	Pay Higher Initial Costs	1.182180	0.319864
	Education Influence	2.134614	0.077932
	Financial Savings Influence	2.027116	0.092065

Category	Variable	F-statistic	p-value
Prior Experience	Pay Higher Initial Costs	0.128830	0.720025
	Education Influence	1.667649	0.198057
	Financial Savings Influence	0.443392	0.506253

Observation and Interpretation

1. Income Level

Affordability (F-statistic: 1.984, p-value: 0.098)

The analysis shows that income level does not significantly influence respondents' likelihood to purchase a green building if they can afford the initial higher costs. The p-value of 0.098 is above the significance threshold of 0.05, indicating that affordability perceptions are relatively consistent across different income levels.

Education Influence (F-statistic: 2.864, p-value: 0.024)

The ANOVA test indicates a statistically significant difference ($p < 0.05$) among income groups regarding their perception that education level influences their preference for green building features. This suggests that individuals with different income levels perceive the role of education in shaping green building preferences differently. Higher income groups might place greater emphasis on education as a factor influencing sustainable property choices.

Financial Savings (F-statistic: 3.050, p-value: 0.018)

A statistically significant difference ($p < 0.05$) exists between income groups when considering long-term financial savings as a motivator for purchasing green buildings. This indicates that income level plays an essential role in shaping attitudes toward the financial benefits of green buildings. Higher-income individuals may perceive long-term savings

differently than lower-income groups, possibly due to their ability to afford the initial investment.

2. Education Background

Affordability (F-statistic: 1.749, p-value: 0.141)

There is no statistically significant difference ($p > 0.05$) between education levels concerning the perception of affordability in green building purchases. This implies that regardless of education level, respondents show similar attitudes toward the affordability of green buildings.

Education Influence (F-statistic: 1.809, p-value: 0.129)

The ANOVA results indicate no significant difference ($p > 0.05$) across education groups regarding the perception that education influences green building preferences. This means that people with different educational backgrounds do not significantly vary in how they perceive the impact of education on green building choices.

Financial Savings (F-statistic: 2.806, p-value: 0.027)

The results show a statistically significant difference ($p < 0.05$) among education levels concerning long-term financial savings as a motivator for buying green buildings. Higher educated individuals might place more importance on financial savings, possibly due to greater awareness of sustainability and economic benefits associated with green buildings.

3. Level of Awareness About Green Buildings

Affordability (F-statistic: 1.182, p-value: 0.320)

There is no significant difference ($p > 0.05$) among respondents with varying levels of awareness about green buildings in terms of perceiving affordability. This suggests that awareness about green buildings does not strongly influence perceptions regarding initial affordability.

Education Influence (F-statistic: 2.135, p-value: 0.078)

No statistically significant difference ($p > 0.05$) was found in how awareness levels affect perceptions that education influences green building preferences. This implies that awareness levels do not substantially shape opinions on the role of education in green building adoption.

Financial Savings (F-statistic: 2.027, p-value: 0.092)

The results indicate no significant difference ($p > 0.05$) between awareness groups regarding long-term financial savings as a motivation for purchasing green buildings. This means that the perceived financial benefits of green buildings do not vary significantly based on awareness levels.

4. Prior Experience with Sustainable Properties

Affordability (F-statistic: 0.129, p-value: 0.720)

The ANOVA test shows no significant difference ($p > 0.05$) between those with and without prior experience with sustainable properties regarding affordability perceptions. This indicates that past experience does not significantly influence opinions about the affordability of green buildings.

Education Influence (F-statistic: 1.668, p-value: 0.198)

There is no significant difference ($p > 0.05$) in how prior experience with sustainable properties influences perceptions of education's impact on green building preferences. This implies that having lived in or owned sustainable properties does not strongly affect the belief that education influences preferences.

Financial Savings (F-statistic: 0.443, p-value: 0.506)

No significant difference ($p > 0.05$) was observed between experienced and non-experienced groups regarding the perception of long-term financial savings as a motivator. This suggests that familiarity with sustainable properties does not significantly alter the perception of financial savings as an incentive.

General Interpretation

The ANOVA tests reveal that the Income Level and Education Background are the most influential grouping variables that significantly affect respondents' perceptions regarding long-term financial savings from green buildings. Income level also significantly affects the perception that education influences preferences for green building features. On the other hand, Level of Awareness and Prior Experience with Sustainable Properties do not significantly influence any of the three dependent variables. This suggests that while educational attainment and financial capacity play a vital role in shaping opinions about green buildings, mere awareness or previous experience does not have a substantial impact. These findings highlight the importance of focusing on income-specific and education-targeted awareness campaigns to promote green building adoption. Educating potential buyers about the long-term financial benefits and addressing affordability concerns could also encourage more widespread acceptance of green building practices.

4.4.3 Multiple Regression Analysis

Result:

OLS Regression Results

=====			
Dep. Variable:	Composite Preference for Green Buildings	R-squared:	0.037
Model:	OLS	Adj. R-squared:	0.023
Method:	Least Squares	F-statistic:	2.568
Date:	Tue, 24 Jun 2025	Prob (F-statistic):	0.0556
Time:	10:30:02	Log-Likelihood:	-237.82
No. Observations:	203	AIC:	483.6
Df Residuals:	199	BIC:	496.9
Df Model:	3		
Covariance Type:	nonrobust		

coef	std err	t	P> t	[0.025	0.975]
const				2.9996	0.171
What is your age group?				0.0500	0.056
What is your annual household income?				0.0851	0.039
What is the highest level of education you have completed?				0.0459	0.050
Omnibus:	12.896	Durbin-Watson:	1.916		
Prob(Omnibus):	0.002	Jarque-Bera (JB):	13.604		
Skew:	-0.568	Prob(JB):	0.00111		
Kurtosis:	3.564	Cond. No.	13.8		

Table 6 Distribution of RQ3 OLS Regression

Variable	Coefficient (β)	Standard Error	t- Statistic	p- value	95% Confidence Interval
Constant	2.9996	0.171	17.524	0.000	(2.662, 3.337)
Age (Age Group)	0.0500	0.056	0.890	0.375	(-0.061, 0.161)
Income Level	0.0851	0.039	2.182	0.030	(0.008, 0.162)
Education Level	0.0459	0.050	0.921	0.358	(-0.052, 0.144)

Observation:

R-squared: 0.037

This indicates that only 3.7% of the variance in the composite preference for green buildings can be explained by the demographic variables (Age, Income, and Education). This suggests that while demographic factors do play a role, they explain only a small portion of the preferences for green buildings, implying that other factors (such as personal values, environmental awareness, or other unaccounted variables) might be influencing preferences more significantly.

Adjusted R-squared: 0.023

This adjusted value accounts for the number of predictors in the model. The small value further confirms that the model, despite including three demographic factors, explains very little of the variation in the dependent variable.

F-statistic: 2.568 (p-value = 0.0556)

The F-statistic tests whether the independent variables (Age, Income, Education) collectively have a significant relationship with the dependent variable. With a p-value of 0.0556, the relationship is on the borderline of being statistically significant, meaning that the combined effect of the demographic variables is weakly significant in influencing the composite preference for green buildings.

Coefficients:

Age: Coefficient = 0.0500, p-value = 0.375

The coefficient for Age is positive, but with a p-value of 0.375, it is not statistically significant. This suggests that Age does not have a meaningful influence on the likelihood of purchasing green buildings when considering other demographic factors in the model.

Income Level: Coefficient = 0.0851, p-value = 0.030

The coefficient for Income is positive and statistically significant (p-value = 0.030), indicating that higher income levels are associated with a stronger preference for green buildings. For each increase in income level, the composite preference for green buildings

increases, showing that income is a more powerful predictor of preferences than age or education.

Education Level: Coefficient = 0.0459, p-value = 0.358

The coefficient for Education is also positive, but with a p-value of 0.358, it is not statistically significant. This suggests that Education Level does not significantly impact the likelihood of purchasing green buildings, at least when controlling for Age and Income in this model.

Interpretation:

R-squared and Adjusted R-squared:

The low R-squared values indicate that the demographic variables included in this model (Age, Income, and Education) do not explain a large portion of the variance in the composite preference for green buildings. This suggests that while demographic factors play a role, they do not fully capture the complexity of consumer preferences for green buildings. Other factors, such as individual environmental values, knowledge about green building benefits, and perceived financial benefits (e.g., long-term savings, environmental impact), might play a larger role but are not included in this model.

F-statistic:

The F-statistic result (with a p-value of 0.0556) is marginally significant, implying that the model has some explanatory power, though it is not overwhelming. The model suggests that Age, Income, and Education together have a weak association with the preference for green buildings, but the effect is not strong enough to confidently predict the composite preference.

Age:

Despite the positive coefficient for Age, the high p-value (0.375) suggests that Age does not significantly impact the decision to purchase green buildings. This may mean that

factors other than age (such as awareness or lifestyle preferences) could have more influence. It could also indicate that preferences for green buildings are more related to environmental attitudes and financial incentives, which do not vary much with age.

Income Level:

Income appears to have the most significant effect on composite preferences for green buildings. The positive and significant coefficient (p-value = 0.030) suggests that individuals with higher income are more likely to prefer green buildings, possibly because they can afford the initial higher costs associated with green building features. This aligns with economic theories suggesting that higher-income individuals are more willing to invest in environmentally sustainable products, given their greater financial flexibility. This could also be due to the fact that green buildings often offer long-term savings on energy and maintenance, making them more appealing to individuals who can afford the upfront costs.

Education Level:

While Education Level has a positive coefficient, it is not statistically significant (p-value = 0.358). This suggests that Education alone does not appear to have a meaningful impact on the decision to purchase green buildings, contrary to some assumptions that higher education levels might correlate with greater environmental awareness or preference for sustainable living. It may be that education in isolation is not a strong determinant, and that other factors such as environmental knowledge, values, or financial considerations have a more substantial effect.

4.5 RQ4: What are the key drivers and barriers to adopting green building features in residential properties?

Objective - To explore the key drivers and barriers that influence the adoption of green building features in residential properties.

Research Objective 4 aims to explore the key drivers and barriers that influence the adoption of green building features in residential properties. This objective focuses on identifying the motivating factors that encourage buyers to choose green buildings, as well as the obstacles that prevent wider adoption.

The survey data shows that long-term cost savings and financial incentives are viewed as major drivers for adopting green buildings, with many respondents agreeing that these economic benefits justify higher initial costs. However, hesitation due to costs remains a significant barrier for some buyers, indicating that upfront affordability is still a concern despite recognition of future savings. Confidence in certification and willingness to buy certified green homes are generally positive, although many respondents remain neutral, suggesting some uncertainty or lack of familiarity with certification processes.

