

# What Kind of “Green” do the Guests Want? An Exploration of Adoption of Luxury Hotel Green Room Attributes

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**Abstract.** *This study aims to provide insights for sustainability initiatives in Singapore luxury hotels. We explore the impact of green room attributes toward guests' satisfaction and hotel selection. We surveyed 387 respondents to identify their preferences for green room attributes. Among different green room attributes, we find that younger travelers are satisfied with cloth laundry bags, while older travelers appreciate wooden keys. A female guest is more likely to enjoy eco-friendly food and beverages amenities, while a male guest is more likely to appreciate motion or occupancy sensors. With regard to choosing a hotel, those traveling for leisure and at an older age ranked service quality as more important. Female travelers appreciate cleanliness compared to room rates, and those with higher education ranked sustainability initiatives higher. The analysis of demographic factors can be referenced by the hospitality industry practitioners and the hoteliers of luxury hotels operators when they plan to implement green room features or marketing strategies targeted to a specific segment of customers. As for the greater aim, the research contributes to the literature that focuses on the rise of green consumption to support global sustainability initiatives.*

**Keywords:** *green room attributes, luxury hotels, sustainability, guest satisfaction, hotel selection*

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## 1. Introduction

From the report of the World Travel & Tourism Council, the tourism industry plays a significant role in providing 330 million jobs (in 2019) and helping to build better lives for millions of individuals and communities in the world, and hence, the going concern of the industry is beneficial for world economics (World Travel & Tourism Council, 2023). However, people are becoming more aware of the possible damage caused to the environment by hospitality business activities, and tourists are more concerned about environmental protection when traveling. Growing concerns for environmental and sociocultural consequences of tourism development has given rise to influential changes in the industry, devoting increasing attention to sustainable forms of tourism.

As a large sector of the tourism industry, the hotel industry is resource-intensive and thus has a greater impact on the natural environment among all hospitality sectors (Rahman et al., 2012). Hotel properties are considered as one of the highest energy consumers among non-residential properties (Huang et al., 2015). Hence, with more and more guests looking for hotels that follow practices to protect the environment, hotel managements are experiencing challenges in implementing effective sustainable policies and practices, yet at the same time upholding their service quality in the competitive markets (Kang et al., 2012). Hotel guests have demonstrated strong awareness of hotels' social responsibility and their environmentally friendly efforts (Ham & Han, 2013). Customers are likely to be interested in green products or services, such as a green hotel room (Millar & Baloglu, 2011). With the recognition of changing mindset, hotels have integrated green room attributes in order to remain relevant and noticeable within the competitive market (Han et al., 2009), and green management in the hotel industry has played a critical role in marketing and operational planning.

Despite the opportunity to publicly showcase sustainability-based effort, some hoteliers remain slow to invest in green initiatives particularly when they are not convinced if green investments are financially beneficial. New green practices require significant initial investments, and quantifying returns such as improvement to a hotel's reputation is often difficult to measure especially in a short term (Bird et al., 2007).

With the Covid-19 pandemic, the pressure on hotel management is getting more intense than before. When travel restrictions are implemented, tourism ceases to exist and there are less or no profits for commercial tourism enterprises, tourism associated organizations and other groups which rely on tourism (Matikiti-Manyeverve & Rambe, 2022). The World Tourism Organization (WTO) reported that during the second quarter of 2020, 100% of worldwide destinations imposed travel restrictions, and international tourism was nearly completely interrupted (UNWTO, 2023). When the resources are limited and the result of the investment is reasonably hard to quantify, the hotel management need to find green practices that are able to achieve not only positive environmental impact, but also to provide business profitability.

The issue for hoteliers who want to do the right thing both in terms of sustainability and in terms of profit considerations is to understand customers' inclination. However, full dimensions of customers' preferences for green room attributes in hotel rooms remain unclear. Previous studies on guests' preferences for green hotel attributes, which focused primarily on individual attributes, such as a towel reuse program or energy-efficient lighting, are limited (Kasim, 2004).

Customers' attitudes toward green behaviors in their everyday lives is a significant factor in determining eco-friendly purchasing, however, to the best of the authors' knowledge, no research has focused on the user satisfaction and selection determination for a hotel, particularly a luxury hotel. Furthermore, even though the impact of gender and age on decision-making has been extensively tested in various marketing and green consumption settings, little attempt has been made to identify whether these demographic characteristics affect behavioral intentions in a green room attribute setting.

Therefore, this study aims to examine guest satisfaction in relation to the green room attributes of luxury hotels operating within Singapore, providing a clearer understanding of green room attributes produced by the room division management. We aim to find out which green room attributes are crucial and rational for higher hotel occupancy rate and positive financial indicators. The findings will be able to provide guidance for room division management to prioritize their resources in selecting the focus or combination of various green room components. Aiming for practical application of our study, we analyze the differences of guests' demographic characteristics in following green room practices. Furthermore, we are interested in examining whether green room attributes influence guests' selection of luxury hotels. Examining this will allow hotel management to gain a better understanding in implementing their green management strategies while maintaining luxury status.

## 2. Literature Review and Hypotheses

### 2.1. *Singapore Hotel Industry*

Tourism plays a vital role in strengthening Singapore's status as a vibrant global city for businesses, leisure, capital, and talent (Singapore Tourism Board, 2020a). Singapore's strategic location as an ingress into the Southeast Asian region allowed the country to grow significantly from profits on trade and capital flows. The hotel landscape in Singapore is characterized by diverse hospitality selections with around 68,000 rooms across over 400 properties island wide, generating SGD1.1 billion solely from hotel room revenue in 2019 (Euromonitor International, 2022; Singapore Tourism Board, 2020b; Hirschmann, 2022). In the last decade, the average growth rate of the number of visitors to Singapore exceeded the growth of hotel room supply, at 6% and 4.2% respectively (Mordor Intelligence, 2022). In a bid to close this gap, Singapore added more focus on its hotel construction pipeline, where 90% of newly constructed hotel rooms

are upper-midscale and luxury hotels scheduled for opening in years 2021 to 2022 (Xin et al., 2020). Despite being significantly affected by the COVID-19 pandemic in 2020, luxury hotels in Singapore are set to recover and are expected to surpass pre-pandemic levels in value sales terms by 2025, given the strong historical performances.

