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Article

A hedonic approach to study willingness to pay for certified green hotel by customers in Thailand

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Abstract: Green hotels are becoming increasingly popular as more and more people become conscious of the impact of their travel on the environment. There are several certifications known as Green Building Certificates given to hotels all over the world to encourage them to move towards eco-friendly attitude. Having a certification is often considered as a marketing tool. These certifications are often internationally known. Although green hotel has been gaining in popularity by both hotel business and tourist demand in Thailand, there is limited information whether tourists are willing to pay more, and if so, how much more. This research studies tourists' willingness to pay for staying in green hotel. The method for the study employs the hedonic pricing model to investigate hotel attributes in the determination of hotel room rates in Phuket, Thailand. The hotel attributes studied include green leaf certification, hotel star, the distance of hotel from the nearest beach, the distance of hotel from the city centre and other facilities of the hotel such as breakfast, meeting room, internet access, shuttle service, fitness centre, pool, and restaurant. The results show that tourists are willing to pay up to 68 percent premium for staying in green hotel. In addition, hotel star rating and some facilities such as free breakfast, fitness centre and shuttle service also have positive effects on room rates. However, the further away the hotel from the beach the lower the room rate.

Keywords: hedonic; willingness; tourist; green hotel; pricing model

1. Introduction

According to the statistics of Thailand's Ministry of Tourism and Sports on international visitors during the first six months of 2024 (from 1 January to 30 June), Thailand welcomed 17,501,283 foreign visitors. Thailand expects to receive 80 million visitors in 2027 [1]. Thailand has emerged as one of the leading global tourism destinations. As of 2024, Thailand expects significant growth in its tourism sector, largely attributed to the post-COVID recovery and the expansion of travel options [2].

Since the launch of the "Visit Thailand Year" campaign in 1987, Thailand has witnessed the Golden Decade of tourism, and the country is perceived in the world's tourism sector, as one of the most impressive destinations. Tourists favour Thailand because it is known for the hospitable and kind people, beautiful nature, lovely food, and fruits. Tourism industry in Thailand is a major component of the current economic foundations of the country and is an important component of economic growth. Thailand's tourism positive images have been reflected in many journal articles and tourism magazines. The country had long been depicted as an attractive destination with various world-class accommodation, excellent cuisines, reasonable prices, safety, and security. Although Tourism brings economic benefits to Thailand, it also causes considerable environmental damage as it is one of the most energy and water

consuming sectors. Hence, the question is how to make tourism contribute to positive economy and minimize the environmental impact is a crucial issue for Thai policy makers. Environmental concern has increased not only for policy makers but also for tourists as they are becoming more environmentally conscious and looking for responsible alternatives to traditional travel options. The increased focus on environmental impact has led to a significant rise in consumer demand for sustainability in the tourism industry. According to Statista in 2020, 60% of global travellers are willing to pay more for eco-friendly accommodations. As a result of this increasing demand for environmentally friendly practice, tourism industry especially hotel business needs to adapt sustainable practices such as sustainability certification schemes to attract tourists [3,4]. Hotels that adopt green certifications not only reduce their environmental impact but also enhance their brand image and appeal to eco-conscious tourists. According to Hassan et al. [5], tourists are more likely to choose a hotel that has implemented visible sustainability practices. Tourism certification in Thailand under Green Leaf Program has started since 1997. It has awarded Green Leaf logo to hotels that have passed the standard quality assessment. Although green hotels have been gaining in popularity by both hotel business and tourist demand in Thailand, there is limited information whether tourists are willing to pay for it. Most of research that studied the willingness to pay for green hotel are from developed countries [6]. As far as we know, none has been studied in Thailand. Thus, our study aims to assess how much tourists are willing to pay for staying in green hotels in Thailand and what are the important hotel attributes that affect hotel prices in Thailand. The study also examines the effect of hotel attributes on willingness to pay for a hotel in Thailand. The paper begins with brief review of global tourism, green hotel, Green Tourism certification, hedonic pricing model. This is followed by research methodology, an analysis of results and conclusion.

2. Literature review

Global tourism has long been a significant driver of economic growth, contributing to employment and GDP across countries. The United Nations World Tourism Organization (UNWTO) has reported that tourism, as one of the world's largest economic sectors, generated approximately 10% of global GDP and provided millions of jobs [7]. Key drivers of global tourism include increased disposable incomes, the rise of low-cost airlines, improved travel technology, and digital platforms facilitating easier booking and travel arrangements [8]. The rapid growth of global tourism is also facilitated by factors such as improvements in transportation, communication, and technology. World Tourism Organisation (WTO), defines 'tourism as the totality of "the activities of visitors who undertake a journey to a main destination outside their usual environment, for less than one year, for any main purpose, including business, leisure, or other personal purpose, apart from employment by an entity local to the place visited." According to the World Travel & Tourism Council [9], between 2014 and 2019, tourism generated 10.4% of global GDP, worth USD 10 trillion, and contribute 10.3% to the global labour market (334 million jobs). It is generally acknowledged that tourism influences the socio-economic development of many countries and represents an alternative development path for

less-developed regions [10]. Tourism accounts for over 20% of GDP generation in some countries. According to the ECA report Borma [11], the economic importance of the tourism sector as a share of GDP is 4%–6% in Ireland, Poland, Belgium and Lithuania, around 15% in Spain, 18% in Portugal, 20% in Greece and almost 25% in Croatia. Khan et al. [12] argue that the tourism industry has created many jobs that play a major role in reducing poverty and inequality and improves the country's trade and boosts the global industrial sector".