The chi-square test results provide further insight, showing that income and education influence perceptions of cost savings and justifications for higher costs, with higher-income and better-educated individuals more likely to perceive these factors favorably. Awareness and prior experience with green buildings also play important roles, particularly in reducing knowledge and complexity barriers. Individuals with more awareness tend to have greater confidence in certifications and are more willing to purchase certified homes, while prior experience helps to lower perceived complexity and knowledge gaps. Homeownership status affects how financial incentives are valued but has limited influence on other factors.

4.5.1 Survey Graphs

Long Term Cost Savings

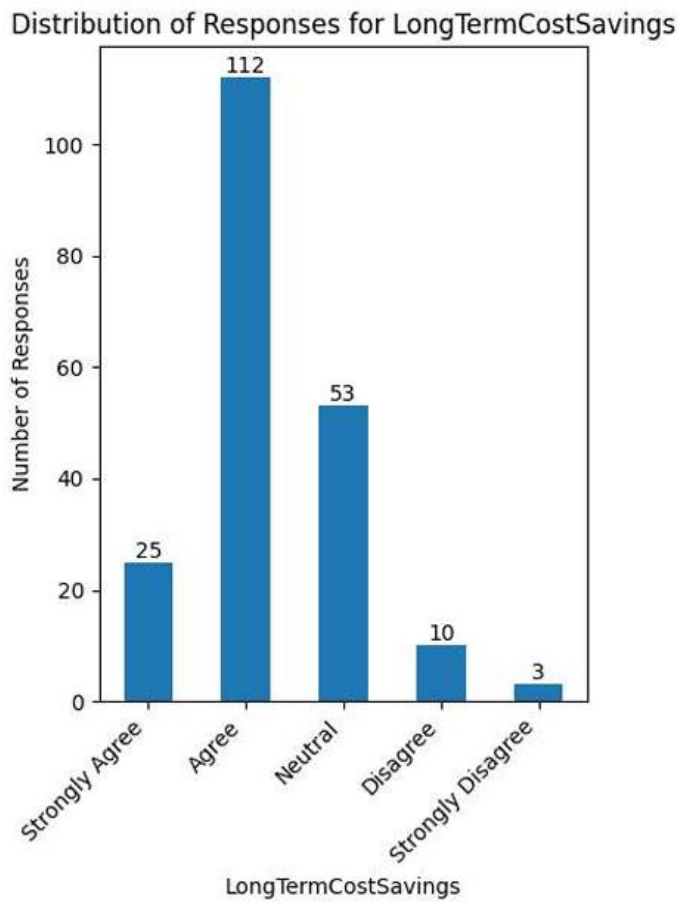


Figure 22 Distribution of Responses for Long Term Cost Savings

The bar graph shows the distribution of responses regarding the importance of long-term cost savings. The majority of respondents agree (112 responses) that long-term cost savings are an important factor, followed by those who are neutral (53 responses). A smaller portion strongly

agrees (25 responses), while fewer disagree (10 responses), and the smallest number strongly disagrees (3 responses).

Interpretation:

The data indicates that long-term cost savings are a significant factor for most respondents, with the majority agreeing that these savings are important. However, the neutral responses suggest that some individuals may not see long-term cost savings as a deciding factor in their housing decisions, or they may not fully understand the financial impact. The relatively low number of disagreements and strong disagreements further suggests that the concept of cost savings is well accepted, though more education or information might be needed to address the neutral group.

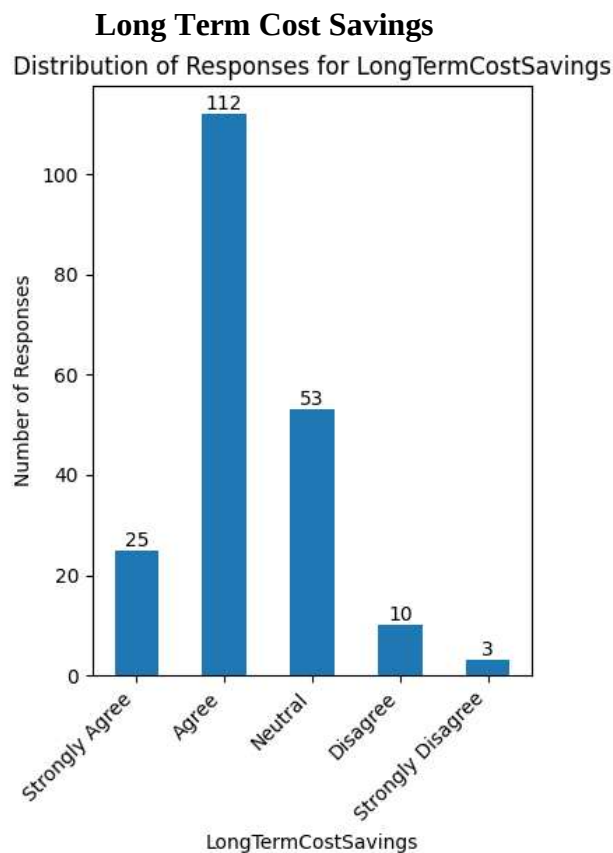


Figure 23 Distribution of Responses for Long Term Cost Savings

The bar graph shows the distribution of responses regarding the justification of high initial costs for green buildings. The majority of respondents agree (98 responses) that the higher initial costs can be justified, followed by those who are neutral (49 responses). A smaller portion strongly agrees (27 responses), while fewer disagree (21 responses), and the smallest number strongly disagrees (8 responses).

Interpretation:

The data suggests that most respondents believe the higher initial costs associated with green buildings are justified, particularly due to the long-term benefits. However, the significant number of neutral responses indicates that some individuals may not fully understand or consider the long-term financial advantages, which could affect their decision-making. The relatively low number of disagreements and strong disagreements suggests that while most recognize the value in paying more upfront for sustainability, more information or education might help convert the neutral individuals into stronger proponents of green building investments.

Hesitation for Due to Costs

Distribution of Responses for HesitationDueToCosts

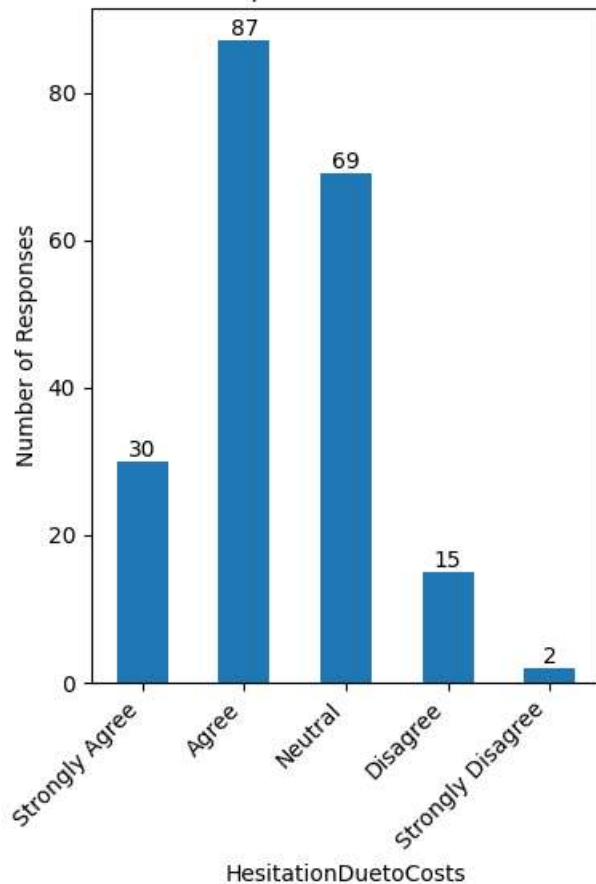


Figure 24 Distribution of Responses Hesitation for Due to Costs

The bar graph shows the distribution of responses regarding hesitation due to costs in relation to green buildings. The majority of respondents agree (87 responses) that cost is a significant factor in their hesitation, followed by those who are neutral (69 responses). A smaller portion strongly agrees (30 responses), while fewer disagree (15 responses), and the smallest number strongly disagrees (2 responses).

Interpretation:

The data suggests that cost is a major factor contributing to hesitation in adopting green buildings, as a significant number of respondents agree that they are hesitant due to higher

costs. The neutral responses indicate that some individuals may have mixed feelings or are uncertain about the financial implications of green buildings. The relatively low number of disagreements and strong disagreements suggests that, while most respondents acknowledge the cost concerns, there is still some openness to the idea of green buildings, especially if the benefits are well-communicated or financial incentives are provided.

Certification Confidence

Distribution of Responses for Certification Confidence

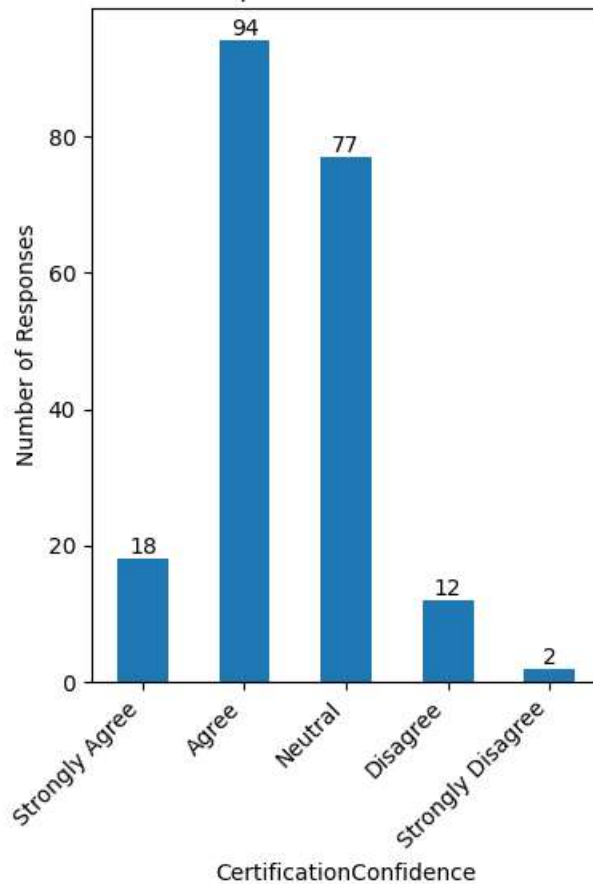


Figure 25 Distribution of Responses for Certification Confidence

The bar graph shows the distribution of responses regarding confidence in certification for green buildings. The majority of respondents agree (94 responses) that they have confidence

in the certification of green buildings, followed by those who are neutral (77 responses). A smaller portion strongly agrees (18 responses), while fewer disagree (12 responses), and the smallest number strongly disagrees (2 responses).