## ***2.2. Green Consumption***

While the tourism industry is one of the key drivers of global development, the industry has also contributed detrimental impacts toward the environment (UNWTO, 2013). Furthermore, the hotel industry is a major consumer of non-renewable and precious resources like land, water, and energy. As such, evaluating sustainability initiatives in the hotel industry can contribute to the global effort in sustainability, and also green hotel image becomes an influential tool for attracting and retaining more guests (Lee et al., 2010). Hence, green strategies can be considered as a win-win situation.

With the energy crisis, climate change and increasingly serious environmental problems, there has been increasing public concern about environmental issues. By recognizing the seriousness of ecological problems, people have become increasingly environmentally conscious to engage in environmentally friendly behaviors in their everyday lives (Han et al., 2009). The green initiative stimulates the new concept of Green Consumption, which is an environmentally responsible behavior characterized by advocating nature and protecting the ecology in the whole process of purchase, use, and disposal (Yue et al., 2020). The environmentally based purchasing approach has attracted the attention of enterprises and consumers in recent years due to increased attention to solving environmental problems. Green consumption phenomenon has thus prompted a tremendous growth of environmentally friendly products and services (Njite & Schaffer, 2017).

Hotel guests have demonstrated strong green awareness by reacting to the hotels' corporate social responsibility (CSR) efforts, expecting the industry to focus on environmental concerns and operate sustainably (Ham & Han, 2013). Gravitating towards green consumption, guests demand for green room attributes in hotels and consider them to positively contribute to their satisfaction and behavioral intentions (Berezan et al., 2014). With the hotel industry being a dynamic sector that is consumer-centric, more hotels are following the movement and embracing sustainable tourism and incorporating green practices to meet consumers' expectations (Kim et al., 2019). To maintain and continue to provide high quality services, some hotels may adopt practices that are seen to have consequences on the environment (Line & Hanks, 2016). This in turn has a consequential impact on hotels' financial decisions.

## ***2.3. A Luxury Hotel***

According to Peng and Chen (2019), a luxury hotel is defined as a hotel providing exemplary service, in addition to its unique and exceptional quality that represents its

consumers' status and wealth. Luxury hotels are also known as full-service hotels that provide a wide variety of services and facilities, including business centers, Wi-Fi access, at least two high quality restaurants, banquet or conference halls, and bathrooms and washrooms that are separate in the guest rooms (Huang et al., 2015).

Hotel properties are considered as the highest energy consumers among non-residential properties, as the heating, ventilating, and air-conditioning systems operate perpetually. This is even more so for luxury hotels, as they consume a considerable amount of energy in the hotel industry. Hence, with the concern of sustainability rising in recent times, luxury hotels are experiencing challenges in implementing sustainable practices, and this would in turn pose a challenge for luxury hotels to uphold their brand image and value in the open eyes of guests (Kang et al., 2012).

To maintain and preserve their luxury status, some of the luxury hotels may adopt practices that are seen to have consequences on the environment (Line & Hanks, 2016). Despite adopting such practices, some hotels portray themselves as environmentally friendly without disclosing these harmful practices to the public (Parguel et al., 2011). This phenomenon is referred to as *greenwashing*, which has led many guests to believe that green initiatives by hotels are merely a marketing strategy that influences guests' purchase decisions for the luxury hotel brands (Rahman et al., 2015). Guests also believe that some hotels are implementing green initiatives in order to be perceived as environmentally sustainable while in reality, their intention for such initiatives could potentially be linked to reducing business operation costs (Peng & Chen, 2019). Furthermore, the concerns to adopt new/additional green practices for luxury hotels also create potential risk of losing their appeal as being superior and no longer offering luxury experience. Hence, some luxury hotels are facing a dilemma in implementing green initiatives while maintaining and uploading high quality of services.

Nevertheless, recent studies have suggested that hotel guests are beginning to be more receptive to luxury goods that contain sustainability-related components (Amatulli et al., 2021). Various consumer segments have started to demand more sustainable traveling options that have lesser impact on the environment, such as environmentally friendly hotels (Peng & Chen, 2019). This could be the result of the increasing number of luxury consumers wanting to demonstrate that they understand and are concerned with the issue of sustainability and contribute their effort by purchasing from sustainable sources (Kale & Öztürk, 2016).

#### **2.4. Green Room Attributes**

In the study of González-Rodríguez et al. (2020), the authors found that some cognitive processes might affect customers' willingness to pay more for staying in a hotel concerned about the environment. Green practices and service quality influence revisiting intentions in the UK and upscale European hotels (Assaker, 2020).

Green room attributes are environmentally friendly attributes located inside a hotel room such as refillable shampoo dispensers and energy-efficient light bulbs (Millar

& Baloglu, 2011; Verma & Chandra, 2016). While there have been numerous studies done in relation to green room attributes in hotels and how they affect customer satisfaction, only a few studies were conducted to examine the green room attributes that guests seek inside hotel rooms (Moise et al., 2018; Robinot & Giannelloni, 2010; Yu et al., 2017).