2.1. Global tourism

Global tourism has long been a significant driver of economic growth, contributing to employment and GDP across countries. The United Nations World Tourism Organization (UNWTO) has reported that tourism, as one of the world's largest economic sectors, generated approximately 10% of global GDP and provided millions of jobs [7]. Global tourism is a massive industry that has a significant impact on the economies, societies, and cultures of the countries involved. According to Thailand PRD [13], *Global tourism* refers to the activity of people traveling to and staying in different countries or regions around the world for leisure, business, or other purposes. It involves both international tourism, where visitors travel from their home country to another country, and *domestic tourism*, where visitors travel within their own country. Global tourism is an important industry, with millions of people traveling internationally each year. It can have a significant impact on the economies of both the host countries and the countries of origin of the tourists, as well as on the environment, society, and culture of the places visited. There are many factors that contribute to global tourism. These include Technology, Natural attractions, Marketing and promotion, Improved transportation, Business travel, Economic development, Political stability, and Cultural exchange. According to the Global Tourism Statistics 2019, International tourist arrivals worldwide were around 95,000 at the beginning of 2019. Nearly $1.9 trillion was spent by tourists in 2019. Global Tourism was about $8.9 trillion in 2019. France tends to hold the Number 1 position in 2019 as more than 90 million tourists visit the country. This is followed by USA, China, Mexico, and UK. Europe has seen international arrivals exceed pre-pandemic numbers. France and Spain maintain their positions as the most visited countries in the world, while Portugal welcomed a record 19.4 million international tourists in 2023, 12.1% more than in 2019 [1].

Thailand also has emerged as one of the leading global tourism destinations. For 2024, Thailand expects significant growth in its tourism sector, largely attributed to the post-COVID recovery and the expansion of travel options [2]. The country's appeal comes from its cultural richness, natural beauty, and competitive prices compared to Western tourist markets. Thailand's Tourism Strategy for 2024 is to focus both economic recovery and sustainable growth [13]. She aims to generate 3.5 trillion baht from tourism, with 2.5 trillion baht expected from international visitors and 1 trillion baht from domestic tourists. This shows the importance of tourism as a critical driver of Thailand's economy, particularly after the COVID-19 pandemic [14]. There are several factors driving Thailand's Tourism. Firstly, Thailand offers a blend of historical, cultural, and natural sites, including temples, beaches, and mountains,

making it a multi-segment destination [15]. Secondly, the expansion of flight routes, improved hospitality services, and visa-free policies for key markets such as China have all boosted tourism [16]. Thirdly, in line with global trends, Thailand has focused on sustainable tourism, ensuring that tourism growth aligns with environmental and social sustainability goals [17]. Thailand tourism is different from wealthier countries such as USA and Europe in their approach to Managing tourism, the kinds of tourists who visit the country and their economic reliance on the sector. Whilst wealthier countries focus on high-value tourism and sustainability, Thailand attracts a large volume of budget-conscious tourists due to its affordability and diverse offerings, from Bangkok's urban attractions to the beaches of Phuket with tourists from China, Europe, and Australia forming a large part of the visitor base [18]. Tourism is a key driver of economic development in many countries, and Thailand is no exception. Thailand has consistently attracted tourists from all over the world, motivated by its diverse cultural attractions, pristine beaches, culinary experiences, and competitive pricing. Although countries like Malaysia, Vietnam, and Spain share some similarities in offerings. While other countries in Southeast Asia, such as Malaysia and Vietnam, offer similar attractions, Thailand's competitive edge lies in its well-developed tourism infrastructure and service quality. According to Jones [19], Thailand's diverse tourism offerings—ranging from bustling urban centres like Bangkok to serene beaches in Phuket and Krabi—are central to its appeal. The country's affordability is another crucial factor. Smith [20] notes that Thailand offers a relatively lower cost of living compared to Western nations, allowing tourists to enjoy luxury experiences, including spa retreats and fine dining, at more accessible prices. Additionally, Thailand's cuisine, recognized as one of the best globally, is another key motivator. Visitors are often drawn to the authenticity and variety of food offerings in cities like Chiang Mai and Bangkok [21].

Although global tourism industry has been a significant driver of economic growth, this has come at the cost of negative consequences for environment and local communities. Currently, there is a surge interest in sustainable tourism, which aims to reduce the social and environmental impacts of the industry while also generating economic benefits for all stakeholders, driven by consumers' growing environmental concerns and the setting of official net zero goals. Within the Thai context, growth has been helped by the development of local sustainable tourism models, moves to encourage businesses to 'measure-reduce-offset' their carbon emissions, and support for the adoption of sustainability standards. Growth in the market for sustainable tourism is being driven by changes to consumer behaviour and increasing interest in sustainability. In a survey in 2024 by Booking.com12, shows that three-quarters of tourists would like to travel more sustainably Within the next year. Over half of respondents also hoped to cut their energy use and to make more environmentally conscious travel decisions. Whereas more than 40% felt guilty when they opted for less sustainable travel choices. According to Leenoi [22], a survey by Agoda found that around 80% of Asian tourists favoured purchasing sustainable travel packages, and that in Thailand, 84% of the public are ready to embrace greener travel options. In 2023, a survey by Euromonitor International found that almost 80% of respondents were prepared to pay a surcharge of at least 10% for eco-tourism products and services.