Interpretation:

The data indicates that most respondents have confidence in the certification of green buildings, with a significant portion agreeing that certifications provide assurance of sustainability. The neutral responses suggest that some individuals may be unsure or lack sufficient information about certifications. The low number of disagreements and strong disagreements indicates that overall, certifications are seen as a valuable tool for verifying the sustainability of green buildings, although further education on the certification process might help address the neutral group.

Buy a Certified Home

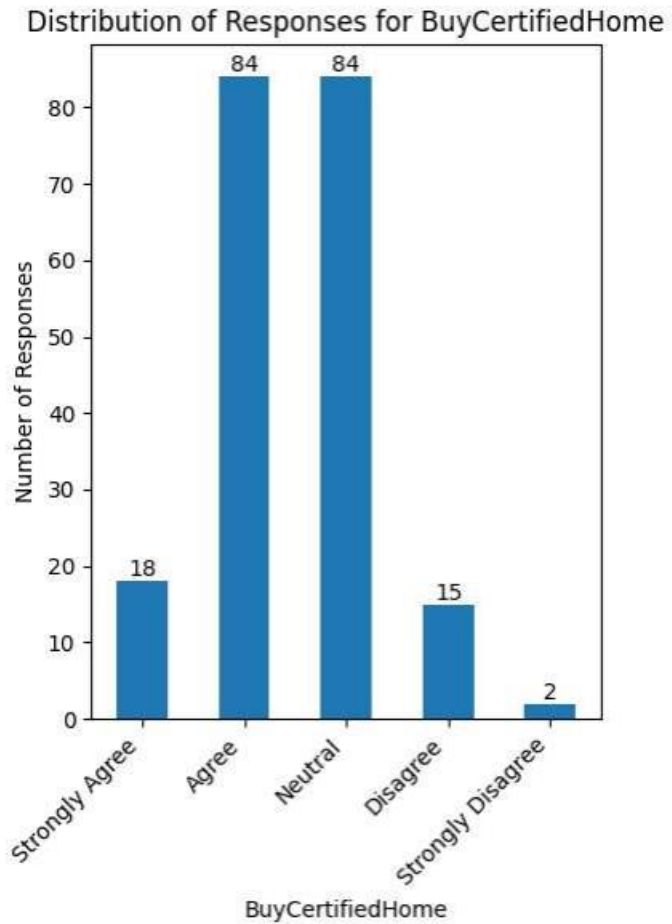


Figure 26 Distribution of Responses For Buy a Certified Home

The bar graph shows the distribution of responses regarding the willingness to buy a certified home. The majority of respondents are neutral (84 responses), followed by those who agree (84 responses) that they would consider buying a certified home. A smaller portion strongly agrees (18 responses), while fewer disagree (15 responses), and the smallest number strongly disagrees (2 responses).

Interpretation:

The data indicates that while a large number of respondents are open to buying certified homes, the majority remain neutral, suggesting that they are neither strongly opposed nor fully convinced by the idea of purchasing certified homes. The significant number of neutral responses might reflect uncertainty or lack of familiarity with green building certifications. The relatively low number of disagreements indicates that while the willingness to purchase certified homes is not universal, it is generally well-accepted. Further efforts could be made to address the neutral group by educating them on the benefits and advantages of purchasing certified green homes.

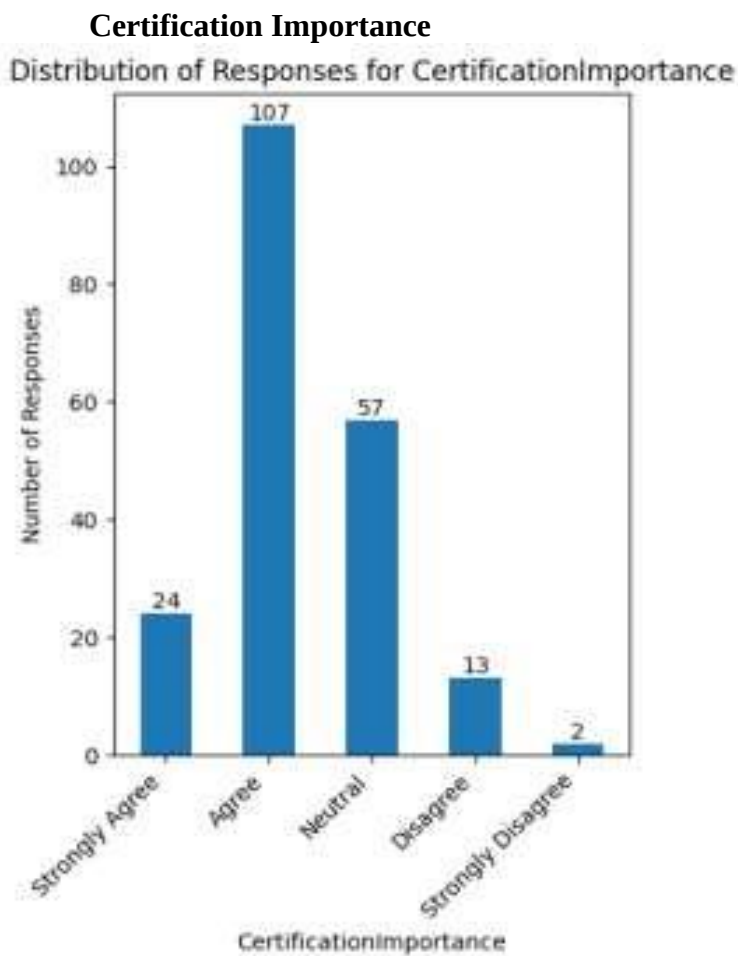


Figure 27 Distribution of Responses for Certification Importance

The bar graph shows the distribution of responses regarding the importance of certification for green buildings. The majority of respondents agree (107 responses) that certification is important, followed by those who are neutral (57 responses). A smaller portion strongly agrees (24 responses), while fewer disagree (13 responses), and the smallest number strongly disagrees (2 responses).

Interpretation:

The data suggests that certification for green buildings is seen as an important factor by most respondents, with a significant number agreeing on its value. However, the neutral responses indicate that while certification is acknowledged, its importance may not be a primary deciding factor for everyone. The relatively low number of disagreements and strong disagreements suggests broad acceptance of certification as an important aspect of green buildings, although further information or emphasis on the specific benefits of certification might help to reduce the neutral group and increase confidence in its importance.

Financial Incentives

Distribution of Responses for FinancialIncentivesInfluence

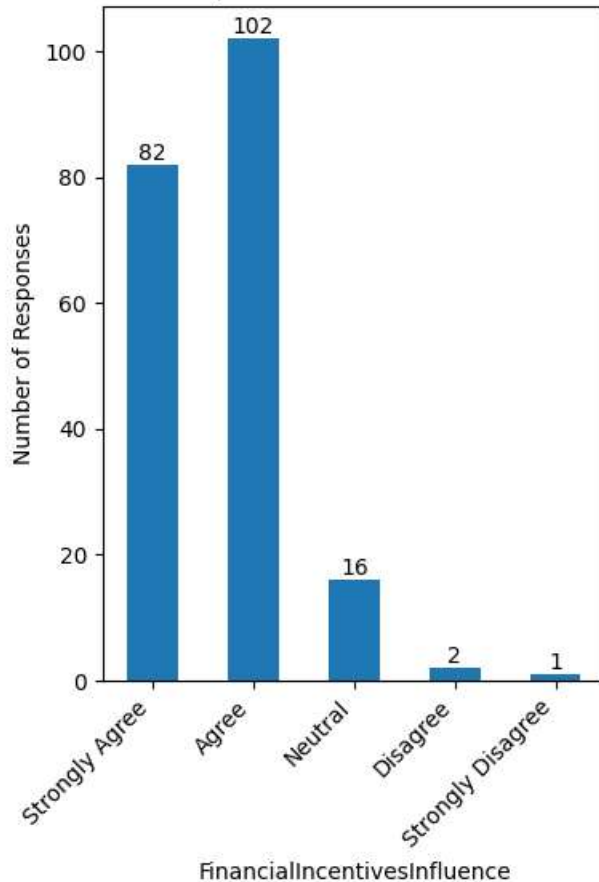


Figure 28 Distribution of Responses for Financial Incentives

The bar graph displays the distribution of responses regarding the influence of financial incentives on decision-making. The majority of respondents agree (102 responses) that financial incentives are an influential factor, with a significant number strongly agreeing (82 responses). A smaller portion is neutral (16 responses), while only a few disagree (2 responses) or strongly disagree (1 response).

Interpretation:

The data indicates that financial incentives are a major factor in influencing decision-making for most respondents. The high number of agreements and strong agreements suggests that

respondents highly value the financial benefits offered through incentives. The relatively small number of neutral, disagree, and strongly disagree responses indicates that financial incentives are generally seen as an effective motivator, but there may still be some who are uncertain or do not prioritize financial incentives as highly. This suggests that enhancing financial incentives could be an effective strategy to encourage green building adoption.

Knowledge Barrier

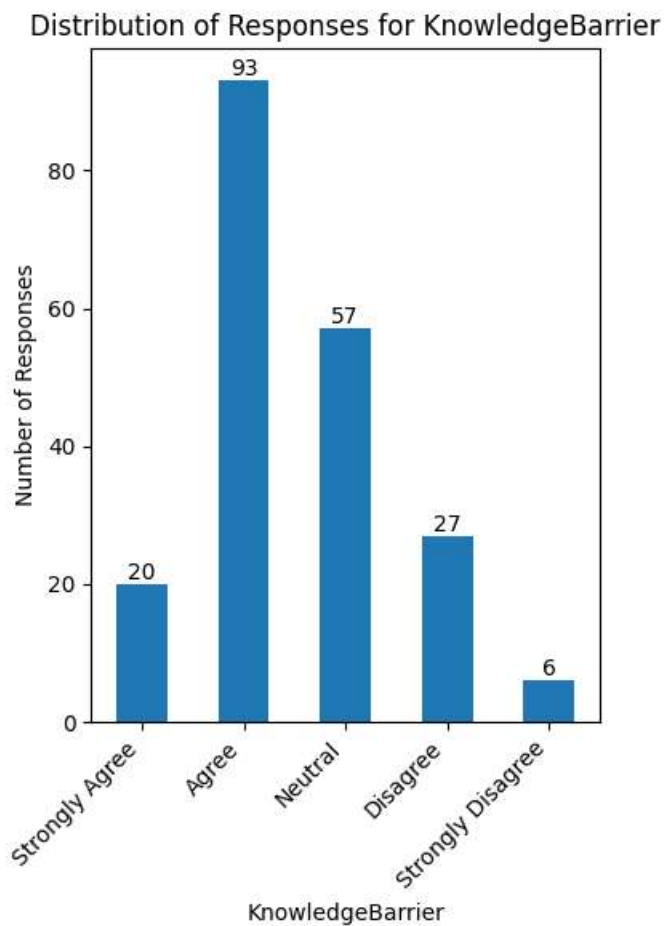


Figure 29 Distribution of Responses for Knowledge Barriers

The bar graph shows the distribution of responses regarding the complexity barrier in adopting green buildings. The majority of respondents are neutral (92 responses), followed by those who agree (51 responses) that the complexity of green buildings is a barrier. A smaller portion strongly agrees (10 responses), while fewer disagree (44 responses), and the smallest number strongly disagrees (6 responses).