A study by Verma and Chandra (2016) unveiled that green room attributes such as energy-efficient light bulbs and recycling bins were perceived positively by guests, while other attributes such as refillable shampoo dispensers, towel reuse program, and bedsheets changed upon request were perceived negatively. On the contrary, the findings from Millar and Baloglu (2011) stated that guests were supportive of green room attributes such as refillable shampoo dispensers, towel and linen reuse policies, and energy-efficient light bulbs. In another study, guests mentioned that they would consider green room attributes such as recycling bins, shampoo dispensers, energy-efficient lighting, occupancy sensors, and changing sheets only upon request (Watkins, 1994).

While there are varying findings from different studies, the scope of research on guests' preferences for green room attributes is limited (Millar & Baloglu, 2011; Verma & Chandra, 2016; Watkins, 1994). As such, in order to address the gap in the literature, this research seeks to identify whether guests who have stayed in luxury hotels in Singapore would be favorable of green room attributes and whether such attributes have influence on their hotel choice.

## **2.5. Guest Satisfaction**

Guest satisfaction is a subjective evaluation of an indicator concerning a particular product or service, derived from the pre-purchase expectations of an individual and perceptions of post-purchase quality (Parasuraman et al., 1985; Gundersen et al., 1996). It represents positive (negative) emotional responses that meet (do not meet) expectations and provides unanticipated satisfaction and desirability in services that have been delivered (Berman, 2005). Although there are various definitions of guest satisfaction, the fundamental concept is that satisfaction is a post-purchase evaluative judgment, which leads to an overall perception about a specific transaction (Fornell, 1992).

Research investigating guest satisfaction has been increasing at a substantial rate over the years as enhancing guest satisfaction has been widely recognized as an essential factor which leads to success for hotels (Choi & Chu, 2001). Guest satisfaction is also considered a prime objective for hotels as studies have found that satisfied guests would result in brand loyalty and even word-of-mouth publicity (Hussain & Khanna, 2019).

In earlier studies, several researchers focused on the correlation between green hotel practices and customer satisfaction (Oliver et al., 1997; Lu & Stepchenkova, 2012; Berezan et al., 2014; Gao & Mattila, 2014). However, Bruns-Smith et al. (2015) stated that although the relationship between green practices and guest satisfaction is lower when contrasted to other core attributes such as price and service, the implementation of green practices does not reduce satisfaction even if not implemented.

While there has been a multitude of studies conducted in relation to green hotel practices and customer satisfaction, there are no studies that specifically researched on who would appreciate green room attributes in luxury hotels and how demographic information affect the appreciation. Therefore, the first hypothesis was constructed as follows:

**H1:** *Green room attributes in luxury hotels in Singapore have a positive relationship with guest satisfaction.*

## 2.6. Hotel Selection

In the current competitive hotel industry, it is essential for hotel managers to understand and recognize how potential guests select their hotels and the criteria for the decision-making process (Buhalis & Law, 2008). Various researchers have shown that hotel attributes have influence on customers' behavioral outcomes including the willingness to recommend and intention to revisit (Hudson & Thal, 2013; Kwok & Yu, 2013; Laroche et al., 2013; Sparks & Browning, 2011). According to Masau and Prideaux (2010), a study on sustainability in Kenya disclosed that 66.5% of 400 respondents were willing to pay a surcharge for a hotel with environmental-friendly policies. On the other hand, studies conducted in the United States of America (USA) and India revealed that most consumers showed an unwillingness to pay a premium to lodge in a hotel with environmental-friendly policies (Huang, 2016). The enthusiasm to pay more for sustainability initiatives were more gravitated towards mid-scale and luxury hotels.

The hotel selection was mostly made in the order of preferences including cleanliness, hotel location, parking convenience and public transportation (Dolnicar & Otter, 2003). Aside from the aforementioned criteria, green room attributes are among the critical factors in a hotel selection decision (Kopnina, 2015). Despite the fact that numerous guests are willing to accept a reduced service quality in return for sustainability (Chou & Chen, 2014), there are also guests who were informed and concerned about the sustainable environment and yet did not consider green room attributes when selecting a hotel (Kasim, 2004). Similarly, green room attributes may not be frequently translated into hotel selection as those attributes may only effectively influence decisions when egoistic product attributes such as price and brand equity are fulfilled (Schuitema & De Groot, 2015). Although hotels have implemented a gamut of green strategies in their operations, the lack of research on how specific green room attributes might influence a customer's hotel selection can be an additional challenge for the hoteliers (Berezan et al., 2014). It is still unclear how this aspect of green room attributes influences the choice of a hotel room, which in the end can be mined to further investigation of the impact on hotel profitability. As such, this study aims to explore the relationship between green room attributes and luxury hotel selection and whether guest satisfaction of the green room attributes changes with guests' backgrounds. Therefore, the study developed the following hypothesis:

**H2:** *Green room attributes have a positive relationship with luxury hotel selection.*

### 3. Methodology

This research was conducted in the context of Singapore by exploring the existing green room variables in the luxury hotels. According to Singapore Tourism Analytics Network (STAN), hotels with an Average Room Rate (ARR) of above SGD400 are classified as luxury hotels in Singapore. Based on the 2018 annual report by STB, there are a total of 15 hotels with room rates above SGD400 (Singapore Tourism Board, 2018). Before the questionnaire was released to the public, interviews were conducted with a number of luxury hotel management who were involved in formulating and implementing green strategy at their respective hotels. This interview was required to ensure the validity of the instrument that was used for data collection. Thereafter, a structured questionnaire was developed by the researchers to test the hypotheses to understand if green room attributes are positively related to guest satisfaction and whether green room attributes influence their hotel selection.

