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Leading Green Innovation to Enhance the Environmental Performance of Malaysian Hotels

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ABSTRACT

This research aims to explore the factors affecting green innovation and their consequent influence on environmental performance within the hotel industry context, focusing on Kuala Lumpur, Malaysia. Employing a quantitative, cross-sectional research design, structured questionnaires were utilized to collect primary data. Analysis was conducted using AMOS software, incorporating exploratory factor analysis (EFA) to refine the measurement model, and confirmatory factor analysis (CFA) to validate and assess model fitness. Structural equation modeling (SEM) was employed to test hypotheses. Results reveal that green organizational culture, strategies, energy conservation practices, and environmental regulations are significant factors influencing the adoption of green innovation within hotels. Additionally, the study demonstrates a positive correlation between green innovation and hotel environmental performance. Notably, this research is constrained to hotels within Kuala Lumpur, Malaysia, suggesting a need for broader geographical and cultural diversity in future investigations. Furthermore, while the focus is on the hotel industry, there is potential for extending this inquiry to other sectors. This study addresses a gap in current literature by specifically examining green innovation within the hotel industry, offering insights into its impact on environmental sustainability. It underscores the importance of understanding the interplay between green practices and environmental performance in fostering sustainable tourism practices. This research lays the groundwork for further exploration into the dynamics of green innovation and its implications for environmental stewardship in hospitality contexts.

1. Introduction

The growing population and global economy have significantly strained the environment and natural resources. There is an urgent need to balance environmental development and environmental degradation before it is too late [2]. The environmental management system (EMS) can help companies become more environmentally responsible and competitive because better

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environmental performance can lead to waste reduction and redesigning products/processes to have a lower environmental impact. The implementation of EMS can lead to environmental performance [14]. Achieving ecologically sustainable standards is one of humanity's most crucial challenges today [44]. As a result, in today's technological landscape, it is critical to embrace green processes and products [30]. We must use green products and techniques to prevent environmental degradation and reduce pollution [11].

Green innovation is discovering ecologically sustainable and environmentally friendly methods of producing and operating products and services without sacrificing quality or productivity. Green innovation is improving management, products, systems, technologies, and operations while remaining sustainable [18]. The practical application of green innovations has enormous potential. It can aid in the resolution of issues concerning environmental protection and the promotion of green development. It is also an important factor in improving various organizations' financial, social, and environmental outcomes [5]. Green innovation relates to three concepts of innovation: organization, product, and process. Green innovation's product and process concepts combine production efficiency, process innovation, and product innovation with environmental objectives [61].

Green practices are growingly crucial in business today [24]. Regulatory bodies, policies, societal pressures, and an increase in ecologically sensitive customers drive firms to achieve ecological sustainability and environmental growth. Malaysia is a good example, where businesses are shifting toward green innovation and green processes in order to conform to the "green mindset" [7]. The tourism industry is one of the world's fastest growing industries. It has immense potential and has brought several benefits globally. It is using millions, generating the country's gross domestic product (GDP) and benefitting other industries [7,43]. Statistically speaking, the tourism industry is the second-fastest-growing industry in the world. The sector provides 219 million jobs, accounting for 10.4% of the global GDP. However, besides its benefits, it has created several environmental challenges for us over the years. It has a crucial role in global warming and contributes 5% of the total CO_2 emissions [68]. Hence, creating an environmentally stable environment without revolutionizing the tourism industry is impossible. Despite having considerable differences, the principles of continuity and fairness are shared among the sustainability models in different countries. Malaysia is striving hard to incorporate sustainable development within its industrial practices. Since 1998, the government has successfully launched several ecological construction projects such as grassland, forestation, and environmental management [50]. The deforestation rate is decreasing, and the area under plantation is increasing, which will go a long way toward enhancing environmental protection policies in Malaysia. Malaysia's green sustainability primarily aims to minimize environmental pollution and reduce damage caused by mismanagement by adopting better ecological management practices [32].