Interpretation:

The data suggests that the perceived complexity of green buildings is a significant concern for many respondents, with a substantial portion being neutral, possibly indicating uncertainty or lack of clarity regarding the complexity involved. While a portion agrees that complexity is a barrier, the relatively low number of disagreements and strong disagreements shows that most respondents do not see complexity as a major deterrent. This could imply that simplifying the process or providing clearer guidance could alleviate concerns and encourage more adoption of green building practices.

Summary of RQ4:

The bar graphs explore various barriers to the adoption of green buildings, including longterm cost savings, the justification of high initial costs, hesitation due to costs, certification confidence, financial incentives, and knowledge and complexity barriers. The graph on long-term cost savings shows that the majority of respondents agree that these savings are an important factor, though a small portion remains neutral. The justification for high initial costs similarly shows strong support for the idea that the upfront cost can be justified by the long-term benefits, but there are still some neutral and opposing views. The hesitation due to costs graph reflects a significant concern, with most respondents agreeing that the high costs are a barrier, and a large number remaining neutral. Financial incentives are seen as a major influence, with overwhelming support for their importance in decision-making, suggesting that financial motivation is key to encouraging green building adoption.

The knowledge barrier graph indicates that a lack of information is seen as a significant obstacle by most respondents, while the complexity barrier is also recognized, though less strongly. Respondents are largely neutral on the complexity issue, which suggests that simplifying processes or providing clearer guidance could help reduce perceived barriers.

In summary, the data highlights that cost and financial incentives are central factors in the decision to adopt green buildings. Knowledge and complexity barriers are also significant but may be alleviated with better education and simplification of green building processes.

4.5.2 Chi Square Test

Result:

Table 7 Distribution of RQ4 Chi Square Test

Test Variable 1	Test Variable 2	Chi-Square Statistic	p-value	Degrees of Freedom
LongTermCostSavings	Income	26.4911	0.0475	16
JustificationofHighInitialCost	Income	28.5312	0.0273	16
HesitationDuetoCosts	Income	15.5660	0.4836	16
CertificationConfidence	Income	22.2788	0.1344	16
BuyCertifiedHome	Income	19.2155	0.2576	16
CertificationImportance	Income	11.1702	0.7989	16
FinancialIncentivesInfluence	Income	14.8984	0.5321	16
KnowledgeBarrier	Income	19.9115	0.2242	16

Test Variable 1	Test Variable 2	Chi-Square Statistic	p-value	Degrees of Freedom
ComplexityBarrier	Income	16.0055	0.4526	16
LongTermCostSavings	Education	31.0999	0.0131	16
JustificationofHighInitialCost	Education	25.6291	0.0595	16
HesitationDuetoCosts	Education	33.6150	0.0061	16
CertificationConfidence	Education	18.6172	0.2890	16
BuyCertifiedHome	Education	14.7942	0.5398	16
CertificationImportance	Education	16.7517	0.4018	16
FinancialIncentivesInfluence	Education	116.3814	2.7177e- 17	16
KnowledgeBarrier	Education	12.1259	0.7353	16
ComplexityBarrier	Education	11.0554	0.8061	16
LongTermCostSavings	Awareness	22.6524	0.1233	16
JustificationofHighInitialCost	Awareness	24.1536	0.0862	16
HesitationDuetoCosts	Awareness	9.8783	0.8729	16
CertificationConfidence	Awareness	30.5180	0.0155	16
BuyCertifiedHome	Awareness	27.0052	0.0414	16
CertificationImportance	Awareness	24.2851	0.0835	16
FinancialIncentivesInfluence	Awareness	17.2894	0.3671	16

Test Variable 1	Test Variable 2	Chi-Square Statistic	p-value	Degrees of Freedom
KnowledgeBarrier	Awareness	36.5407	0.0024	16
ComplexityBarrier	Awareness	20.8473	0.1845	16
LongTermCostSavings	PriorExperience	14.4463	0.0060	4
JustificationofHighInitialCost	PriorExperience	5.3079	0.2571	4
HesitationDuetoCosts	PriorExperience	5.4424	0.2448	4
CertificationConfidence	PriorExperience	5.1615	0.2711	4
BuyCertifiedHome	PriorExperience	3.8031	0.4333	4
CertificationImportance	PriorExperience	11.2149	0.0243	4
FinancialIncentivesInfluence	PriorExperience	2.7667	0.5976	4
KnowledgeBarrier	PriorExperience	20.3331	0.0004	4
ComplexityBarrier	PriorExperience	9.7092	0.0456	4
LongTermCostSavings	HomeOwnershipStatus	6.1879	0.1855	4
JustificationofHighInitialCost	HomeOwnershipStatus	3.2726	0.5133	4
HesitationDuetoCosts	HomeOwnershipStatus	1.3997	0.8442	4
CertificationConfidence	HomeOwnershipStatus	4.7557	0.3133	4
BuyCertifiedHome	HomeOwnershipStatus	1.6785	0.7946	4
CertificationImportance	HomeOwnershipStatus	2.4500	0.6536	4
FinancialIncentivesInfluence	HomeOwnershipStatus	10.9093	0.0276	4

Test Variable 1	Test Variable 2	Chi-Square Statistic	p-value	Degrees of Freedom
KnowledgeBarrier	HomeOwnershipStatus	1.5747	0.8133	4
ComplexityBarrier	HomeOwnershipStatus	6.4689	0.1668	4

Observation and Interpretation:

The Chi-square test results provide valuable insights into the factors that influence individuals' perceptions and decisions regarding green building practices. One key observation is that Income Level significantly affects both LongTermCostSavings and Justification of High Initial Cost. The statistical significance observed in these relationships suggests that individuals with different income levels may perceive the importance of long-term cost savings and the justification of higher initial costs for green buildings differently. Higher-income individuals may be more willing to justify the higher upfront costs of sustainable buildings due to a greater ability to absorb the initial expenses, while those with lower incomes may be more sensitive to these costs.

However, the Hesitation Due to Costs, Certification Confidence, Buy Certified Home, and Certification Importance variables do not show significant relationships with income. This indicates that income does not have a strong influence on whether individuals hesitate to adopt green buildings due to costs, their confidence in the certification process, or their willingness to purchase certified homes. This could suggest that factors other than income, such as personal values, environmental awareness, or understanding of the long-term benefits, may play a larger role in these decisions.

Similarly, Education Level is significantly associated with LongTermCostSavings, Hesitation Due to Costs, and Financial Incentives Influence. These findings suggest that more

educated individuals may better understand the long-term financial benefits of green buildings, such as cost savings, and are more likely to consider financial incentives when making housing decisions. However, Certification Confidence, Buy Certified Home, and Certification Importance do not show a significant relationship with education level, implying that education may not directly influence individuals' views on the importance of green building certifications or their willingness to buy certified homes. This could be due to a lack of awareness or understanding of the green certification process among people with varying education levels.

Awareness plays a crucial role in influencing factors such as Certification Confidence, Buy Certified Home, and Knowledge Barrier, with significant relationships observed between awareness and these variables. These results indicate that individuals who are more aware of green building practices are more likely to trust certification processes, be open to purchasing certified homes, and perceive knowledge barriers as a significant factor in adopting green buildings. In contrast, Financial Incentives Influence and Knowledge Barrier did not show significant relationships with awareness, suggesting that while awareness increases trust in certification and purchase willingness, it may not significantly affect perceptions of financial incentives or knowledge-related barriers.

Prior Experience also demonstrates significant relationships with LongTermCostSavings and Knowledge Barrier, which highlights the importance of previous exposure to green building practices. Individuals with prior experience in green buildings may be more aware of the long-term savings and better equipped to understand the complexities and knowledge barriers associated with these types of homes. However, Justification of High Initial Cost, Hesitation Due to Costs, Certification Confidence, Buy Certified Home, and Financial Incentives Influence were not significantly influenced by prior experience,

suggesting that these factors may be more related to personal values, external influences, or general knowledge of green building practices.

Lastly, Home Ownership Status showed significant relationships with Financial Incentives Influence, suggesting that homeowners may place a higher value on financial incentives when considering the adoption of green building practices compared to renters. However, other variables such as LongTermCostSavings, Justification of High Initial Cost, Hesitation Due to Costs, Certification Confidence, Buy Certified Home, Certification Importance, and Knowledge Barrier did not show significant relationships with homeownership status. This indicates that whether an individual owns or rents their home does not play a major role in their attitudes toward long-term savings, initial cost justification, or the complexities of adopting green buildings.

Conclusion:

Awareness plays a significant role in shaping opinions and behaviors related to green building adoption, particularly influencing confidence in certifications, buying certified homes, and knowledge barriers.

Income and education levels influence several aspects of green building preferences. Higher education levels seem to correlate with more favorable views on long-term savings, justifications for high costs, and overcoming financial barriers. Income also plays a role in justifying initial costs and perceiving long-term savings, while education impacts perceptions related to financial incentives and hesitation due to costs. However, there are no significant differences regarding certifications, knowledge barriers, and complexity barriers across income and education levels. Prior experience also has a significant impact, particularly in overcoming knowledge barriers and reducing complexity barriers. It also increases the perceived importance of certifications.

Homeownership status seems to influence the role of financial incentives but does not have a significant effect on other perceptions of green buildings.

Summary of Tests:

The Chi-square tests investigated the association between categorical variables like age, income, education, housing, and geographical location with various factors such as LongTermCostSavings, JustificationofHighInitialCost, and FinancialIncentivesInfluence.