As this research study focuses on luxury hotels in Singapore, the sample frame was Singapore's total population. A total of 416 responses were gathered randomly for the questionnaire. 93.03% of the respondents had stayed in a luxury hotel in Singapore before, while 6.97% indicated that they had not. Therefore, only 387 responses were considered valid. The number of valid responses also exceeds the required number of responses of 384, indicating the reliability of the data collected as it is within the 95% confidence level based on Singapore's population size in the year 2021. The respondents were asked to rate their satisfaction level with each of the green room attributes when staying at a luxury hotel in Singapore, based on a five-point Likert scale to measure satisfaction (rating ranged from 1=very dissatisfied to 5=very satisfied). The analysis continues with the analysis of guests' rating regarding their luxury hotel selections using Likert scale (rating ranged from 1= very unlikely to 5= very likely). Finally, additional analysis is exploring green room attributes toward guests' overall preferences (ranging from 1= most important to 9 = least important). The questionnaire draft was reviewed by the hotel management (the interviewees) to ensure the statements about green room attributes are understood and judged on their relative importance. Data was exported into R to further analyze the results by performing a series of statistical tests.

### 4. Results

In our sample, 64.6% of the individuals travel for leisure, while the remaining participants travel for business. There were 50.6% male and 49.4% female respondents. There are five groups of age range, and the mean of the median age in our sample is 37.12. For education level, we created dummy variables to present each of the educational levels: NITEC/Higher NITEC<sup>1</sup> = 0, Diploma = 1, Bachelor's Degree = 2, Master's Degree = 3

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<sup>1</sup> Pre-diploma

and Doctorate Degree = 4. This Edu variable shows that the majority of the respondents have an education level higher than a Diploma. The summary statistics are reported in Appendix A.

To measure guest satisfaction, we collected eleven different green room attributes. The average of all guest satisfaction ratings is around 3.5, except for the GS\_RefillableSoapDispensers with a mean of 2.615. In a similar manner, we measured the hotel selection rankings with the same eleven green room attributes and denoted them as HS. Among the hotel selection rankings, the highest mean rating comes from HS\_WoodenKeycards (with a mean of 2.393) and the lowest mean is from HS\_RefillableSoapDispensers, which is 1.935. We collected the preferences of travelers when they choose a hotel: the most important reason on average is Rank\_Cleanliness (with a mean of 2.99), and the least important reason is Rank\_SustainabilityInitiatives (with a mean of 8.088).

We use the following regression model to study the guest satisfaction rate (GS) in Appendix B:

$$GS_i = \beta_0 + \beta_1 Leisure_i + \beta_2 MedianAge_i + \beta_3 Male_i + \beta_4 Edu_i + Controls + \varepsilon_i,$$

where Leisure and Male are dummy variables, MedianAge and Edu are ranked values defined according to the age group and education levels. One significant demographic variable in the model is medianAge. We find in panel A that the younger the guests the more likely they would have higher satisfaction on cloth laundry bags. The older guests more likely would appreciate the attribute of Wooden Keycards. Based on the gender, we find that female guests are more likely to enjoy GS\_EcofriendlyFnBAmenities (at a 5% level), while male guests tend to appreciate GS\_MotionOccupancySensors (at a 10% level). The more educated the guests are, the more likely they would enjoy GS\_EcofriendlyToiletries and GS\_DigitalCompendiums, but less likely to appreciate GS\_RefillableSoapDispensers, both at a 10% level of significance. Based on the education level in panel B, the result shows that master's degree holders are less likely to appreciate GS\_RefillableSoapDispensers, while doctoral degree holders are less likely to appreciate GS\_MotionOccupancySensors, both at a 5% level of significance.

We then study the hotel selection likelihood (HS), based on each of the green room attributes using the following equation in Appendix C:

$$HS_i = \beta_0 + \beta_1 Leisure_i + \beta_2 MedianAge_i + \beta_3 Male_i + \beta_4 Edu_i + Controls + \varepsilon_i,$$

where we control for the rest of the hotel selection scores as well as all guest satisfaction scores, with robust estimate of standard errors. Edu is positively related to HS\_EcofriendlyFnBAmenities (at a 10% level), while Leisure is positively related to HS\_EnergyefficientFixtures (at a 10% level). Those who travel for leisure (at a 10% level) and younger (at a 1% level) are less likely to give a high score in HS\_EcofriendlyToiletries. The results confirm that most of the statistically and economically significant coeffi-

cients are from the type of green room attributes in guest satisfaction and hotel selection scores, rather than from the demographic information of the guests. It is suggested that hotel guests are very consistent with their attitudes and preferences to the green room attributes, which has less to do with their purpose of the trip, age, gender, or education. The Cronbach's alpha is selected to measure the scale of reliability coefficient for Guest Satisfaction and Hotel Selection. Based on the parameter from prior research (Gliem & Gliem, 2003; Croasmun & Ostrom, 2011), the reliability testing in our research yielded an instrument that showed strong internal consistency, with 0.8833 for Guest Satisfaction and 0.8938 for Hotel Selection.

We then investigate the preferences of travelers when they choose a hotel from the same set of control variables with robust estimate of standard errors. A preference ranking of 1 means the most important, while 9 means the least important in Appendix D.

$$Preferences_i = \beta_0 + \beta_1 Leisure_i + \beta_2 MedianAge_i + \beta_3 Male_i + \beta_4 Edu_i + Controls + \varepsilon_i$$

We find that travelers for leisure care less about Location as the estimated coefficients are around 0.7 and significant at a 1% level. Those traveling for leisure and at older age ranked Service Quality as more important as the estimated coefficients are negative and statistically significant. Female travelers appreciate Cleanliness and prefer higher Room Rates. Higher educated travelers rank Reviews and Recommendations lower when they select hotels but give higher preferences to Sustainability Initiatives. For Service Quality, both estimated coefficients of master's and doctoral degree holders are positive and significant. However, for Sustainability Initiatives, only doctorate holders show negative and significant results, which implies this group of travelers ranked Sustainability Initiatives higher compared to other groups in the sample.