Although the overall Thai tourism industry remains competitive on the world stage, development of the sustainable tourism segment currently lags behind that of many other countries. The World Economic Forum's (WEF) 2024 Travel and Tourism Development Index ranks Thailand 47th out of the 119 countries, placing the country 4th in the ASEAN region behind only Singapore, Indonesia, and Malaysia. Although Thailand has been slow to develop its sustainable tourism offerings, the country is transitioning to a more environmentally friendly stance. As the tourism landscape evolves, Thailand's tourism industry has adapted to new trends, particularly in sustainability and pricing strategies. Two key developments in this changing ecosystem are the rise of the Green Hotel business model and the adoption of hedonic pricing strategies. In response to growing environmental concerns, Thailand has implemented the Green Hotel business model, which focuses on reducing the carbon footprint of hospitality establishments through energy-efficient operations, waste reduction, and community engagement [8]. This model has been particularly successful in Phuket, where many hotels are adopting eco-friendly practices to attract environmentally conscious travellers.

2.2. Green hotels

Green hotels, also known as eco-friendly or sustainable hotels, are accommodations that prioritize environmental sustainability in their operations and practices. They are typically more efficient in the use of energy, raw materials and water while satisfying customers and providing quality service. The meaning of green hotel is where a property is committed to promoting sustainability and helping to protect the environment through eco-friendly, green practices. It can be applied to chain hotels, inns, B&BS, motels, and other lodging partners. Green hotels aim to minimize their effect on their immediate environment and global pollution levels. They improve energy efficiency, reduce waste, and improve the well-being of guests and staff through various initiatives.

2.3. Green key certificates

The Green Key Certificate is an international eco-label awarded to hotels, hostels, campsites, and other tourism establishments that adhere to strict environmental standards. It is Managed by the Foundation for Environmental Education (FEE), The certification covers aspects such as water conservation, energy efficiency, waste management, and the use of eco-friendly products. To earn a Green Key, establishments must meet criteria related to environmental management, staff involvement, guest awareness, and corporate social responsibility [23]. There are several reasons why it is important to promote green hotels. Firstly, we must reduce the environmental impacts of hotels. Tourism significantly harms the environment with pollution. and green house effects. Secondly, Travellers with sustainable minds are on the rise. To remain competitive, hotels must respond to the wishes of the travellers. Consumers who are concern with climate change and the impacts of travel and tourism have on the planet, are turning to green hotels. Thirdly, Sustainability means profit. The demand for sustainable, environmentally conscious, and ethically

responsible travel is rising and Hotels that fail to adapt to green business models and more sustainable practices risk losing more than loyal customers.

Green Tourism certification is acknowledged worldwide as an indicator of good sustainability practice and a hallmark of quality assessment. More than 5,900 hotels and other establishments in 70+ countries are Green Key certified. The Green Key certificate is the leading standard for excellence in the field of environmental responsibility and sustainable operation within the tourism industry. In Thailand, the Green Leaf Program was initiated at the end of 1997. Its main objective is to help hotels improve their efficiency in saving energy, water, and other resources. It focuses on facilitating the efficient use of energy and natural resources under the theme **"**Save Money, Save Environment." The programs had the following objectives: to encourage hotel and tourism business in Thailand to develop operational standards and promote environmental quality; to develop environmental management standards in the hotel and tourism business in accordance with the needs of the service users and the efficiency of technology and to promote the role and participation in environmental conservation in the hotel and tourism business [13].

The Green Hotel award operates by the Department of Climate Change and the Environment, recognizes hotels that have implemented systems that ensure the efficient use of resources and energy. Applicants are also required to demonstrate respect and care for the environment, and for the local culture and community. According to Leenoi [22], between 2019 and 2023, 306 hotels participated in the scheme, with 121 gold, 102 silver and 83 bronze awards given out during this time. But only 1% of all Thai hotels are covered by the project. Although recipients of the Green Hotel award can be found in 34 different provinces, three-quarters of these are in the major tourist destinations of Bangkok, Phuket, Krabi, Chonburi, and Surat Thani. However, in most second-tier provinces, there are few to no recipients. In addition, Green Hotel awards have overwhelmingly gone to larger operators, and so it appears that interest in the scheme is limited to major players in the most important tourist destinations. In Thailand, the "Green Hotel" certification, awarded by the Department of Climate Change and Environment (formerly known as the Department of Environmental Quality Promotion), and the "Green Leaf" certification, awarded by the Green Leaf Foundation, are recognised standards. Out of 1012 THA hotel members, approximately 116 have received the Green Hotel standard, and 176 are certified by the Green Leaf Foundation [23]. Green Globe uses the United Nations' SDGs to assess the sustainability of companies active in the tourism industry. Fifteen hoteliers that are active in Thailand have achieved Green Globe certification, though most of these are major international hotel chains, such as Mövenpick, Pullman and Sofitel. A further 18 hotels were in the process of applying for Green Globe certification [24].

2.4. Importance of green key certificates

There are many benefits for tourists and hotel owners in having green hotels certificates. For tourists, the Green Key certification assures tourists that the hotel is committed to sustainable practices, reducing its environmental impact [25]. Green-certified hotels often provide healthier environments, with better air quality and

organic food options, which appeal to health-conscious travelers [26]. In the case of hotel owners, the benefits are many. Firstly, holding Green Key certification allows hotels to distinguish themselves from competitors by appealing to the growing eco-tourism market. This can attract a higher-value clientele willing to pay premium rates for sustainable accommodations [27]. Secondly, implementing energy and water-saving measures, which are essential for certification, can lead to substantial cost savings in the long run, benefiting hotel owners.