The tourism industry in Malaysia has grown exponentially since the development and environmental reforms in 1978, which has improved the lifestyle of Malaysian people, attracting foreign tourists and investments. According to the reports, the annual tourism income for the year 202 the year 2023 in Malaysia has been recorded as RM28.2 billion, which is the contribution of both international visitors, 10 million, and local tourists, .0 billion [49]. Another reason for the increase in tourism is Malaysia's multicultural and technologically advanced society, which entertains religious, business, medical, marine, and eco- tourism [7]. Malaysia's adaptive policy and fast environmental growth in recent years have contributed to the country's tourism sector's rapid growth country [16]. Once we have discussed Malaysia's role in adopting green practices, it is time to discuss Malaysia's tourism industry; the industry contributes 11.04% to rde rd the Malaysian economy. practice used by more than 8.0 million people [68]. Therefore, tourism is crucial for the Malaysia economy, and it must become ecologically stable to minimize its environmental impacts.

Growth in the tourism industry is beneficial for the Malaysia economy, but it negatively impacts environmental conditions [49]. The tourism industry negatively affects wildlife, generates waste and pollution [52]. The negative impacts on the environment due to tourism result in the vulnerability of the global system [39], reduce the competence of tourism destinations [51] and reduce the quality of life for the host population [28]. However, the lack of environmental regulations [8] and the negative impact of tourism in Malaysia means that any ecological policies are implemented in Malaysia restaurants are voluntary and for advertisement and goodwill purposes [35,62]. The tourism industry's immense contribution to the Malaysia economy must not be an excuse to avoid ecological regulations. This industry must be strictly regulated for environmental production due to the extent of ecological damage caused by it annually [17]. The hotel industry of Malaysia, like other industries, focuses on profit maximization. The major difference between the hotel industry and any other industry is the emphasis on green strategies for customer satisfaction. The manufacturing industry adopts such strategies for their profit, but the hotel industry adopts them to satisfy the customers. Industry adopts such strategies for their profit, but the hotel industry adopts them to satisfy their customers. Wan Norhidayah *et al*., [65] highlighted that most hotels offer not just lodging but also provide additional services such as cuisine and entertainment. The hotels' multiactivity character is inextricably linked to their profit- maximizing strategy. The primary motivation for hotels to offer multiple services is to increase profit margins. In other words, their profit-maximizing behaviour drives their multiactivity nature. Furthermore, considering many activities implies the presence of scope economies for hotels, which is a primary environmental motive to offer multiple services.

The aim of this paper is to contribute to the literature on the relationship between green innovation and firm environmental performance while also investigating the extension of green innovation and firm evidence. The relationship between environmental performance and green innovation is well established [54]. Still, it is not fully understood how sustainable environmental performance is contributed by green innovation in the tourism industry. This study will provide empirical evidence toward the discussion above by evaluating evidence that emphasizes the relationship between environmental performance and green innovation in the hotel industry. The discussion will be based on data obtained from hotels in Malaysia, the world's leading economy and the most significant greenhouse gas contributor. However, the government of Malaysia has implemented pro-green innovation regulations in the country.

The impact of green innovation on firms' profitability has been well documented in production and other industries, but there is a lack of literature on the hotel industry [8,19]. Several studies have discussed sustainability in the hotel industry of Malaysia, for example, [46,58] but literature on green innovation is scarce [17]. Sustainability in a firm's performance is positively affected by the implementation of green innovation. Literature suggests that green innovation is an abstract notion leading to apprehensions among many hotels about its adoption [8]. Moreover, there is a lack of literature investigating the relationship between green innovation and firm environmental performance [54]. In addition, this study has highlighted the need to identify the strategies that can enable the organization to adopt green innovation, which can lead to performance. It has presented the four important green strategies, including environmental regulations, green innovation strategies, green conservation and green organizational culture. Therefore, it has filled the gap of attaining green innovation, as the mentioned strategies are important for the development of green innovation. Hence, this research is conducted to understand the relationship between hotels' environmental performance and green innovation. Relatively, the already established literature tries to address the issue through empirical evidence collection to encourage hotels to adopt green initiatives and enhance both competitive potential and environmental performance. This study has

presented a practical model to investigate the relationship between environmental performance and green innovation in Malaysia's hotel industry. This research is unique to the author's knowledge as there is no available study on green innovation adoption and hotels' environmental performance in the Malaysia context.