## 5. Discussion and Conclusion

The research investigated two main research objectives to understand how each green room attribute affects guests' satisfaction and to explore how each green room attribute influences guests in hotel selection. The majority of the green room attributes held a mean ranking satisfaction level of above three, except for Refillable Soap Dispensers, which held a mean ranking satisfaction level of 2.615. This achieves the first research objective of understanding how each green room attribute affects guests' satisfaction. In addition, apart from Refillable Soap Dispensers, the comparison of the relationship between green room attributes and guest satisfaction revealed a positive relationship between the two factors, suggesting that green room attributes in luxury hotels have a positive relationship with guest satisfaction.

The research also revealed the relationship between green room attributes and how they influence guests' hotel selection. When rating hotel selection based only on the green room attributes, the mean scores for all attributes were found to be below three.

This indicates that the green room attributes do not influence guests' hotel selection, thus debunking the second hypothesis of green room attributes having a positive relationship with hotel selection.

In addition, the regression analysis revealed a significant positive relationship between guest satisfaction and hotel selection for all identified green room attributes. This would mean that both guest satisfaction and hotel selection have a direct relationship with each other. Although it is established that green room attributes strongly correlate with guest satisfaction, luxury hotels are still faced with limitations in implementing such attributes. The high implementation costs and infrastructure are the main constraints. The alteration of existing hotel buildings may result in high renovation costs while certain national heritage hotels are faced with restrictions in re-structuring the hotels' infrastructure. The hotel management also fear that sustainability implementations may dampen the luxurious experience for guests. For example, the removal of single-use amenities may fall short of guests' expectations when staying in luxury hotels as they largely enjoy taking home the personal amenities as part of the experience.

However, times have changed, specifically in the year 2017, when the United Nations declared the year as the International Year of Sustainable Tourism for Development, resulting in most luxury hotels recognizing that moving towards sustainable development was inevitable (Lee, 2017). Furthermore, hotels are recognizing that green practices are ethical and at the same time beneficial in reducing costs, improving profitability, and demonstrating good reputation for the hotel brand for the future (Kularatne et al., 2019).

Despite the finding that green room attributes do not contribute directly to hotel selection, it is suggested that guests are generally satisfied with the presence of green room attributes, indicating that luxury hotels should consider venturing and adopting those attributes accordingly. The top green room attributes that should be on the list of consideration include wooden keycards, eco-friendly F&B amenities, and toiletries as well as motion or occupancy sensors. On the other hand, it is distinct that guests do not fully gravitate towards refillable soap dispensers.

In conclusion, this research offers new insights about guests' receptiveness to green room attributes within guest rooms and how they boost guest satisfaction. It opens opportunities for luxury hotels in Singapore to operate sustainably whilst enhancing guest satisfaction. However, the findings show that guests are more concerned with other attributes such as cleanliness, price, location, and service quality when making a hotel selection decision. Altogether, this research proves to be valuable in aiding Singapore's luxury hotel scene towards a more sustainable future without compromising on guest experience.

The findings of the study provide some vital managerial implications that can help hoteliers to strategically implement their green room attributes that could improve guests' satisfaction, higher revisiting rate thus improving occupancy rate that can lead to a better financial performance, however, limitations to this study should be noted.

The study considers the effect of a single green factor on guests' satisfaction and hotel selection (i.e., green room) and as such it represents a partial equilibrium analysis. Other than the green room, guests' satisfaction and hotel selection can be affected by a range of other green factors such as green building, green initiatives at the hotel's restaurants and cafés or green facilities available within hotels.

Despite the fact that hotels are implementing a plethora of green room initiatives due to the growing trend toward sustainability, there is a paucity of study on the subject, creating potential for future research. Future research could explore the different attitudes and perceptions of guests from different countries and possible technological innovation in the hotel operation. Researchers may be able to find variances in behavioral intents and attitudes toward green room attributes from a distinct cultural perspective by gathering respondents from diverse nations.

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## Appendix A Summary Statistics

	<b>Obs</b>	<b>Mean</b>	<b>Std. dev.</b>	<b>Min</b>	<b>Max</b>
Leisure	387	0.646	0.479	0	1
Male	387	0.506	0.501	0	1
Age	387	37.127	11.993	24	64
NITEC	387	0.049	0.216	0	1
Diploma	387	0.271	0.445	0	1
Bachelor's	387	0.506	0.501	0	1
Master's	387	0.114	0.318	0	1
Doctor	387	0.036	0.187	0	1
Edu	387	1.77	0.876	0	4
GS_ClothLaundryBags	387	3.7	0.918	1	5
GS_EcofriendlyFnBAmenities	387	3.858	0.872	1	5
GS_EcofriendlyToiletries	387	3.86	0.947	1	5
GS_EnergyefficientFixtures	387	3.804	0.903	1	5
GS_DigitalCompendiums	387	3.486	0.972	1	5
GS_LinenReusePolicies	387	3.413	1.055	1	5
GS_MotionOccupancySensors	387	3.742	1.063	1	5
GS_RecyclingBins	387	3.39	1.17	1	5
GS_ReducedRoomCleaning	387	3.315	1.082	1	5
GS_RefillableSoapDispensers	387	2.615	1.147	1	5
GS_WoodenKeycards	387	3.698	1.112	1	5
HS_ClothLaundryBags	387	2.129	1.213	1	5
HS_EcofriendlyFnBAmenities	387	2.31	1.212	1	5
HS_EcofriendlyToiletries	387	2.287	1.227	1	5
HS_EnergyefficientFixtures	387	2.238	1.23	1	5
HS_DigitalCompendiums	387	2.075	1.231	1	5
HS_LinenReusePolicies	387	1.984	1.165	1	5
HS_MotionOccupancySensors	387	2.289	1.269	1	5
HS_RecyclingBins	387	1.956	1.152	1	5
HS_ReducedRoomCleaning	387	1.959	1.14	1	5
HS_RefillableSoapDispensers	387	1.935	1.158	1	5
HS_WoodenKeycards	387	2.393	1.341	1	5
Rank_Cleanliness	387	2.99	1.712	1	9
Rank_GreenRoomAttributes	387	7.494	1.709	1	9
Rank_HotelAesthetics	387	5.176	2.174	1	9
Rank_HotelFacilities	387	4.256	1.761	1	9
Rank_Location	387	3.822	2.082	1	9
Rank_ReviewsandRecommendations	387	5.398	2.214	1	9
Rank_RoomRates	387	3.943	2.518	1	9
Rank_ServiceQuality	387	3.835	2.022	1	9
Rank_SustainabilityInitiatives	387	8.088	1.533	1	9