Income showed significant relationships with LongTermCostSavings and JustificationofHighInitialCost, indicating that income influences these factors, but did not have a major impact on other dependent variables such as BuyCertifiedHome.

Education had a significant effect on FinancialIncentivesInfluence, with bachelor's degree holders more likely to respond positively to financial incentives. However, the tests showed little to no relationship with KnowledgeBarrier and ComplexityBarrier.

Awareness and prior experience significantly influence perceptions and decisions regarding green buildings. Higher awareness levels are associated with increased confidence in certifications, a greater likelihood of purchasing certified homes, and fewer knowledge barriers. On the other hand, prior experience with green buildings reduces perceived complexity and knowledge barriers, and increases the

importance of certifications. Homeownership status influences the impact of financial incentives, it does not significantly affect other factors like long-term cost savings, justification for high initial costs, or certification confidence. Overall, awareness and experience play a critical role in shaping attitudes and behaviors toward green buildings,

emphasizing the importance of education and exposure in promoting sustainable practices.

Overall Conclusion:

Chi-square tests shows significant associations observed for some variables (e.g., FinancialIncentivesInfluenceand Age) but no substantial relationships for others (e.g., HesitationDuetoCosts and Income).

In conclusion, while demographic and educational factors show some predictive power, the results imply that they alone may not fully explain decision-making processes related to long-term cost savings, justifications for high initial costs, or hesitation due to costs. The findings underscore the complexity of these relationships and suggest that additional factors, beyond the ones explored in this study, may be influencing the outcomes. Future research could benefit from exploring other potentially influential variables, as well as examining the potential interaction effects between the tested predictors.

4.6 Summary

The analysis presented in this chapter delves into the various factors influencing the adoption of green buildings, focusing on environmental awareness, sustainability, demographic influences, and barriers to adoption. The findings are based on statistical tests, including paired t-tests, regression analysis, and chi-square tests. These provide valuable insights into how socio-economic variables, such as income, education, and awareness, impact perceptions and behaviours related to green buildings.

Environmental awareness was found to significantly influence sustainability-related factors, particularly in shaping perceptions of health benefits and the importance of sustainability. However, the relationship between environmental awareness and the importance of a low ecological footprint was not statistically significant. The regression analysis revealed that income and awareness levels were key determinants of attitudes toward environmental awareness and sustainability. Specifically, higher-income individuals showed less sensitivity to environmental issues, while lower-income groups were more influenced by environmental

awareness. Education also played a role in shaping the perceived importance of long-term cost savings, with those holding higher education degrees, such as a bachelor's or master's degree, valuing these savings more highly.

Regarding demographic influences, the analysis highlighted that income and education significantly impacted perceptions of long-term financial savings, the justification of high initial costs, and the willingness to pay higher upfront costs for green buildings. Higher-income individuals were generally more willing to justify the costs, while those with lower incomes and more education were more likely to prioritize long-term savings. Interestingly, prior experience with sustainable properties notably reduced knowledge and complexity barriers but did not significantly affect other adoption factors, such as the perception of financial incentives or certification confidence.

Barriers to adoption, such as the perceived high costs, lack of knowledge, and complexity of the green building process, were also analyzed. Financial incentives were identified as a strong motivator, with respondents acknowledging their importance in decision-making. Additionally, most respondents had high confidence in certifications, although neutral responses indicated that further education on certifications could help address uncertainties. The analysis of hesitation due to costs revealed that while many respondents acknowledged cost concerns, there was still an openness to green buildings, suggesting that adoption could increase with the correct information and financial incentives.

The chi-square tests further corroborated these findings, revealing significant relationships between income, long-term savings perception, and justification of high initial costs. Education and awareness were also found to influence perceptions of financial incentives and certifications, with individuals with higher education levels valuing these incentives more. The tests also indicated that awareness significantly influenced perceptions of knowledge barriers, with more aware individuals encountering fewer barriers to adoption.

In conclusion, while demographic factors such as income and education significantly influence green building adoption, there remains a need for further awareness campaigns and financial incentives, mainly targeting lower-income groups. The study also emphasizes the importance of prior experience in overcoming barriers to adoption, suggesting that direct exposure to green buildings can help individuals better understand their benefits and reduce concerns related to cost and complexity. Overall, the findings highlight the complexity of green building adoption and the need for a multi-faceted approach that considers financial and educational interventions to encourage wider adoption.

CHAPTER V:

DISCUSSION

5.1 Discussion of what are the primary factors influencing buyer decisions when considering green buildings?

To identify and analyze the primary factors that influence buyer decisions when considering green buildings.

The analysis of buyer decision factors reveals essential insights into the preferences and behaviours of respondents regarding green building features, directly addressing Research Objective 1, which seeks to identify the primary factors influencing buyer decisions when considering green buildings. Consistent with prior studies emphasizing energy efficiency as a leading motivator for green homebuyers (e.g., Wilson et al., 2020; Liu & Zhao, 2019), energy efficiency was regarded as a critical factor by most respondents. However, the significant number of neutral responses indicates a level of uncertainty that aligns with literature highlighting price sensitivity as a barrier to green building adoption (Kats, 2017). Despite broad acceptance of energy efficiency across demographic groups, the reluctance to pay a premium underscores the persistent challenge of balancing environmental benefits with financial concerns.

Furthermore, the strong preference for indoor air quality and natural lighting, particularly influenced by age and education, aligns with established environmental psychology theories that suggest comfort and health considerations are key drivers of sustainable housing choices (Maslow, 1943; Steemers & Manchanda, 2010). The finding that education and awareness significantly impact these preferences supports previous research

emphasizing the role of environmental literacy in shaping sustainable consumption behaviours (Xiao & Hong, 2010). This highlights the importance of targeted educational programs to elevate the perceived value of green features among diverse buyer segments.

Sustainability's recognition as an important factor, although less decisive in financial willingness to pay for sustainable materials, reflects the complex interplay between environmental values and economic considerations found in the literature (Zhang et al., 2018). The observed gap in willingness to pay suggests that enhanced incentives or awareness campaigns could be instrumental in converting neutral buyers into active supporters of green building investments.

Notably, prior experience and homeownership status had limited effects on general attitudes but did influence investment willingness in sustainable materials, corroborating findings that direct exposure can increase acceptance and positive behaviours towards sustainability (Brounen & Kok, 2011). The lack of significant influence from income and housing type suggests that preferences for green building features may transcend traditional socioeconomic divisions, emphasizing the universal appeal of sustainability when adequately communicated.

The implications of these findings are significant for policymakers and developers aiming to accelerate green building adoption. They suggest that while education and awareness are crucial, addressing economic barriers remains essential to overcoming hesitation. Strategies combining financial incentives with awareness campaigns may thus be most effective in shifting buyer behaviour toward more sustainable housing choices, ultimately contributing to broader environmental goals.

5.2 Discussion of how does environmental sustainability affect the attractiveness of green buildings compared to traditional properties?

To examine the impact of environmental sustainability on the attractiveness of green buildings in comparison to traditional properties.

The discussion of sustainability impacts in the context of green building features provides critical insights into how environmental awareness, the perceived importance of a low environmental footprint, health benefits, and broader sustainability concerns shape consumer decisions, directly addressing Research Objective 2. This objective sought to examine how environmental sustainability influences the attractiveness of green buildings compared to traditional properties, and the findings reveal a nuanced picture of consumer attitudes and behaviors in this domain.

Environmental awareness emerged as a significant factor influencing sustainability attitudes, consistent with numerous studies that highlight awareness as a foundational step towards pro-environmental behavior (Kollmuss & Agyeman, 2002; Bamberg & Möser, 2007). The majority of respondents acknowledged environmental awareness as impactful in their decision-making, but the relatively high number of neutral responses suggests ambivalence or uncertainty among a sizeable portion of the population. This aligns with existing research indicating that awareness alone does not always translate into strong behavioral commitment, highlighting the complexity of sustainability adoption (Gifford, 2011). Furthermore, the data showed that individuals with lower environmental awareness were more influenced by specific sustainability-related factors such as health benefits and the importance of sustainability itself. This indicates a possible opportunity for targeted educational strategies to elevate awareness and leverage related benefits to motivate green building adoption.

The importance of maintaining a low environmental footprint was also underscored by most respondents, affirming its recognized value in sustainable decision-making (Jones et al., 2016). Yet, the substantial neutral group reflects a common challenge noted in the literature—

while many people conceptually support environmental responsibility, translating this into prioritized decision criteria often competes with other factors such as cost or convenience (Barr et al., 2005). The statistically significant association between valuing a low environmental footprint and recognizing health benefits underscores a vital linkage between environmental sustainability and personal well-being, a connection increasingly emphasized in green building literature (Mills, 2009; Kats, 2010). This suggests that marketing strategies and policy initiatives that frame green buildings as beneficial to both the planet and individual health may find greater resonance among buyers.

Health benefits were highlighted as another pivotal influence, with a majority agreeing that green buildings contribute positively to health outcomes. This is in line with evidence from environmental health research that identifies improved indoor air quality, natural lighting, and reduced exposure to toxins as benefits of sustainable construction (Mendell & Heath, 2005; Lan et al., 2017). Interestingly, the regression analysis revealed that income level played a significant role in shaping perceptions of health benefits—higher-income respondents were less likely to recognize these advantages, which could reflect differing priorities or levels of skepticism (Wang & Chai, 2019). Regional differences, particularly the elevated health benefit perceptions reported by individuals in the East region, further suggest that cultural, environmental, or market-specific factors influence how sustainability attributes are valued. Such geographic variations highlight the need for regionally tailored communication and promotional campaigns to effectively engage diverse populations.

Sustainability as a broad concept was widely acknowledged as important, reinforcing its established role as a core value driving green building interest (Roberts, 2008). However, the notable neutral response rate again points to variability in how strongly sustainability motivates purchase decisions, suggesting that other considerations may sometimes override environmental concerns. The influence of income, with lower-income individuals placing

greater emphasis on sustainability, adds complexity to prevailing assumptions that higher income equates to stronger environmental commitment. This finding aligns with research showing that economic constraints can sometimes heighten the salience of sustainability due to concerns about resource efficiency and cost savings (Jackson, 2005). Regional disparities, such as the heightened sustainability importance among respondents in the North-East, reinforce the concept that local contexts shape environmental values and decision priorities, warranting differentiated policy approaches and marketing efforts.