2. Theoretical Framework and Hypothesis Development

Sahoo *et al*., [54] highlighted that green hotels include the hotels that strive to be more ecologically friendly in terms of efficiency and low use of energy, water and materials but still their emphasis is on providing high-quality services. Many advantages have already been found by hoteliers as a result of implementing green techniques. These advantages include brand value, building a positive image in the eyes of guests, cutting expenses and liabilities and more profit. Besides these advantages, several hotels have begun to engage in corporate social responsibility (CSR) activities and implement social programmes because the hotel sector has had harmful consequences on the environment; CSR is the correct thing to do to give back to nature [33]. In 2008, the intercontinental hotel group (IHG) became the first green hotel to open. It was the world's first 100% environmentally friendly hotel. The utilization of solar panels on the roofs, a rainwater harvesting system to feed water to the toilets, electricity generated by wind power, recycled glass windows and furniture and fixtures constructed entirely of recycled materials were among the green features provided by the hotel [26]. The literature review on green innovation and other green strategies considered by this research is given below.

2.1 Transaction-Cost Theory

The development of stable network relationships can help in reducing transaction costs of environmental collaborations with partners. The investment in social capital is also a green strategy for the company because of its efficiency in building new green intellectual capital. Therefore, the transaction cost, either social capital or any other, can help the companies in achieving effective green innovation [24]. This research is based on the transaction-cost environmental theory for investigating the impact of green innovation on hotels' environmental performance in Malaysia. Transaction cost theory states that an optimum organizational structure achieves environmental efficiency by minimizing exchange costs [54]. This theory implies that the coordination costs of managing, controlling and monitoring transactions are incurred with each kind of transaction. The theory works on the general theory of governance, exchange relationships and environmental organization while focusing on the make or buy decision, also known as the "canonical transaction" [13]. This theory is an extension of agency theory. Companies innovate to cut costs and reduce the time required for production or operation while improving performance. Hence, this theory supports green innovation in this study. According to this theory, green innovation helps a company enhance and develop it is environmental, social sustainability, environmental and social performance. The conceptual framework describing the research hypothesis is displayed in Figure 1.

2.2 *Environmental Regulations*

Several past studies have found that environmental regulations are drivers for investment in environmental initiatives [40,45,54,58] and presented that innovation-driving environmental policies positively influence technological innovation and incentivize green innovation in companies.

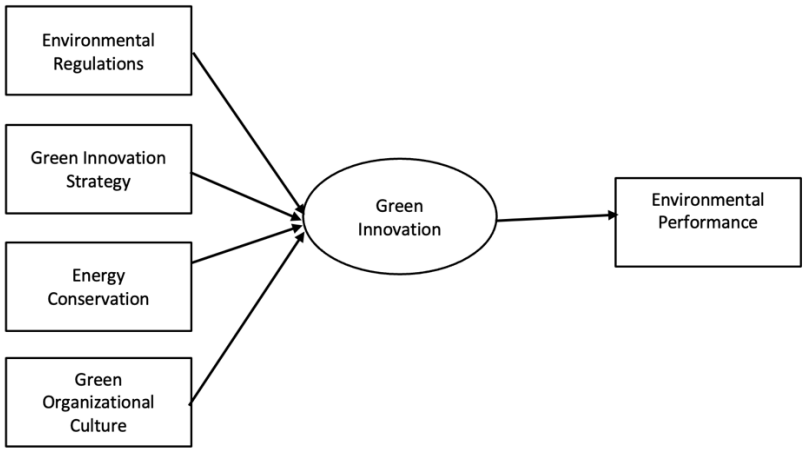

Fig. 1. Research model

However, some empirical studies show a different picture. They discovered that regulatory policies do not directly impact the green behavior of companies [34,46,54]. Moreover, some studies have shown that companies' green development depends on environmental regulations [56]. Hence, there is a lack of literature addressing the relationship between green innovation and environmental regulations. Based on the differences between the researchers regarding the effect of environmental regulations on corporate green innovation concerns and understanding that the rules constitute a formal structure that imposes substantial institutional pressure on firms, the study established the following hypothesis:

H1. There is a positive impact of environmental regulations on green innovation.