## Appendix B

### Regression Analysis on Guest Satisfactions

This table presents regressions estimates of demographic information on the guest satisfactions on each of the green room attributes using the following regression model, where rate is from 1, “very dissatisfied”, to 5, “very satisfied”, with heteroskedasticity-robust standard errors:

$$GS_i = \beta_0 + \beta_1 Leisure_i + \beta_2 Age_i + \beta_3 Male_i + \beta_4 Edu_i + Controls + \varepsilon_i,$$

where the rest of guest satisfactions and hotel selections variables are controlled. SCR refers to Scale reliability coefficient. Associated t-statistics are reported in parentheses \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Panel A										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Cloth Laundry Bags	Ecofriendly FnB Amenities	Ecofriendly Toiletries	Energy Efficient Fixtures	Digital Compendium	Linen Reuse Policies	Motion Occupancy Sensors	Recycling Bins	Reduced Room Cleaning	Refillable Soap Dispensers	Wooden Keycards
Leisure	-0.117 (-1.63)	0.046 (0.67)	0.087 (1.15)	0.021 (0.29)	-0.013 (-0.16)	0.067 (0.87)	-0.137 (-1.57)	-0.027 (-0.28)	-0.104 (-1.25)	-0.012 (-0.10)	0.124 (1.43)
Age	-0.005* (-1.74)	0.001 (0.27)	0.000 (0.10)	0.004 (1.55)	0.003 (0.83)	-0.001 (-0.31)	-0.001 (-0.39)	0.002 (0.58)	0.001 (0.36)	0.005 (0.81)	0.011*** (3.40)
Male	0.067 (0.91)	-0.163** (-2.56)	-0.062 (-0.91)	0.099 (1.57)	-0.115 (-1.53)	-0.092 (-1.23)	0.147* (1.83)	-0.046 (-0.57)	0.121 (1.48)	0.098 (0.85)	0.046 (0.56)
Edu	-0.035 (-0.92)	0.012 (0.32)	0.067* (1.70)	-0.010 (-0.27)	0.079* (1.81)	-0.063 (-1.52)	-0.010 (-0.23)	-0.015 (-0.32)	-0.061 (-1.31)	-0.121* (-1.85)	0.003 (0.07)
GS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
HS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Robust	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	387	387	387	387	387	387	387	387	387	387	387
adj. R-sq	0.443	0.500	0.492	0.525	0.424	0.559	0.488	0.552	0.502	0.136	0.520
SIRC	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938

Panel B

	(1) Clothing Laundry Bags	(2) Ecofriendly F&B Amenities	(3) Ecofriendly Toiletries	(4) Energy Efficient Fixtures	(5) Digital Compendiu ms	(6) Linen Reuse Policies	(7) Motion Occupancy Sensors	(8) Recycling Bins	(9) Reduced Room Cleaning	(10) Refillable Soap Dispensers	(11) Wooden Keycards
Leisure	-0.122* (-1.71)	0.053 (0.78)	0.086 (1.11)	0.028 (0.37)	-0.014 (-0.16)	0.066 (0.85)	-0.133 (-1.52)	-0.029 (-0.30)	-0.111 (-1.30)	-0.028 (-0.24)	0.117 (1.36)
Age	-0.004 (-1.48)	-0.000 (-0.05)	0.001 (0.26)	0.004 (1.52)	0.002 (0.72)	-0.001 (-0.22)	-0.002 (-0.52)	0.002 (0.69)	0.001 (0.36)	0.004 (0.78)	0.012*** (3.73)
Male	0.061 (0.83)	-0.158** (-2.50)	-0.065 (-0.95)	0.090 (1.43)	-0.104 (-1.40)	-0.092 (-1.23)	0.151* (1.90)	-0.051 (-0.63)	0.124 (1.50)	0.105 (0.91)	0.039 (0.47)
NITEC	-0.117 (-0.41)	-0.001 (-0.00)	0.092 (0.34)	0.520 (1.59)	-0.730** (-2.23)	-0.281 (-0.91)	-0.392 (-1.22)	0.438 (1.20)	-0.229 (-0.72)	-0.895* (-1.80)	0.304 (0.91)
Diploma	0.169 (0.75)	-0.014 (-0.05)	0.164 (0.68)	0.355 (1.18)	-0.360 (-1.36)	-0.086 (-0.32)	-0.389 (-1.32)	0.244 (0.80)	-0.221 (-0.90)	-0.514 (-1.14)	0.257 (0.90)
Bachelor	0.045 (0.20)	-0.136 (-0.44)	0.277 (1.19)	0.255 (0.86)	-0.259 (-0.98)	-0.194 (-0.73)	-0.305 (-1.06)	0.255 (0.85)	-0.242 (-1.01)	-0.689 (-1.56)	0.378 (1.32)
Master	-0.150 (-0.66)	0.027 (0.09)	0.312 (1.29)	0.323 (1.05)	-0.159 (-0.56)	-0.292 (-1.03)	-0.229 (-0.77)	0.185 (0.59)	-0.404 (-1.51)	-1.058** (-2.34)	0.257 (0.86)
Doctor	0.125 (0.50)	0.243 (0.70)	0.222 (0.77)	0.473 (1.51)	-0.346 (-1.21)	-0.360 (-1.22)	-0.669** (-2.12)	0.274 (0.86)	-0.367 (-1.33)	-0.674 (-1.26)	0.027 (0.08)
GS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
HS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Robust	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	387	387	387	387	387	387	387	387	387	387	387
adj. R-sq	0.447	0.504	0.489	0.528	0.429	0.557	0.490	0.550	0.498	0.145	0.521
SRC	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833