2.5. Hedonic pricing

To develop guidelines for enhancing the potential of the hotel business and sustainable tourism. Hargrave [28] defines Hedonic pricing as a model that identifies price factors according to the premise that price is determined both by internal characteristics of the good being sold and external factors affecting it. Rosen [29] formalized the hedonic pricing model, demonstrating that the price of a differentiated good reflects the value of its characteristics. For example, a property's price might be influenced by its size, location, and age. The Hedonic model assumes that markets are competitive and that prices are adjusted to reflect the equilibrium between supply and demand for each characteristic. Regression analysis is commonly used to estimate the contribution of individual attributes to the overall price. Applications of Hedonic Pricing including Environmental Economics [30–32]; Real Estate Markets [33]; Transportation and Infrastructure [34] and Tourism and Hospitality [35]. When applied to green hotels, hedonic pricing model disentangles the premium customers are willing to pay for eco-certifications from other factors, such as location and star ratings. Green hotels, often charge premium prices because of their certified eco-friendly practices. This premium reflects customers' willingness to pay (WTP) for attributes such as energy efficiency, waste management, and water conservation systems [36].

2.6. Willingness to pay (WTP)

Previous studies have established a positive relationship between environmental certifications and WTP. For instance, Han et al. [36] demonstrated that environmentally aware travellers prefer accommodations with recognized eco-labels. Similarly, Chan [37] highlighted the role of green marketing in driving customer choices in Thailand's hospitality sector. Several studies have explored the willingness to pay (WTP) for green hotels, particularly in developed countries, where sustainability and environmental awareness are more prominent among consumers. Research from developed nations shows a strong correlation between environmental consciousness and consumers' WTP for eco-friendly hotel services [38]. Research has shown that Consumers in developed countries, such as the United States, Canada, European nations, and parts of Asia, have demonstrated a higher WTP for green hotels. This is because consumers in these countries are social responsibility initiatives that promote sustainability in tourism and hospitality sectors. The study by Schwartz et al. [6] in the United States found that 68% of respondents were willing to pay a premium for green-certified hotels. It shows that customers with higher incomes and education levels were more likely to value sustainability and demonstrate a stronger WTP.

According to Han and Hyun [39], when examining WTP for eco-friendly hotels in the UK, France, and Germany found that 75% of respondents in these countries are willing to pay more for accommodations that actively reduce their environmental footprint. The study also emphasized the role of hotel certification schemes, such as Green Key and LEED, in influencing consumers' willingness to pay for sustainability practices. This shows that environmental certifications enhance trust among eco-conscious travellers, leading to a greater WTP. A study in Canada conducted by [40] found that 64% of tourists were willing to pay up to 10% more for staying in hotels with proven sustainable practices. It shows that tourists in developed nations are often more motivated by long-term environmental benefits and are willing to invest in green practices if they perceive them as contributing to ecological well-being. According to research by Sun et al. [41] on the willingness of Japanese and South Korean travellers to pay for green hotel initiatives found that 70% of respondents from both countries were willing to pay a premium for hotels that incorporated energy-efficient technologies, waste reduction programs, and water conservation practices. Studies show that key factors that influence WTP for green hotels in developed countries include environmental awareness, income levels, education, and familiarity with green certifications. Lee and Chen [42] pointed out that consumers who are knowledgeable about environmental issues and have higher education levels tend to show a higher willingness to pay for green accommodations. Also, tourists who prioritize health, safety, and sustainable living are more likely to favour eco-friendly hotel options, even at a higher cost. Hedonic pricing refers to the pricing strategy where prices are determined by the characteristics or features of a product, such as the location, view, or amenities in a hotel. In Thailand, this pricing model is increasingly being applied in the hospitality sector, particularly for luxury resorts and boutique hotels. For instance, beachfront hotels or properties with unique cultural experiences command higher prices due to the added value they offer tourists [43]. Hedonic pricing in tourism allows businesses to differentiate their offerings and capture higher revenues while catering to niche markets [17].

2.7. The hedonic pricing models

The hedonic pricing model is often used to estimate for environmental or ecosystem services that directly affect market prices for homes. This method of valuation may require a strong degree of statistical expertise and model specification, following a period of data collection. Yuthasak [17] argues that Hedonic pricing captures a consumer's willingness to pay for what they perceive are environmental differences that add or detract from the intrinsic value of an asset or property. A typical example of hedonic pricing method is in the real estate market, in which the price of land or building determined by the characteristics of both the property itself (i.e., internal factors like its size, appearance), and its surrounding environment (i.e., external factors (has the neighbourhood has a high crime rate and/or is accessible to schools and a downtown area, the level of water and air pollution, or the value of other homes close by). The hedonic pricing model is typically used to estimate the extent of the factor that affects the market price of the property. There are many benefits for using the hedonic model for hotel pricing. These include: the ability to estimate values,

based on concrete choices, particularly when applied to property markets with readily available, accurate data and it is flexible to be adapted to market goods and external factors. The hedonic pricing methodology has been developed under the concept that goods are valued for their utility-bearing attributes and characteristics (Rosen 1974). It has been used to determine the value of numerous products with respect to their attributes such as automobile [44], eco-labelled apparel [45], real estate [46–50], and hotel [51–60]. Based on hedonic pricing methodology, a class of differentiated products can be described as a vector of product characteristics. Therefore, the hedonic price function can be expressed as $P(x) = P(x_1, x_2, \ldots, x_n)$ where x_i is a set of product characteristics. The implicit price of each characteristic can be derived by taking the partial derivative of the hedonic price function with respect to x_i. The implicit prices estimated by the hedonic price model reflect real traveller willingness to pay for hotel room based on hotel attributes. Previous studies based on the hedonic price model have focused many hotel attributes as indicate in **Table 1**.

Table 1. Hotel attributed used by hedonic pricing model.