In sum, these findings illustrate that sustainability-related factors—environmental awareness, low environmental footprint, and health benefits—are generally supported but exert varying degrees of influence depending on individual socioeconomic characteristics, awareness levels, and geographic location. This variability emphasizes the critical role of awareness-raising and education in converting neutral or hesitant consumers into active supporters of green building sustainability. It also underscores the persistent influence of financial considerations, especially price sensitivity regarding sustainable materials, which remains a key barrier to broader adoption. Overcoming this challenge will likely require integrated approaches combining education, financial incentives, and tailored messaging that connects environmental sustainability to personal health and economic benefits. Such strategies could facilitate stronger, more consistent support for sustainability initiatives and enhance the market appeal of green buildings relative to traditional properties.

5.3 Discussion of how do demographic factors such as age, income, and education level influence buyers' preferences for green buildings?

To investigate how demographic factors, including age, income, and education level, affect buyers' preferences for green buildings.

The analysis of demographic factors provides important insights into how education, income, awareness, and prior experience influence buyer preferences and attitudes towards green buildings, directly addressing Research Objective 3. This objective aimed to investigate how key demographic characteristics shape decisions regarding sustainable residential properties.

The data reveal that while most respondents acknowledge the benefits of green buildings, demographic factors moderate the degree to which these benefits are valued. Willingness to pay higher initial costs, a crucial barrier in sustainable housing adoption, was generally positive among respondents; however, financial considerations remain significant. The regression analysis showed that income, particularly individuals earning above \$200,000, has a marginal positive influence on this willingness, suggesting that higher financial capacity facilitates greater acceptance of upfront investments in sustainability. This finding aligns with broader economic behavior theories where disposable income impacts investment decisions in non-essential goods (Thaler, 1985; Kahneman & Tversky, 1979). Conversely, education did not strongly predict willingness to pay more, indicating that knowledge and understanding of green benefits alone may not overcome financial constraints. This underscores a common theme in the literature that economic capacity often outweighs awareness in determining green purchasing behaviors (Gifford, 2011; Sovacool, 2014).

Regarding the influence of education on green building preferences, the data demonstrate a robust association between higher education levels and the recognition of education itself as a critical factor in sustainability decisions. Respondents holding Bachelor's and Master's degrees were significantly more likely to view education as a key influence, consistent with existing research that links education with greater environmental concern and pro-environmental behaviors (Diekmann & Preisendörfer, 2003; McCright & Dunlap, 2011). Interestingly, higher-income respondents were less likely to emphasize education's role,

possibly reflecting their pre-existing familiarity or resources to access sustainable options without reliance on educational interventions. This suggests that educational efforts may have the greatest impact among mid- to lower-income populations, where increasing knowledge could fill gaps in awareness and motivation.

Financial savings also emerged as a pivotal factor, with most respondents agreeing that long-term economic benefits motivate green building investments. The role of awareness was particularly pronounced here—respondents with lower awareness were less inclined to perceive financial savings as a compelling reason to adopt green buildings. This gap points to the importance of targeted educational campaigns that highlight the economic advantages of sustainability, echoing findings from studies that stress the effectiveness of clear, relatable financial messaging in promoting green behaviors (Delmas & Lessem, 2014; Dietz et al., 2009). Enhancing awareness could help mitigate perceived financial barriers and improve adoption rates, especially in demographic segments less familiar with sustainable benefits.

In summary, these findings highlight the multifaceted influence of demographic factors on green building preferences. While income and education contribute to shaping attitudes, the moderating role of awareness is critical in bridging the gap between recognizing sustainability's value and taking action. This has significant practical implications for policymakers and marketers: promoting green buildings effectively requires tailored communication strategies that address financial realities and leverage educational tools. Emphasizing long-term savings and practical benefits in messaging may particularly resonate with lower-income and less-educated groups, while highlighting environmental and health benefits may appeal to higher-educated buyers.

5.4 Discussion of what are the key drivers and barriers to adopting green building features in residential properties?

To explore the key drivers and barriers that influence the adoption of green building features in residential properties.

The analysis of drivers and barriers to adopting green building features directly addresses Research Objective 4, which aimed to explore the key factors influencing consumer decisions in residential sustainability. The findings reveal several crucial insights about the complex interplay between economic considerations, knowledge, and confidence in green building practices.

A dominant driver identified in this study is the perceived long-term cost savings associated with green buildings. The majority of respondents recognize that the financial benefits accrued over time make green buildings a sound investment. This aligns with prior research emphasizing economic incentives as strong motivators in sustainable consumer behavior (Gifford, 2011; Stern, 2000). However, the presence of neutral respondents signals that this understanding is not universal, highlighting the need for targeted educational campaigns to clearly communicate the economic advantages and lifecycle cost reductions of green buildings.

The justification of higher initial costs also found substantial support, with most participants agreeing that upfront expenses are warranted by the ensuing benefits. This reinforces findings in the literature that while initial costs can be a psychological barrier, perceived long-term value can offset this concern (Zuo & Zhao, 2014; Kats et al., 2003). Yet, the neutral responses again suggest that some potential buyers remain unconvinced, possibly due to insufficient awareness or direct experience with green building benefits, emphasizing a gap between knowledge and decision-making that education and outreach could bridge.

Cost-related hesitation remains a notable barrier, confirming widespread concerns about affordability that have been extensively documented (Wilson & Dowlatabadi, 2007;

Jackson, 2005). The fact that many respondents are still neutral indicates an opportunity to convert this ambivalence through policy measures like subsidies or financing schemes that reduce the initial financial burden. Financial incentives emerged as one of the most strongly endorsed motivators in this study, with respondents overwhelmingly agreeing that rebates, tax breaks, or other economic supports can significantly encourage green building adoption. This corroborates the critical role of incentives found in earlier work as effective tools to accelerate sustainable housing uptake (Sunikka-Blank & Galvin, 2012; Brown & Southworth, 2018).

Confidence in green building certifications, such as LEED or Green Mark, was identified as another important factor influencing adoption decisions. While many respondents expressed trust in these certifications as credible assurances of sustainability, a sizeable neutral group points to lingering uncertainty or unfamiliarity with certification processes. This highlights the importance of improving transparency and consumer education about certification standards to strengthen confidence and thereby facilitate market acceptance (Reh et al., 2014; Kats et al., 2010).

Knowledge barriers—specifically, lack of information about green building benefits and processes—remain significant impediments. The study's results confirm the widely acknowledged challenge that limited understanding and awareness hinder widespread adoption (Kollmuss & Agyeman, 2002; Abrahamse et al., 2005). Complexity in adoption was less frequently perceived as a major barrier but nonetheless represents an area where simplifying procedures and offering clearer guidance could further reduce resistance (Fuerst & McAllister, 2011).

In summary, the findings indicate that economic factors—long-term savings, initial cost justification, and financial incentives—are the primary drivers in green building adoption, while knowledge gaps and hesitations linked to cost and complexity continue to pose barriers. These results have important practical implications: policymakers and industry stakeholders

should prioritize educational initiatives that clearly communicate the economic and environmental benefits of green buildings, enhance transparency around certifications, and expand financial incentive programs to lower upfront barriers. By addressing both financial concerns and informational deficits, it is possible to foster greater acceptance and accelerate the transition to sustainable residential construction.

5.5 Answer's To Research Questions

1. What are the primary factors influencing buyer decisions when considering green buildings?

When considering green buildings, various factors significantly influence buyer decisions, ranging from financial to environmental and health-related considerations. One of the most important drivers is long-term cost savings. Although green buildings may come with higher initial costs, many buyers consider them a worthwhile investment due to their energy-efficient features, such as better insulation, appliances, and renewable energy systems. These features help reduce long-term utility bills, making green buildings appealing to those looking for long-term financial savings. However, some buyers remain neutral, possibly due to a lack of understanding of the economic benefits or a preference for short-term savings.

Sustainability and environmental impact also play a crucial role in buyer decisions. Green buildings are perceived as more sustainable compared to conventional buildings, offering benefits like reduced energy consumption, lower carbon footprints, and minimal environmental impact. As climate change and resource depletion become pressing concerns, more buyers seek properties that align with their environmental values. The desire to contribute to reducing greenhouse gas emissions and lowering their ecological footprint motivates many buyers, particularly those who prioritize sustainability in their lifestyle choices.

Health considerations are becoming increasingly important, with health benefits emerging as another factor influencing decisions. Green buildings often feature improved indoor air quality, natural lighting, and better ventilation, contributing to a healthier living environment. These features are beautiful to individuals who prioritize wellness, as studies have shown that better air quality and natural light can improve physical and mental health. The perception of green buildings as healthier living spaces is growing, especially as buyers become more aware of the risks associated with traditional building materials.

Another critical factor is certification and credibility. Certifications such as LEED (Leadership in Energy and Environmental Design) and Green Mark are independent third-party assurances that a building meets specific environmental standards. Buyers value these certifications as they provide a verifiable measure of a building's sustainability. However, some buyers remain neutral or uncertain about the importance of certifications, indicating that increased education and awareness may be necessary to boost confidence in the certification process.

Financial incentives such as tax breaks, rebates, or government subsidies are essential motivators for many buyers. These incentives help mitigate the higher initial costs of green buildings, making them more financially accessible. In regions with such incentives, they can make green buildings more attractive to a broader range of buyers, especially those hesitant about the upfront costs.

Knowledge barriers are a significant hurdle in the adoption of green buildings. Many buyers report a lack of understanding about the benefits, processes, and available incentives related to green buildings. This knowledge gap can lead to misconceptions and confusion, hindering adoption. Addressing these barriers through educational campaigns and providing more precise information could help increase the acceptance of green buildings.

Finally, complexity barriers also contribute to hesitation in purchasing green buildings. While not as prominent as financial or knowledge barriers, the perceived complexity of

understanding and navigating the certification process and the details of sustainable technologies remains a concern. Simplifying these processes or offering clearer guidance could help make green buildings more accessible and less intimidating to potential buyers.

In summary, financial, environmental, health, and educational factors influence buyer decisions regarding green buildings. Key drivers include long-term cost savings, sustainability, health benefits, and certification credibility. However, barriers such as knowledge gaps and perceived complexity persist. By continuing to provide education, financial incentives, and more precise information about the benefits of green buildings, it is possible to address the neutral or hesitant groups, fostering broader adoption in the future.

2. How does environmental sustainability affect the attractiveness of green buildings compared to traditional properties?

Environmental sustainability plays a pivotal role in enhancing the attractiveness of green buildings compared to traditional properties. Green buildings are designed to reduce environmental impact, making them highly appealing to environmentally conscious buyers. This appeal stems from various factors tied to sustainability, including energy efficiency, resource conservation, and reduced carbon footprints.