## Appendix C

### Regression Analysis on Hotel Selections

This table presents regressions estimates of demographic information on the hotel selection likelihood, based on each of the green room attributes, on a scale of 1 being “very unlikely” to choose the hotel and 5 being “very likely,” using the following equation with heteroskedasticity-robust standard errors:

$$HS_i = \beta_0 + \beta_1 Leisure_i + \beta_2 Age_i + \beta_3 Male_i + \beta_4 Edu_i + Controls + \epsilon_i$$

where the rest of guest satisfactions and hotel selections variables are controlled. SCR refers to Scale reliability coefficient. Associated t-statistics are reported in parentheses \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Cloth Laundry Bags	Ecofriendly FnB Amenities	Ecofriendly Toiletries	Energy efficientFix tures	Digital Compendiu ms	Linen Reuse Policies	Motion Occupancy Sensors	Recycling Bins	Reduced Room Cleaning	Refillable Soap Dispensers	Wooden Keycards
Leisure	0.105 (1.42)	0.055 (0.93)	-0.102* (-1.82)	0.105* (1.76)	0.027 (0.34)	-0.002 (-0.04)	-0.042 (-0.61)	0.104 (1.50)	-0.036 (-0.60)	-0.008 (-0.10)	-0.027 (-0.33)
Age	0.003 (0.92)	-0.002 (-1.14)	-0.007*** (-3.56)	0.001 (0.29)	-0.004 (-1.44)	0.003 (0.88)	-0.001 (-0.34)	0.001 (0.43)	-0.003 (-1.32)	0.002 (0.88)	0.003 (0.98)
Male	0.054 (0.78)	-0.013 (-0.22)	0.045 (0.81)	-0.037 (-0.65)	0.078 (1.04)	0.019 (0.34)	-0.048 (-0.74)	-0.059 (-0.91)	-0.039 (-0.60)	0.017 (0.23)	-0.052 (-0.70)
Edu	0.019 (0.55)	0.057* (1.93)	-0.003 (-0.13)	-0.013 (-0.51)	-0.042 (-1.14)	-0.039 (-1.14)	0.027 (0.85)	0.020 (0.63)	0.024 (0.74)	-0.014 (-0.39)	-0.016 (-0.41)
GS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
HS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Robust	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	387	387	387	387	387	387	387	387	387	387	387
adj. R-sq	0.696	0.798	0.818	0.791	0.675	0.776	0.751	0.721	0.730	0.641	0.692
SRC	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938	0.8938

Panel A

Panel B

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Cloth Laundry Bags	Ecofriendly FnB Amenities	Ecofriendly Toiletries	Energy efficient fixtures	Digital Compendiu ms	Linen Reuse Policies	Motion Occupancy Sensors	Recycling Bins	Reduced Room Cleaning	Refillable Soap Dispensers	Wooden Keycards
Leisure	0.108 (1.49)	0.052 (0.86)	-0.100* (-1.76)	0.104* (1.74)	0.023 (0.27)	-0.004 (-0.06)	-0.041 (-0.59)	0.105 (1.53)	-0.043 (-0.71)	-0.007 (-0.09)	-0.031 (-0.36)
Age	0.004 (1.34)	-0.001 (-0.77)	-0.007*** (-3.69)	0.001 (0.34)	-0.004 (-1.60)	0.002 (0.65)	-0.001 (-0.45)	0.001 (0.27)	-0.003 (-0.99)	0.003 (1.07)	0.003 (0.92)
Male	0.041 (0.61)	-0.016 (-0.28)	0.049 (0.88)	-0.038 (-0.68)	0.084 (1.14)	0.027 (0.48)	-0.046 (-0.71)	-0.056 (-0.88)	-0.043 (-0.67)	0.007 (0.10)	-0.049 (-0.66)
NITEC	0.470 (1.59)	0.034 (0.12)	-0.252 (-1.33)	0.038 (0.15)	-0.229 (-0.87)	-0.293 (-0.97)	-0.206 (-0.95)	0.173 (0.72)	0.094 (0.32)	0.416*** (2.60)	-0.148 (-0.69)
Diploma	0.515* (1.83)	0.191 (0.75)	-0.215 (-1.30)	0.054 (0.23)	-0.403 (-1.65)	-0.402 (-1.37)	-0.049 (-0.25)	-0.065 (-0.31)	0.234 (0.84)	0.443*** (2.86)	-0.150 (-0.78)
Bachelor	0.528* (1.87)	0.249 (0.99)	-0.220 (-1.37)	0.016 (0.07)	-0.323 (-1.30)	-0.409 (-1.38)	-0.084 (-0.43)	0.038 (0.18)	0.280 (1.00)	0.318** (2.24)	-0.153 (-0.81)
Master	0.572** (2.03)	0.228 (0.90)	-0.164 (-0.97)	-0.022 (-0.10)	-0.385 (-1.56)	-0.421 (-1.39)	-0.044 (-0.20)	0.127 (0.60)	0.147 (0.53)	0.252 (1.62)	-0.215 (-1.01)
Doctor	0.275 (0.91)	0.295 (1.14)	-0.252 (-1.36)	0.061 (0.26)	-0.543* (-1.93)	-0.395 (-1.28)	0.096 (0.43)	-0.032 (-0.14)	0.245 (0.85)	0.555** (2.52)	-0.119 (-0.49)
GS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
HS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Robust	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	387	387	387	387	387	387	387	387	387	387	387
adj. R-sq	0.698	0.797	0.817	0.789	0.674	0.776	0.750	0.721	0.730	0.643	0.689
SRC	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833	0.8833