2.3 Green Innovation Strategy

Green innovation is defined as the improvement or development of companies' software or hardware related to green processes and products. It can include innovative technologies that help develop corporate environmental practices that positively design green products, recycle waste, prevent pollution, and help save energy that positively influences sustainability [48]. Green innovation requires originality in developing green processes and products to improve a company's sustainability and satisfy environmental preservation requirements [45]. Many studies have focused on enhancing green innovation by achieving green sustainability, greening the suppliers, and building green core competence [6,17,35,58]. However, as mentioned above, literature concerning green innovation and strategy is lacking.

This study believes that the green innovation strategy positively influences green innovation. Green innovation in organizations is possible by effectively implementing green innovation strategies. This innovation promotes EMSs, preventing pollution and reducing waste [47]. A firm must use its technical, human capabilities, and heterogeneous resources to achieve its green innovation goal [65]. It is known that a company's potential for innovation depends on its resources [26,46] and these resources can be used in the development of green strategies.

The companies prefer to stimulate a green innovation strategy to reduce legal and regulatory pressures. Firms prefer a proactive approach toward developing a green innovation strategy that results in green innovation instead of reacting to government-imposed restrictions [67]. A firm can coordinate its resources toward achieving green innovation and developing green processes and

products to implement its green innovation strategy. Finally, firms can exploit new market opportunities and gain a competitive advantage while avoiding environmental and social costs of ecological degradation by devising a green innovation strategy and its implementation [3,59].

Consumers are becoming more environmentally sensitive, prefer firms that produce green products, and are willing to pay a higher price for such services and products [27,36]. Green innovation strategies are crucial for bringing about green product innovation and fulfilling customer demands for sustainable and green products. Environmental systems help companies to bring innovation in products and processes that contribute to green creation [54]. Therefore, the second hypothesis for this study is as follows:

H2. Green innovation strategy positively influence green innovations.

2.4 Green Organizational Culture

Organizational culture plays a crucial role in developing and implementing innovation in a company [55]. Corporate culture can either promote or demote innovation in a firm. Hotels must establish and maintain environmental sensitivity and consciousness if they wish to adopt green innovation. Environmental practices depend highly on the organizational culture, which helps share the firm's policies and actions regarding ecological problems. A green organizational structure is crucial in implementing green innovation by motivating and addressing the company and its employees [34].

Moreover, senior management's efforts toward bringing green innovation are not alone sufficient to ensure its implementation. The organization must ensure a green organizational culture because it provides a convenient environment for green activities to bring about green innovation (CSR) [63]. An organizational structure prepares and formulates the mentality within and outside an organization that facilitates innovation adoption [64]. A green organizational structure is essential for green innovation because green values sharing helps enact green innovations [3]. An environmentally oriented organizational structure would ensure the successful implementation of environmental inventions and policies. Creating a green corporate culture is a sustainability effort and can help better integrate environmental policies [15].

However, the relationship between organizational structure and green innovation has been studied in the manufacturing industry, but there is a lack of literature for the service industry. For instance, a study by Khammadee and Ninaroon [34] discovered a direct relationship between green innovation and green organizational culture in the manufacturing industry. However, there is a lack of any such literature that studies the relationship in the service industry. Some studies discovered that various kinds of organizational structures were positively related to innovation. Aftab *et al*., [3] and Skordoulis *et al*., [59] found that long-term orientation and, individualism, organizational culture dimensions positively impacted innovative behaviors.