First, energy efficiency is one of the key factors that sets green buildings apart. These properties are designed with energy-efficient systems, such as advanced insulation, low-energy lighting, energy-efficient appliances, and renewable energy sources like solar panels. These features reduce the overall energy consumption of the building, resulting in lower utility costs for the occupants. Compared to traditional properties, which may rely on outdated and inefficient systems, green buildings offer significant savings over time, making them an attractive investment for long-term cost-conscious buyers.

Second, resource conservation is another significant element. Green buildings use sustainable building materials and practices that minimize waste and reduce the depletion of natural

resources. This includes using recycled or locally sourced materials and reducing water usage through low-flow fixtures and water-efficient landscaping. Such practices help conserve valuable resources and align with broader societal efforts to reduce environmental degradation. In contrast, traditional buildings may lack these sustainable elements and contribute more heavily to resource consumption and waste.

Moreover, lower carbon footprints are a central appeal of green buildings. They are designed to reduce greenhouse gas emissions by incorporating energy-saving technologies, renewable energy sources, and sustainable construction practices. For buyers who are particularly concerned about climate change, the environmental sustainability of a property is a key motivator. Green buildings actively contribute to lowering the carbon footprint, which makes them highly attractive to those looking to reduce their environmental impact.

The growing societal concern about climate change and environmental degradation has amplified the demand for sustainable living options. Buyers are increasingly aware of the importance of adopting practices that support environmental preservation, and green buildings directly fulfil this need. These properties offer long-term financial benefits and allow individuals to live in a way that aligns with their ecological values.

In contrast, traditional buildings, which are often built with less attention to energy efficiency and sustainability, are seen as less environmentally friendly. While they may be less expensive to purchase initially, they come with higher operational costs due to inefficiency. They may contribute more to environmental issues, making them less attractive to buyers who prioritize sustainability.

In summary, environmental sustainability significantly enhances the attractiveness of green buildings by offering energy efficiency, resource conservation, and a lower carbon footprint. As consumers become more environmentally conscious, green buildings are appealing because of their long-term cost savings and because they align with broader environmental

goals. Conversely, traditional buildings, with their higher ecological impact and inefficiency, are less attractive to a growing market segment that values sustainability.

3. How do demographic factors such as age, income, and education level influence buyers' preferences for green buildings?

Demographic factors such as age, income, and education level significantly influence buyers' preferences for green buildings. Each of these factors plays a unique role in shaping how potential buyers perceive the value, benefits, and desirability of green buildings compared to traditional properties.

Age: Age influences how buyers perceive the importance of sustainability in green buildings. Younger buyers, particularly Millennials and Generation Z, are more likely to prioritize environmental concerns and sustainability in their purchasing decisions. These groups are generally more attuned to the issues of climate change, energy conservation, and social responsibility. For them, green buildings represent not only a smart financial choice but also a way to align their lifestyle with their environmental values. On the other hand, older buyers, such as Baby Boomers, may place less emphasis on sustainability and more on traditional factors like comfort, location, and investment value. This generational divide suggests that the appeal of green buildings may be more pronounced in younger age groups who are more willing to pay a premium for eco-friendly features and long-term sustainability.

Income: Income is one of the most significant factors influencing preferences for green buildings. Higher-income buyers are often more willing to invest in green buildings, as they have the financial capacity to absorb the higher initial costs that come with energy-efficient technologies and sustainable building materials. These buyers may view the long-term cost savings from lower energy bills, tax incentives, and potential higher resale value as justifying the upfront investment. Furthermore, high-income individuals may be more inclined to prioritize sustainability because they can afford to support environmental initiatives. In

contrast, lower-income buyers might be more hesitant about the initial investment required for green buildings. Despite being aware of the long-term savings, they may prioritize affordability and short-term financial concerns over the environmental benefits. For these buyers, the decision to purchase a green building may be influenced more by financial incentives, subsidies, and a clearer understanding of the long-term financial benefits.

Education Level: Education plays a crucial role in shaping how buyers perceive the importance of green buildings. Higher levels of education are typically associated with a greater awareness of environmental issues and the long-term benefits of green buildings. Educated buyers are more likely to appreciate the environmental and economic advantages of green buildings, such as energy efficiency, lower utility bills, and improved health outcomes. Bachelor's, master's, or doctoral degree holders tend to prioritize sustainability in their purchasing decisions, as they have a deeper understanding of how green buildings contribute to reducing carbon footprints and preserving natural resources. Conversely, individuals with lower levels of education, such as those with only a high school diploma, may have less awareness of green building concepts or may not perceive the additional cost as justifiable. These buyers may be less likely to seek out green buildings unless they are educated about the long-term savings and environmental benefits.

Interplay of Demographic Factors: The interplay between these demographic factors further shapes green building preferences. For instance, a young, highly educated, high-income buyer is more likely to prioritize sustainability and may be willing to pay a premium for a green building. Conversely, an older, lower-income, and less educated buyer may be more focused on immediate affordability and less concerned about environmental impact. As such, understanding the demographic profile of potential buyers is essential for developers and policymakers who aim to market green buildings effectively. Tailoring marketing strategies to

highlight the specific benefits that resonate with different demographic groups can help address their unique concerns and increase the appeal of green buildings.

In conclusion, age, income, and education level all significantly influence how buyers view and prioritize green buildings. Younger, wealthier, and more educated buyers tend to place greater value on sustainability and are more likely to invest in green buildings, while older, lower-income, and less educated buyers may be more hesitant or focused on other factors. By understanding these demographic influences, stakeholders in the green building sector can better target their marketing and sales strategies to align with buyers' preferences, ultimately driving greater adoption of sustainable properties.

4. What are the key drivers and barriers to adopting green building features in residential properties?

Several key drivers and barriers influence the adoption of green building features in residential properties. These factors are shaped by economic, environmental, and social considerations, as well as the level of awareness, experience, and incentives available to prospective buyers.

Key Drivers of Green Building Adoption

1. Long-Term Financial Savings: One of the most compelling drivers for adopting green building features is the potential for long-term financial savings. Green buildings are designed to be energy-efficient, with features such as improved insulation, energy-efficient appliances, and renewable energy systems like solar panels. These features significantly reduce energy consumption and lower utility bills over time. Buyers who view their home as a long-term investment are attracted to these savings, as lower operational costs offset the higher upfront costs associated with green buildings.

2. Environmental Sustainability: Increasing awareness of climate change and ecological degradation has driven many buyers to prioritize sustainability. Green buildings are designed to reduce a property's carbon footprint through features like energy efficiency, water

conservation, and sustainable materials. Many buyers desire to contribute to environmental protection by reducing energy use, minimizing waste, and using renewable resources. As environmental concerns grow globally, more individuals seek to live in homes that align with their sustainability and resource conservation values.

3. Health and Wellness: The health benefits of green buildings also play a critical role in driving their adoption. Green buildings often incorporate features that enhance indoor air quality, natural ventilation, and natural lighting, which can positively impact the health and well-being of occupants. These factors appeal to health-conscious buyers prioritizing living environments promoting physical and mental well-being. Studies have shown that access to natural light, improved air quality, and better ventilation can reduce the risk of respiratory issues, allergies, and other health problems, making these features a strong incentive for potential homeowners.

4. Government Incentives and Policies: Financial incentives, such as tax breaks, subsidies, or government grants, are significant motivators for adopting green building features. These incentives help reduce the initial investment required to incorporate sustainable technologies and materials into residential properties. Many governments, particularly in regions with strong sustainability goals, offer these incentives to encourage the construction and purchase of green homes. Policies that mandate or incentivize sustainable building practices also push developers and homebuyers toward green solutions.

5. Certification and Credibility: Green building certifications, such as LEED (Leadership in Energy and Environmental Design) or Green Mark, serve as a trusted third-party verification of a property's sustainability. These certifications provide buyers with confidence that the building meets high environmental standards. The growing importance of certifications has made them a key driver for adoption, as they ensure sustainability and enhance the property's marketability and resale value.

Key Barriers to Green Building Adoption

1. **High Initial Costs:** The higher initial cost is one of the most significant barriers to adopting green building features. Sustainable materials, energy-efficient appliances, and renewable energy systems often come with a premium, which can deter potential buyers. While long-term savings can offset these costs, the higher upfront investment may be a significant financial hurdle for buyers unable or unwilling to pay more for these features. For some, the perceived return on investment may not justify the initial expense.
2. **Lack of Awareness and Knowledge:** A significant barrier to adopting green building features is the lack of awareness and understanding about the benefits of sustainable building practices. Many prospective buyers may not fully comprehend green buildings' long-term financial, health, and environmental advantages. Without clear, accessible information about the advantages of green buildings and how to access available financial incentives, some buyers may remain hesitant to invest in green features. Overcoming this knowledge barrier requires effective education and marketing highlighting green building investments' immediate and long-term benefits.
3. **The complexity of the Building Process:** The perceived complexity involved in integrating green building features can deter developers and homeowners from pursuing sustainability. Adopting energy-efficient technologies, sustainable materials, and renewable energy systems requires specialized knowledge and expertise. Additionally, navigating the certification process and ensuring the building complies with environmental standards can be cumbersome. Simplifying the process and offering more explicit guidance and support for developers and buyers could help mitigate these concerns and make green building adoption more accessible.
4. **Financing Challenges:** While financial incentives exist, the overall cost of financing green buildings remains a barrier for many. Lenders may be unfamiliar with the long-term financial benefits of green buildings and may be hesitant to offer favourable financing terms for

sustainable properties. Additionally, the valuation of green features in appraisals can be inconsistent, leading to potential buyers perceiving that the higher initial costs are not adequately recognized in the market. This financing gap creates uncertainty and discourages investment in green buildings.

5. Perceived Risk and Uncertainty: Some buyers may perceive green building technologies as unproven or experimental, especially in markets with relatively new green buildings. This perception can create a sense of uncertainty or risk, as buyers may worry about the reliability, durability, or maintenance costs of green building technologies. Additionally, the long-term benefits of green buildings may not be immediately apparent, leading some buyers to question whether they will truly experience the anticipated savings and environmental advantages.

6. Cultural and Social Norms: In some markets, cultural preferences or social norms may not align with the values promoted by green buildings. For example, adopting modern, sustainable design features may face resistance in regions where traditional construction methods and building styles dominate. Changing these cultural attitudes and encouraging a shift toward more sustainable living practices requires a concerted effort from policymakers, developers, and community leaders.

CHAPTER VI:

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary

This study provides a comprehensive understanding of the factors influencing the adoption of green buildings, highlighting the critical roles of long-term financial savings, sustainability, health benefits, and demographic characteristics such as income, education, and awareness. While there is broad support and recognition of the benefits that green buildings offer—especially in terms of environmental impact and improved health—significant barriers

persist, primarily related to high upfront costs, limited knowledge, and perceived complexity of the adoption process.