Attributes	**Author(s)**
Hotel Stars	[51], [54], [59,60]
Hotel Chain	[61,62]
Hotel Age	[63]
No. of Room	[62], [64]
Room Size	[65,66]
Breakfast	[60], [65]
Swimming Pool	[67,68]
Fitness	[59,60], [65], [68]
Meeting Room	[60], [65]
Shuttle	[60], [65]
Restaurant	[60], [65]
Internet	[59,60], [65]
Green Hotel Certificate	[60]
Distance from a Set Point (City, Station, Airport)	[59,60]

Based on previous studies, the willingness to pay for staying in green hotel can be estimated by using hedonic pricing model which is formalized by hotel attributes. These hotel attributes can be categorized into three groups: the hotel attributes (Z_i), hotel location (L_i) and hotel's green attribute (G_i). The hedonic price function for green hotel can be expressed as $P = f(Z_i, L_i, G_i)$. The willingness to pay for green attribute in hotel can be derived by the implicit price of green attribute expressed by $\frac{\partial P_i(Zi,Li,,Gi)}{\partial G_i}$. Green attribute used by previous studies is green certificate [60,69].

Kuminoff et al. [69] found that U.S. travellers are willingness to pay a premium between $9 and $26 for certified green hotel. Hence, the hotel attributes used in this study are based on previous literature review such as hotel stars, green attribute, and hotel facilities which include breakfast, internet access, pool, conference facility, restaurant, and airport shuttle. To avoid multicollinearity problem with hotel star, the number of rooms, room size and hotel chain are not included in the set of hotel characteristic variables. Although hotel age may affect the hotel marketability, the date of the last renovation could be more important. However, the up-to-date information about hotel renovation is quite limited. Hence, hotel age is not included in this study.

3. Methodology

Qualitative research method is used in this study by using survey from a particular outstanding website as a key tool to collect the data in Phuket from tourists who have chosen to stay in green hotels. This study collects data on price and hotel attributes of hotels in Phuket. This study focuses only on Phuket to avoid heterogeneity problem induced by regional effect. According to the latest 2019 TripAdvisor annual Traveller's Choice Awards, Phuket was the only Thai destination in the list of World's Best Destination and the second-best destination in Asia and the 6th in the global ranking. The newly released China Thailand Travel Sentiment Survey 2020, conducted in mid-April by C9 Hotel works and Delivering Asia Communications (DAC) showed that 71 per cent of Chinese would like to visit Thailand once the COVID-19 situation is normalized and Phuket was the top three destinations. The second author surveyed 179 hotel samples in total. In Thailand, most hotels are bookable on the online travel agencies. Due to the market competitiveness, none of these online travel agencies is dramatically different from the others in terms of rates. Accordingly, all the data were collected from only one of the major online travel agencies. Agoda website was chosen because it is the top Asia's leading hotel booking sites. By the nature of the hotel, the room rates depend on the season and the day of the week. To avoid heterogeneity problem from seasonality and the day of the week, weekend rates during the period of high season are collected. The average weekend rates during mid-December through mid-January are used as dependent variable. For each hotel, the following hotel attributes are collected: hotel star rating, hotel facilities whether hotel provides a free breakfast, a fitness center, free internet access, meeting room, a swimming pool, restaurant, free shuttle bus. These qualitative attributes are converted to binary variables, which the presence or absence of each attribute is indicated, by 1 or 0 value. In addition, hotel location variables such as distance from the hotel to the city center and to the nearest beach are measured by Geographical Information System (GIS). Dummy variable for green hotel is also created by collecting data on Green Leaf certified hotels from Green Leaf Foundation. Furthermore, hotel star rating in this study is derived from Thailand Hotel Standard Foundation. Following Chen and Rothschild [65], Rosen [70], and Thrane [71], this study employs a log-linear specification for hedonic pricing function as stated in Equation (1) below:

$$\begin{aligned} \text{Ln}\,(\text{ROOMRATE}_i) = {} & \beta_0 + \beta_1\,\text{GREEN}_i + \beta_2\,\text{BREAKFAST}_i + \beta_3\,\text{INTERNET}_i + \beta_4\,\text{GYM}_i \\ & + \beta_5\,\text{POOL}_i + \beta_6\,\text{MEETING}_i + \beta_7\,\text{REST}_i + \beta_8\,\text{SHUTTLE}_i \\ & + \beta_9\,\text{STAR}_i + \beta_{10}\,\text{DIST\_B}_i + \beta_{11}\,\text{DIST\_C}_i + \varepsilon_i \end{aligned} \quad (1)$$

To answer the research question on "how much tourists are willing to pay for staying in green hotel in Thailand?", the implicit price for green attribute is estimated to represent how much tourists are willing to pay for staying in the green hotel in Thailand. In addition, the implicit prices for other hotel attributes are also estimated to represent the effect of hotel attributes on the willingness to pay for staying in the hotel in Thailand. The impact of dummy coefficient of on the hotel room rate can be

interpreted as % Δ ROOMRATE = ($e^{\hat{\beta}}$-1) × 100. Hence, the positive coefficient of the dummy variable 'green' show that the tourists are willing to pay 68 percent higher rate of room in the green hotel. In addition, free breakfast contributes positively to room rates. Hotels that offer a free breakfast charge about 15 percent higher than those that do not include breakfast. Similarly, room rates in the hotel with fitness center are about 20 percent higher than those in hotels without fitness center. Hotels that provide free shuttle charge 33 percent higher than those that do not provide this service. Moreover, an extra hotel star is associated with a 64.49 percent increase in room rates. The method utilizes survey data from the Agoda website, focusing on hotel customers visiting Thailand. It incorporates hedonic pricing variables such as room rates, green certification, and associated amenities to analyze factors influencing customer preferences and pricing.