Similarly, team culture was found to be directly related to innovation performance. Research indicates that organizational culture is a positive enforcer of innovation. The following hypothesis is developed based on the arguments mentioned above:

H3. Green organizational culture has a positive effect on green innovation

2.5 Energy Conservation

Energy consumption is linked to environmental growth and modernization but is also responsible for environmental pollution [51]. Several studies that studied the relationship between environmental growth and energy consumption found environmental pollution and greenhouse gas emissions to be a critical environmental concern regarding energy expenditure [9,49,51]. Environmental implications associated with energy expenditure cannot be removed entirely, but sensible energy use can help minimize these environmental concerns [60]. Energy efficiency is the term that addresses minimal use of energy to gain maximum outcomes. Achieving energy efficiency ensures the solution of problems such as greenhouse emissions and energy security threats without compromising the environmental development of a country/company [24]. Energy efficiency is considered very important, so energy efficiency policies have been introduced into the national agendas by governments worldwide [67]. Significant investments are being made into green technology by governments and companies to achieve energy efficiency goals and ambitions dictated by government policies [24]. Management bodies are put into shape to oversee such energy efficiency monitoring policies [12]. However, despite the investments and regulations, energy efficiency targets are still far from achieving [42]. The energy efficiency levels are not constant between countries because of several contemporary factors such as technological development, degree of scientific development, the efficiency of governmental organizations, forms of specialization, and relative factor prices. Recently, green innovation has been in demand, and pressure for green innovation is pressing hard, mainly due to the visible effects of environmental pollution and global warming. Green innovation is vital in energy efficiency because it can help cut carbon mitigation costs through clean and renewable energy [20,22,72) studied factors affecting energy efficiency, who concluded that energy efficiency is promoted by green innovation and institutional quality. Based on the above discussion, we hypothesized that:

H4. Energy conservation is positively related to green innovation

2.6 Green Innovation and Environmental Performance

Innovation is an intangible asset that reflects itself in providing a competitive advantage and improving the company's international performance [34]. Companies wish and expect to reap benefits such as reduced cost of production and higher customer demand by implementing green innovation. A company's performance is judged by its outputs, which are influenced by several external and internal factors [66]. These outputs can be tangible or intangible. Tangible outputs include higher profit margin, increased customers, and higher revenue, whereas intangible outputs include reputation and company image. Studies divide them into two dimensions, competitive advantage, and environmental performance. Several studies of green innovation processes with their competitive advantage and environmental performance, and according to them, process innovation and green products are directly proportional to competitive advantage.

Environmental performance is the increase in marketing and financial capabilities due to applying green methods that enable businesses to outperform the industry norm [54]. In addition, green environmental performance is based on a reduction of cost for energy consumption, an improvement in capacity utilization, a decrease in waste treatment fees, and penalty costs for environmental accidents. Green innovation is the most crucial thing which can help in environmental advancement. Therefore, many companies are emphasizing clean technology to achieve environmental success in the future. Shell and BP invested in solar, wind, and many other renewable energy sources by

believing that these sources of energy have the potential to quickly replace nonrenewable sources [23]. The adoption of green innovation techniques not only improves the organizational performance but also enhances the organization's image and competitive advantage [9].

Water treatment and discharge ensure that the company does not incur any environmental accidents and that useless products are discarded. On the one hand, it helps the company reduce losses; on the other, it allows the company to improve its image and gain a competitive advantage [49]. In the hotel industry [42], this innovation is linked with many factors that are ignored by prior studies. Also, those studies have not focused on green innovation in Malaysian hotels. According to Nisar *et al*., [42], the hotel industry emphasizes programs like green innovation because of their numerous advantages.

Similarly, Asadi *et al*., [7] highlighted that green innovation could increase the environmental as well as environmental performance of the hotel. Green innovation also improves existing operations' performance [48]. According to Rasidah *et al*., [53], successfully adopting green innovations creates new competitive regions and "win-win" situations by reducing the hotel industry's environmental results and improving their environmental conditions. Social, ecological, and environmental benefits are also associated with green innovation due to reduced costs and waste. Therefore, studies show that green innovation directly affects environmental performance [42]. Based on the above discussion, the following hypothesis is developed:

H5. There is a positive impact of green innovation on environmental performance.