Income and education emerge as influential factors shaping how individuals perceive and value green building features. Higher-income and more educated buyers tend to better appreciate the long-term economic and environmental advantages, demonstrating a greater willingness to invest in green buildings. Conversely, lower-income groups and those with less awareness face more substantial obstacles, underscoring the importance of targeted educational efforts and financial support to bridge these gaps.

Financial considerations strongly impact buyer decisions, with many recognizing the value of long-term savings from green building investments. However, neutral and hesitant responses suggest that the economic benefits are not fully understood or appreciated by all, highlighting the need for clear, accessible communication around the financial advantages. Education and awareness also play a pivotal role in building trust—particularly in certifications and incentives—that can motivate adoption.

Knowledge barriers and uncertainty about certification processes further limit green building uptake. Although complexity is a less prominent barrier, simplifying procedures and providing clearer guidance are recommended to facilitate smoother adoption experiences. The strong endorsement of financial incentives indicates that policy measures such as subsidies, tax rebates, and grants could effectively reduce the impact of initial cost concerns and encourage wider acceptance.

Unique Contribution

This research contributes uniquely to the green building adoption literature by integrating a multi-dimensional analysis that combines economic, environmental, and social factors with demographic influences, including nuanced effects of awareness and prior

experience. Unlike many previous studies that focus on isolated factors, this study offers a holistic perspective that captures the interplay between financial concerns, knowledge gaps, and demographic profiles in shaping adoption behavior. Furthermore, the findings on regional and income-based variations in perceptions of health benefits and sustainability provide novel insights for localized policy and marketing strategies. This comprehensive approach equips policymakers, developers, and educators with deeper, actionable knowledge to design more effective interventions that target specific barriers and leverage key motivators within diverse buyer segments.

Overall, the findings emphasize that increasing awareness through tailored education, improving transparency and credibility of certifications, and offering targeted financial incentives are essential strategies to overcome barriers and promote the adoption of green buildings. By addressing both economic and informational challenges, stakeholders can enhance consumer confidence and accelerate the transition toward more sustainable residential construction.

6.2 Implications

The findings of this study have several important implications for both academic research and practical applications in the green building sector. The insights gained from analyzing buyer decision factors, sustainability impacts, and the role of demographic influences provide valuable guidance for stakeholders looking to promote and adopt green building practices in residential properties.

Implications for Policy Makers: The study's findings suggest that policymakers should focus on enhancing public awareness and education about the benefits of green buildings, particularly in terms of long-term financial savings, environmental sustainability, and health benefits. Policymakers can play a critical role by offering financial incentives, such as rebates or tax breaks, to reduce the initial costs of green buildings and make them more accessible to a

broader range of buyers. Additionally, policies that promote energy efficiency standards and green building certifications, such as LEED and Green Mark, could drive the adoption of sustainable building practices.

Implications for Developers and Real Estate Market: For developers, the study highlights the importance of addressing the price sensitivity of potential buyers by emphasizing the long-term savings and sustainability benefits of green buildings. Additionally, builders should focus on integrating green features that contribute to health and wellness, such as natural lighting and improved indoor air quality. Developers could also benefit from offering properties with recognized sustainability certifications to enhance marketability and provide assurance to potential buyers. Understanding the demographic factors that influence green building preferences, such as age, income, and education level, will help tailor marketing efforts to different market segments and increase buyer engagement.

Implications for Educators and Sustainability Advocates: The study underscores the need for targeted education and outreach campaigns to raise awareness about the economic and environmental benefits of green buildings. Educational institutions and sustainability advocates should focus on informing the public, particularly those with lower awareness, about the advantages of investing in sustainable properties. Given the varying preferences across different demographic groups, educators can develop tailored curricula and resources that emphasize the value of green buildings in terms of both personal health and environmental impact.

Implications for Future Research: This study contributes to the understanding of factors that drive green building adoption, but further research is needed to explore the effectiveness of different marketing and educational strategies in promoting green buildings. Future studies could examine regional variations in green building preferences, particularly in developing areas, and assess the impact of specific policy interventions on the adoption of sustainable

housing solutions. Additionally, research into the long-term financial performance of green buildings could provide more concrete evidence to further support their economic advantages. In conclusion, the implications of this study point to the need for a collaborative effort between policymakers, developers, educators, and sustainability advocates to address barriers to green building adoption, raise awareness, and ultimately create a more sustainable and eco-friendly residential real estate market.

6.3 Recommendations for Future Research

Based on the findings of this study, future research should prioritize a few key areas to effectively advance understanding and promote green building adoption:

Regional and Socioeconomic Influences: Further investigation is needed on how regional and income-related factors affect green building preferences and barriers. Understanding geographic and economic disparities will help tailor policies and interventions that address localized needs and improve accessibility for lower-income buyers.

Effectiveness of Financial Incentives and Policy Measures: Research should evaluate how current government incentives, subsidies, and regulations influence adoption rates. Identifying which policy tools most effectively reduce upfront costs and encourage sustainable construction will provide critical guidance for policymakers.

Role of Consumer Education and Awareness: Given the clear impact of awareness on adoption, future studies should focus on assessing the effectiveness of targeted educational campaigns. Understanding which messaging strategies best improve knowledge and motivation across demographic groups can enhance outreach efforts.

Impact of Green Building Certifications: There is a need to explore how certification systems affect consumer trust, market value, and adoption decisions.

Investigating the credibility and recognition of certifications will help improve their role as market drivers.

By concentrating on these priority areas—regional and economic contexts, policy impact, education, and certification—future research can generate actionable insights that directly address the most significant barriers and drivers to green building adoption.

APPENDIX A

SURVEY COVER LETTER

Instructions:

Thank you for participating in this survey. Your responses will help us understand buyer preferences and factors influencing the adoption of green buildings in Singapore's residential market. Please indicate how strongly you agree or disagree with each statement by selecting one of the following options:

- Section 1: Demographic Information (Select the most appropriate response).
- Sections 2-5: Please indicate how strongly you agree or disagree with each statement using the following 5-point Likert scale:

- 1 – Strongly Disagree
- 2 – Disagree
- 3 – Neutral
- 4 – Agree
- 5 – Strongly Agree

Section 1: Demographic Information

1. What is your age group?

- ☐ 18-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55 and above

2. What is your annual household income?

- ☐ Less than \$50,000
- ☐ \$50,000 - \$100,000

☐ \$100,000 - \$150,00

☐ \$150,000 - \$200,000

☐ Above \$200,000

3. What is the highest level of education you have completed?

☐ High School Diploma

☐ Associate Degree

☐ Bachelor's Degree

☐ Master's Degree

☐ Doctorate or higher

4. What type of housing are you most interested in purchasing?

☐ Condominium

☐ Apartment

☐ Landed House

☐ Executive Condominium

☐ Others (please specify) _____

5. How aware are you of green buildings and their benefits?

☐ Not aware

☐ Slightly aware

☐ Somewhat aware

☐ Very aware

☐ Extremely aware

6. Have you previously lived in or owned a property with green building features?

☐ Yes

☐ No

7. Are you currently a homeowner?

☐ Yes

☐ No

8. Which region do you live in?

☐ Central

☐ East

☐ North

☐ North-East

☐ West

Section 2: Primary Factors Influencing Buyers' Decisions

9. Energy efficiency is an important factor for me when buying a home.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

10. I am willing to pay more for a home with energy-efficient features.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

11. I value better indoor air quality when choosing a home.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

12. Features like natural lighting and sound insulation are important to me.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

13. I consider the use of sustainable materials important when purchasing a home.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

14. I would pay more for a home built with sustainable materials.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

15. Section 3: Impact of Environmental Sustainability

My awareness of environmental issues influences my decision to buy a green building.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

16. I prefer a home that reduces my environmental footprint.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

17. Green buildings provide significant health benefits that make them more attractive to me.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

18. Environmental sustainability is a key factor in making green buildings more attractive than conventional homes.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section 4: Influence of Demographic Variables

19. I am more likely to purchase a green building if I can afford the initial higher costs.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

20. My education level influences my preference for green building features.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

21. I am more inclined to buy a green building because of the long-term financial savings, despite the upfront costs.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section 5: Drivers and Barriers to Green Building Adoption

22. I am attracted to green buildings because of long-term cost savings.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

23. Reduced utility bills justify the higher initial cost of green buildings.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

24. I am hesitant to buy a green building due to the upfront costs.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

25. Green building certifications (e.g., LEED, Green Mark) increase my confidence in a property.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

26. I would be more likely to buy a home with a certification like LEED or Green Mark.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

27. Certifications are important when evaluating a home's sustainability.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

28. Financial incentives (e.g., tax rebates) would encourage me to adopt green building practices.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

29. A lack of knowledge about green building certifications and their benefits is a barrier to adoption for me.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

30. The complexity of green building certifications (e.g., LEED, Green Mark) discourages me from adopting green practices.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

APPENDIX B
INFORMED CONSENT

Research Title:

Evaluating the Attractiveness of Green Building Quantitative Model of Buyer Drivers in Singapore's Residential Market

Principal Investigator :

My name is TAN Wei Ler Edwin, I am a Bachelor of engineering with Second Class Honours (Second Division) having followed an approved programme in Electrical and Electronic Engineering

Purpose of the Study:

You are invited to participate in a research study that aims to explore the factors driving the attractiveness of green buildings in Singapore's residential market. The purpose of this study is to evaluate the key buyer drivers influencing the decision to adopt green buildings, focusing on demographic, financial, and environmental factors. By employing a quantitative model, this research seeks to provide insights into the market dynamics and inform strategies for promoting sustainable housing solutions in Singapore.

Procedures:

If you agree to participate, you will be asked to complete a structured survey. The survey will include questions about your experiences, preferences, and perceptions regarding health insurance marketing strategies. It will take approximately 15–20 minutes to complete.

Confidentiality:

All information you provide will be kept confidential and used solely for academic purposes. Your responses will be anonymized to ensure that no personally identifiable information is included in the study's results. The data will be securely stored and accessed only by the researcher and authorized personnel.

Potential Risks and Benefits:

There are no significant risks associated with participating in this study. Your participation will contribute to valuable insights into improving health insurance marketing strategies, which may ultimately benefit consumers and the industry.

Consent Statement:

By signing below, you confirm that you have read and understood the information provided above. You consent to participate in this study and allow the researcher to use your responses for academic purposes.

Participant's Name: _____

Participant's Signature: _____

Date: _____

Researcher's Signature: _____

Date: _____

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