The Hedonic Price Model in regression is used to estimate the implicit prices of individual attributes or characteristics of a product or service by analyzing its market price. In this context, regression techniques play a key role in quantifying how different features contribute to the overall price. In Regression we used the regression techniques, such as Ordinary Least Squares (OLS), to estimate the coefficients (β). These coefficients reflect the marginal contribution of each attribute to the price. The dependent variable is the price of the product or service (e.g., hotel room rates, etc.). The Independent Variables (Attributes) are defined by selecting the characteristics or features of the product/service that may influence its price. For example: Hotel attributes: star ratings, green certification, amenities (pool, gym, etc.), size, location, number of bedrooms, etc. To formulate the Regression Equation: The general form of the hedonic pricing regression model is $P = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta nXn + \epsilon$ and it appears in the above equation. The coefficients indicate how much the price changes with a one-unit change in an attribute, holding other factors constant.

Based on the objectives of the study and the literature reviews, the conceptual framework for the study can be formed as in **Figure 1** below:

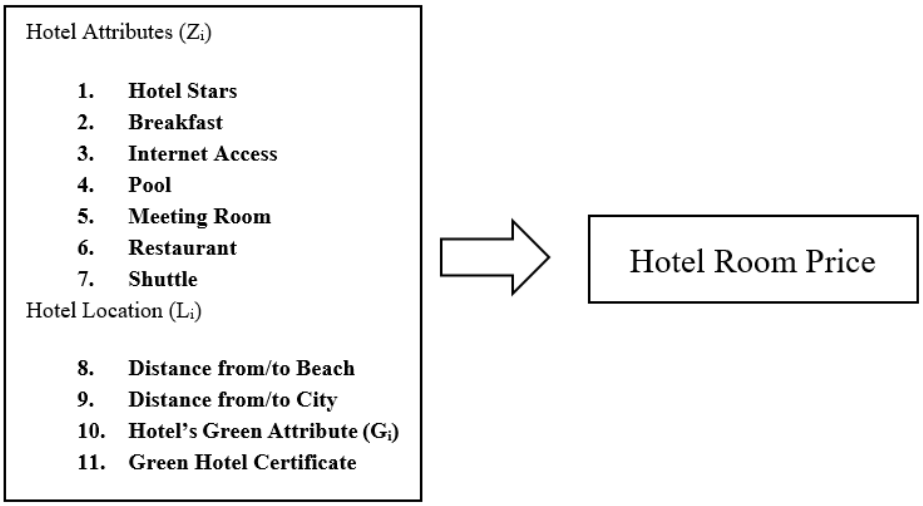

Figure 1. Conceptual framework.

Empirical model

Based on the above conceptual framework, the empirical model can be formed as follows.

$$\begin{aligned} \text{Ln}\,(\text{ROOMRATE}_i) = {} & \beta_0 + \beta_1\,\text{GREEN}_i + \beta_2\,\text{BREAKFAST}_i + \beta_3\,\text{INTERNET}_i + \beta_4\,\text{GYM}_i \\ & + \beta_5\,\text{POOL}_i + \beta_6\,\text{MEETING}_i + \beta_7\,\text{REST}_i + \beta_8\,\text{SHUTTLE}_i \\ & + \beta_{9\,\text{STARi}} + \beta_{10}\,\text{DIST\_B}_i + \beta_{11}\,\text{DIST\_C}_i + \varepsilon_i \end{aligned} \quad (2)$$

where

ln (ROOMRATE) = Hotel Room Price in Ln functional form,
α = Intercept,
GREEN = 1 if the hotel has green hotel certificate,
= 0 if the hotel has no green hotel certificate,
BREAKFAST = 1 if the hotel has free breakfast,
= 0 if the hotel has no free breakfast,
INTERNET = 1 if the hotel has free internet,
= 0 if the hotel has no free breakfast,
GYM = 1 if the hotel has fitness,
= 0 if the hotel has no fitness,
POOL = 1 if the hotel has swimming pool,
= 0 if the hotel has no swimming pool,
MEETING = 1 if the hotel has meeting room,
= 0 if the hotel has no meeting room,
REST = 1 if the hotel has restaurant,
= 0 if the hotel has no restaurant,
SHUTTLE = 1 if the hotel has free shuttle,
= 0 if the hotel has no free shuttle,
STAR = Hote1 star rating from 1–5,
DIST_B = Distance from the hotel to the nearest beach (Kilometers),
DIST_C = Distance from the hotel to the city center (Kilometers).

4. Analysis and results

In Thailand, most hotels are bookable from the online travel agencies. Due to the market competitiveness, none of these online travel agencies is dramatically different from the others in terms of rates. Data were collected from only one of the major online travel agencies**.** Agoda website was chosen because it is the top Asia's leading hotel booking sites. The room rates depend on the season and the day of the week. For ideal weather, most hotels and resorts in Phuket are charging high season rates from mid-December through mid-January which covers the Christmas and New Year period. Conversely, most hotels and resorts in Phuket are charging low season rates prices from September through October due to rainy and monsoon season. Due to the popularity of Phuket as weekend getaways, most hotels and resorts in Phuket have higher rates on weekends. To avoid heterogeneity problem from seasonality and the day of the week, weekend rates during the period of high season are collected. The

average weekend rates during mid-December through mid-January are used as dependent variable. For each hotel, the following hotel attributes are collected: hotel star rating, hotel facilities whether hotel provides a free breakfast, a fitness centre, free internet access, meeting room, a swimming pool, restaurant, free shuttle bus. These qualitative attributes are converted to binary variables, which the presence or absence of each attribute is indicated, by 1 or 0 value. In addition, hotel location variables such as distance from the hotel to the city centre and to the nearest beach are measured by Geographical Information System (GIS). Dummy variable for green hotel is also created by collecting data on Green Leaf certified hotels from Green Leaf Foundation. Furthermore, hotel star rating in this study is derived from Thailand Hotel Standard Foundation. Following Chen and Rothschild [61], Rosen [70], and Thrane [71], this study employs a log-linear specification for hedonic pricing function as stated in Equation (1).