## Appendix D

### Regression Analysis on Travelers' Preferences

This table presents regressions estimates of demographic information and preferences ratings preferences of travelers when they choose a hotel from the following factors: cleanliness (model 1), green room attributes (model 2), hotel aesthetics (model 3), hotel facilities (model 4), location (model 5), reviews and recommendations (model 6), room rate (model 7), service quality (model 8) and sustainability initiatives (model 9). A preference ranking of 1 means most important while 8 means least important using the following equation with heteroskedasticity-robust standard errors:

$$Preferences_i = \beta_0 + \beta_1 Leisure_i + \beta_2 Age_i + \beta_3 Male_i + \beta_4 Edu_i + Controls + \epsilon_i$$

where the rest of guest satisfactions and hotel selections variables are controlled. SCR refers to Scale reliability coefficient. Associated t-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Cleanliness	GreenRoom Attributes	Hotel Aesthetics	Hotel Facilities	Location	Reviewsand Recommendation	Room Rates	Service Quality	Sustainability Initiatives
Leisure	-0.130 (-0.73)	0.020 (0.14)	-0.461** (-1.97)	0.077 (0.42)	0.719*** (3.39)	0.128 (0.54)	-0.018 (-0.06)	-0.644*** (-2.91)	0.308*** (2.14)
Age	0.004 (0.56)	-0.018** (-2.59)	0.024*** (2.62)	0.000 (0.03)	-0.006 (-0.67)	0.010 (0.99)	0.007 (0.59)	-0.017* (-1.83)	-0.004 (-0.66)
Male	-0.409** (-2.31)	-0.094 (-0.65)	0.041 (0.18)	-0.048 (-0.26)	-0.182 (-0.91)	0.299 (1.36)	0.584** (2.16)	-0.242 (-1.20)	0.051 (0.37)
Edu	0.110 (1.13)	-0.110 (-1.39)	0.066 (0.51)	-0.130 (-1.23)	-0.230* (-1.84)	0.264** (2.11)	0.027 (0.17)	0.136 (1.11)	-0.133* (-1.69)
GS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
HS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Robust	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	387	387	387	387	387	387	387	387	387
adj. R-sq	0.120	0.338	0.041	0.095	0.153	0.110	0.048	0.073	0.281
SRC	0.889	0.8976	0.89	0.8937	0.8941	0.8904	0.8896	0.8877	0.8947

Panel A

	Panel B								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Cleanliness	GreenRoom Attributes	Hotel Aesthetics	Hotel Facilities	Location	Reviewsand Recommendation	Room Rates	Service Quality	Sustainability Initiatives
Leisure	-0.122 (-0.68)	0.042 (0.30)	-0.500** (-2.13)	0.070 (0.37)	0.727*** (3.40)	0.137 (0.58)	-0.045 (-0.16)	-0.625*** (-2.83)	0.316** (2.23)
Age	0.002 (0.22)	-0.019*** (-2.69)	0.027*** (2.80)	-0.001 (-0.13)	0.006 (-0.56)	0.010 (1.02)	0.008 (0.63)	-0.018* (-1.96)	-0.004 (-0.60)
Male	-0.393*** (-2.24)	-0.091 (-0.63)	0.036 (0.16)	-0.036 (-0.20)	-0.195 (-0.97)	0.293 (1.34)	0.594** (2.19)	-0.255 (-1.26)	0.048 (0.34)
NITEC	-1.030* (-1.73)	-0.901** (-2.18)	-0.157 (-0.17)	-0.793 (-1.27)	0.854 (1.07)	1.037 (1.15)	-0.996 (-0.88)	1.929** (2.53)	0.058 (0.17)
Diploma	-0.561 (-1.11)	-0.461 (-1.23)	0.302 (0.35)	-0.606 (-1.20)	0.398 (0.68)	0.539 (0.69)	-0.519 (-0.56)	0.987 (1.52)	-0.078 (-0.28)
Bachelor	-0.760 (-1.52)	-0.631* (-1.76)	0.519 (0.63)	-0.896* (-1.82)	0.139 (0.25)	1.060 (1.38)	-0.303 (-0.33)	1.002 (1.59)	-0.130 (-0.49)
Master	-0.424 (-0.79)	-0.355 (-0.91)	-0.152 (-0.18)	-1.098** (-2.01)	-0.036 (-0.06)	1.477* (1.83)	-0.706 (-0.72)	1.423** (2.13)	-0.129 (-0.40)
Doctor	0.299 (0.43)	-1.642*** (-2.83)	0.611 (0.59)	-0.514 (-0.72)	-0.349 (-0.42)	1.023 (1.16)	-0.589 (-0.50)	2.118*** (2.62)	-0.957* (-1.69)
GS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
HS controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Robust	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	387	387	387	387	387	387	387	387	387
adj. R-sq	0.128	0.350	0.042	0.094	0.147	0.110	0.043	0.086	0.280
SRC	0.8796	0.8875	0.8805	0.884	0.8843	0.8807	0.8797	0.8778	0.8849