Based on the literature above, the following research model is designed for this research (Figure 1).

3.**Methods**

3.1 Research Instrument

The conceptual model was empirically tested by adopting a 23-item-questionnaire that comprises environmental regulation [four items adopted from the studies of Zhu *et al*., [73] and Yu *et al*., [71] green innovation strategy [four items adopted from the studies of Xue *et al*., [69] and Asadi *et al*., [7], energy conservation [three items adopted from the study of Abbas and Khan [1], green organizational culture [four items adopted from the study of Abbas and Khan [1], green innovation [four items adopted from the studies of Ahmed *et al*., [4] and Asadi *et al*., [7] and environmental performance [four items adopted from the studies of Nisar *et al*., [42] and Zhu *et al*., [73] To measure the items, a 5-point Likert scale was used (where 1= strongly disagree, 5= strongly agree).

3.2 Sampling and Data Collection

The study's target sample consists of hotel managers working in 4 to 5-star hotels in Kuala Lumpur, Malaysia. The main reason for selecting the study sample from Kuala Lumpur was its popularity among local and international visitors, and the top-most visited Malaysian city. The convenience sampling technique in which respondents are selected as per the researcher's convenience was adopted to select the target respondents. The data were collected face-to-face for two months, from August to October 2022. Nine hundred fifty questionnaires were delivered, from which only 486 were returned; hence, the response rate was 44%. Thirteen responses were excluded from the received responses due to incomplete information, so the utilizable sample size was 473 hotel managers. This sample size is acceptable for measuring the causal model, as a sample of 200 or

plus is adequate for using Maximum Likelihood Estimation. Table 1 presents the demographic characteristics of the respondents.

3.3 Data Analysis

To purify the measurement model, an exploratory factor analysis (EFA) was conducted, and to test the validities, confirmatory factor analysis (CFA) was applied using AMOS-24. Structural equation modeling (SEM) was performed to test the study hypothesis. In line with Hair *et al*., [25] and Henseler *et al*., [29] recommendations, measurement, and structural models were tested simultaneously to estimate the hypothesized construct relationships without the confounding effects of estimation error. Demographics (age, gender, education, and work experience) were considered control variables, and a one-way ANOVA was performed to test the impact of control variables. The results of one-way ANOVA indicate an insignificant impact of demographics on our outcome variable; therefore, no control variable is used in the current study. The detail of demographic profiles is given in Table 1. Most respondents were males with 5–7 years of experience in the hotel industry. In terms of qualification, most of the respondents were graduates.

4. Results

4.1 Harman's One-Factor Test

Harman's one-factor test was performed to identify common factor bias. The results reveal a 31.92 cumulative percentage of the variance between variables, which is less than the recommended value of 50% of the total variance [38].

Table 1
Respondents' demographic profiles

Demographic characteristics	Frequency	(%)
Gender		
Male	255	54
Female	218	46
Age		
18–25 years	157	33.2
26–33 years	227	48
34–40 years	55	11.6
41–50 years	26	5.5
Above 50 years	8	1.7
Work experience		
Less than one year	68	14.4
2–4 years	119	25.2
5–7 years	267	56.4
Above seven years	19	
		4.00
Education level		
Undergraduate	80	17.00
Graduate	269	57.00
Postgraduate	124	26.00

Note: *N = 473*

4.2 Exploratory Factor Analysis

EFA was conducted to determine the relationship structure between the constructs and the respondent, and the results are presented in Table 2. The results demonstrate excellent item loadings that ranged between 0.56 and 0.95. Moreover, Cronbach's alpha values of all constructs are greater than 0.70, which confirms the study variables' high internal consistency.

4.3 Discriminant and Divergent Validity

Discriminant and convergent validities are determined based on average variance extracted (AVE) and composite reliability (CR) values [25]. According to Bagozzi *et al*., [10], if AVE's values are more significant than 0.50 and CR is higher than 0.60, there will be excellent convergent validity. Fornell and Lacker [21] recommended that the values of AVE's square root should be higher than the construct's correlation values, which will confirm divergent validity.