In **Table 2** shows the mean, standard deviation, min, and max value of both dependent and independent variables. The standard deviation of room rate is relatively varied since the sample size covers various types for hotels in Phuket. The minimum room rate during high season is $17; whereas the maximum room rate during high season is $354.95. Hotel attributes such as free breakfast, fitness, internet access, meeting room, swimming pool, restaurant and free shuttle, including green certificate are measured on dummy variables, in which 1 indicates presence and 0 indicates absence. The average distance from the hotel to the nearest beach is 3.25 kilometres, whereas the average distance from hotel to the city centre is 22.02 kilometres.

Table 2. Descriptive statistics (179 Samples).

Variable	Description of Variable	Mean	SD	Min	Max
ROOMRATE	Room rates during the High Season in US Dollars	354.95	468.88	17	2044
GREEN	Green Certificate (No = 0; Yes = 1)	0.09	0.29	0	1
BREAKFAST	Free Breakfast (No = 0; Yes = 1)	0.74	0.44	0	1
INTERNET	Free Internet Access (No = 0; Yes = 1)	0.95	0.23	0	1
GYM	Fitness (No = 0; Yes = 1)	0.39	0.49	0	1
POOL	Swimming Pool (No = 0; Yes = 1)	0.74	0.44	0	1
MEETING	Meeting Room (No = 0; Ye s= 1)	0.21	0.41	0	1
REST	Restaurant (No = 0; Yes = 1)	0.81	0.39	0	1
SHUTTLE	Free Shuttle (No = 0; Yes = 1)	0.56	0.50	0	1
STARS	Hotel Star Rating from 1–5	3.44	0.70	2	5
DIST_B	Distance from the hotel to the nearest beach (Kilometers)	3.25	2.08	0.2	17.2
DIST_C	Distance from the hotel to the city center (Kilometers)	22.02	5.25	8.7	48.6

In **Table 3** shows the estimated results of hedonic pricing function, which indicates one night weekend room rate in the natural logarithm as a function of a set of hotel attributes. The adjusted-R square on this hedonic pricing function is 0.53 which indicates that approximately 53% of variation in the room rate can be explained by these selected hotel attributes. The study shows that six variables including green certificate (GREEN), free breakfast (BREAKFAST), fitness room (GYM), free shuttle (SHUTTLE), hotel star rating (STARS), and distance from hotel to the nearest beach

(DIST_B) have significant effect on room rate. The coefficient on continuous variables can be interpreted as normal log- linear regression; however, the coefficient on dummy variables can be interpreted by $(e^{\hat{\beta}} - 1) \times 100$, where $\hat{\beta}$ is the coefficient and e are the base of the natural logarithm.

Table 3. Correlation between independent variables.

	STARS	**GREEN**	**BREAKFAST**	**INTERNET**	**GYM**
STARS	1				
GREEN	0.2106	1			
BREAKFAST	0.2955	0.0871	1		
INTERNET	0.1275	0.0767	0.1291	1	
GYM	0.5657	0.3562	0.2562	0.1291	1
POOL	0.5309	0.1884	0.3872	0.0656	0.4355
MEETING	0.473	0.2316	0.1171	0.0487	0.3707
REST	0.1898	0.096	0.1826	−0.1146	0.2079
SHUTTLE	0.3636	0.1946	0.1145	0.2671	0.2408
DIST_B	−0.046	−0.1625	−0.2405	0.0311	−0.0866
DIST_C	−0.3025	−0.0433	−0.1538	−0.0533	−0.1309
	REST	SHUTTLE	DIST_B	DIST_C	
REST	1				
SHUTTLE	0.0552	1			
DIST_B	−0.0773	0.0497	1		
DIST_C	−0.0184	−0.0785	−0.1853	1	

In **Table 4**, to answer the research question, the implicit price for green attribute is estimated to represent how much tourists are willing to pay for staying in the green hotel in Thailand. In addition, the implicit prices for other hotel attributes are also estimated to represent the effect of hotel attributes on the willingness to pay for staying in the hotel in Thailand. The impact of dummy coefficient of on the hotel room rate can be interpreted as % Δ ROOMRATE = $(e^{\hat{\beta}} - 1) \times 100$. Hence, the positive coefficient of the dummy variable 'green' show that the tourists are willing to pay 68 percent higher rate of room in the green hotel. In addition, free breakfast contributes positively to room rates. Hotels that offer a free breakfast charge about 15 percent higher than those that do not include breakfast. Similarly, room rates in the hotel with fitness center are about 20 percent higher than those in hotels without fitness center. Hotels that provide free shuttle charge 33 percent higher than those that do not provide this service. Moreover, an extra hotel star is associated with a 64.49 percent increase in room rates. The distance from hotel to the nearest beach reflects whether the hotel is located close to the beach. The negative coefficient of DIST_B shows that the further the hotel is away from the beach, the lower the room rate. Another kilometre father away from the beach can lower room rates by 18.60 percent. Nevertheless, the proximity to the city centre has no impact on the room rate.

Table 4. Estimation of implicit price for each hotel attributes from hedonic pricing model.

LnROOMRATE	Coefficient	Standard Deviation	*T*-Value	*P*-Value	VIF
GREEN	0.5193*	0.1844	2.82	0.01	1.21
BREAKFAST	0.1399*	0.1266	1.90	0.07	1.29
INTERNET	−0.0215	0.2305	−0.09	0.93	1.13
GYM	0.2584**	0.1313	1.97	0.05	1.71
POOL	0.2277	0.1452	1.57	0.12	1.67
MEETING	−0.0494	0.1469	−0.34	0.74	1.48
REST	−0.0322	0.1327	−0.24	0.81	1.12
SHUTTLE	0.2830*	0.1112	2.55	0.01	1.27
STARS	0.6449*	0.1074	10.21	0.00	2.35
DIST_B	−0.1860*	0.0267	−6.98	0.00	1.28
DIST_C	−0.0041	0.0103	−0.40	0.69	1.22
Constant	1.5862*	0.5050	3.14	0.00	
Adjusted-R2	0.53				
Mean VIF	1.43				

Overall, the results show that the green attribute has the high impact on room rates. This price premium about 68 percent represents that tourist are willing to pay a premium for certified green hotel. This premium for green attribute also indicates an increasing value for hotel business; hence hotel operators should promote their green practices and registers for green certificate. As expected, one of the most significant variables on room rates is hotel star rating since it is an indicator of what to expect at the hotel. Besides, hotels which offer extra services such as free breakfast, free shuttle and fitness centre can charge higher room rates than those without these extra services. The results can imply that these attributes can add the extra value to the hotel. Finally, the distance from the hotel to the beach is also significant variable since Phuket is the popular tourist destination that offers many beautiful beaches. Tourists are willing to pay more if hotels are located close to the beach.

5. Discussion

The results of this study confirm that tourists are more willing to pay to stay in the green hotel. Interestingly, the results of the study are quite mixed compared to previous studies. Similar to Kuminoff et al. [69], this study finds that the fitness centre has positively significant effect on room rates. However, this result is inconsistent with Chen and Rothschild [65] and Kuminoff et al. [69]. Chen and Rothschild [65] found that fitness centre has significant effects on the weekday rates, but not on the weekend rates, whereas Thrane [71] found no significant relationship between fitness centre and room rates. This study also shows that hotels offered a free breakfast charge about 15 percent higher than those that do not include breakfast. These results are inconsistent with Soler et al. [60], Chen and Rothschild [65], Kuminoff et al. [69], which found no significant relationship between breakfast and room rates. In contrast to Chen and Rothschild [65], this study finds that free hotel shuttle has significant impact on room rate. The reason for the difference results between Chen and Rothschild [65] and this study may come from the city characteristics. Chen and Rothschild [65] used Taipei

where there is a good and relatively cheap public transportation; whereas this study focuses on Phuket where public transportation is quite limited and relatively expensive. According to location factor, this study finds that distance from hotel to city centre has no significant impact on room rates. This is somewhat unexpected and in contradiction with other previous studies [54,71]. The possible reason behind this could be that Phuket is the tourist destination where there are many famous beaches. Hence, tourists are likely willing to pay for hotel which is closer to the beach than to city centre.

6. Conclusion

This study examines the impact of green attribute on the willingness to pay for hotel room. Hedonic pricing model has been used to estimate implicit price of many products and services such as automobile, eco-labelled apparel, real estate, and hotel. The previous studies about the willingness to pay for green hotel are relatively limited for Thailand. Therefore, this study fills the gap of the existing studies by estimating implicit price of green attribute for hotel in Thailand. This research study employs the hedonic pricing model to estimate implicit prices of hotel attributes that determine room rates. To avoid heterogeneity problem induced by regional effect, Phuket is chosen as the study site. Like Soler et al. [60] and Kuminoff et al. [69], these studies show that green certification positively affects room rates. Hedonic pricing provides a robust framework for us to study the value of green certifications and attributes in the Thailand hotels industry. As consumer demand for sustainability grows, understanding WTP for certified green hotels is critical for aligning business strategies with environmental goals.It is our belief that Findings from hedonic pricing studies offer valuable insights for hotel owners and policymakers. Tourists can leverage eco-certifications to differentiate their offerings and justify premium pricing, while policymakers can use the findings to design incentives that promote green certifications and educate customers about their significance, enhancing demand for sustainable tourism. The study has several limitations. Firstly, Hedonic relies heavily on the availability and quality of data. Missing or inaccurate data on specific attributes can bias results. Secondly, this approach assumes competitive markets and accurate information, that may not be available in emerging markets such as Thailand. Thirdly, there is limited research on the role of green certificates and their credibility in Thailand. Fourthly, there is a lack of longitudinal studies to evaluate how WTP for green certifications evolves with changing consumer awareness.

It is important that further research should address the limitations current leverage advanced methodologies to enhance the precision and applicability of hedonic models for green hotels. Recommendation. For the policy implication, the results of study show that tourists are willing to pay for green hotel. Hence, hotel operators should promote green practice and adopt green certificate. Moreover, hotels operators in Phuket can provide extra amenities such as free breakfast, shuttle service and fitness centre in order to increase tourists' willingness to pay. However, this study uses only hedonic pricing model as the research methodology. The future study about willingness to pay for green hotel should use other environmental valuation methods such as contingent valuation and conjoint valuation in order to study not only the impacts of hotel attributes but also tourists' personal characteristics and attitude

toward green hotel. In addition, the method of behaviour economics can be applied in order to estimate the willingness to pay for green hotel.

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