Table 2
Exploratory factor analysis

Variables	Items	Loadings	*α*	AVE
Energy conservation	(1) Providing public transportation for guests	0.899	0.933	0.83
	(2) The hotel industry purchases equipment with energy- saving/water-saving marks or green-label items	0.931		
	(3) The hotel's transportation fleet uses alternatively fueled or hybrid vehicles	0.893		
Green innovation strategy	(1) Destruction or containment of waste	0.742	0.807	0.51
	(2) Capital and technology investment	0.721		
	(3) ISO 14000	0.735		
	(4) Changes in pollution prevention	0.660		
Environmental regulation	(1) Regional resource-saving and conservation regulations	0.911	0.954	0.84
	(2) National resource-saving and conservation regulations	0.921		
	(3) Regional environmental regulations (such as waste emissions and cleaner production	0.945		
	(4) Developed countries' environmental regulations	0.885		
Green Organizational culture	(1) Our hotel industry makes a concerted effort to make every employee understands the importance of environmental preservation	0.694	0.812	0.52
	(2) Environmental preservation is a high-priority activity in our hotel industry	0.763		
	(3) Preserving the environment is a central corporate value in our hotel industry	0.742		
	(4) Our hotel industry develops products and processes that minimize environmental impact	0.686		
Green innovation	(1) Our hotel industry uses less or nonpolluting/toxic materials	0.748	0.823	0.54
	(2) Our hotel industry improves environmentally friendly packaging for existing and new products	0.755		

Table 2 (Continued)

	(3) Our hotel industry recovers from hotel's end-of-life products and recycling products and recycling	0.763		
	(4) Our hotel industry uses eco-labeling	0.666		
Environmental performance	(1) Improved energy consumption	0.724	0.809	0.53
	(2) Improved capacity utilization	0.782		
	(3) Increased waste treatment initiatives	0.806		
	(4) Increase employee awareness	0.563		

The results shown in Table 3 demonstrate that all CR values are more significant than 0.60, AVE greater than 0.50, and the square root of AVE are higher than correlations, which confirm both discriminant and divergent validities. Furthermore, all the correlation values are positive, significant, and consistent with the study hypotheses.

4.4 Confirmatory Factor Analysis

Bagozzi *et al*., [10] recommended that it is necessary to check the measurement model fitness before testing hypotheses. To test the fitness of the measurement model, CFA was performed. Six-factor measurement model (as shown in Figure 2) tested for fitness using standard fit indices such as "Chi-square (x 2/df), Tucker–Lewis index (TLI), comparative fit index (CFI), incremental fit index (IFI) and root mean square error of approximation (RMSEA)". CFA results, as shown in Table 4, real excellent model fitness as all the fit indices for the six-factor baseline model is according to the cutoff criteria for fit indexes (x 2/df = 1.898, RMSEA = 0.044, IFI = 0.970, TLI = 0.964 and CFI = 0.970) as recommended by McNeish, (2022).

4.5 Test of Hypotheses

The degree of relationship between study variables is tested by performing SEM through AMOS-24. Table 5 presents the result of the direct effect, which reveals significant effect of environmental regulation ($b = 0.283$, $p < 0.001$), green innovation strategies ($b = 0.258$, $p < 0.001$), energy conservation ($b = 0.371$, $p < 0.001$) and green organizational culture ($b = 0.364$, $p < 0.001$) on green innovation. Moreover, results reveal a significant direct effect of green innovation on environmental performance ($b = 0.256$, $p < 0.001$). Consequently, all hypothesized relationships are well supported by study results. The results of hypotheses testing are also shown in Figure 3.

5. Discussion and Conclusions

Innovation's continuous arrival is positively related to firm performance and competitiveness. Therefore, in the past, much research on innovation was conducted. However, limited studies have investigated the relationship between green innovation and environmental performance. This study explores organizational factors, such as green organizational culture, energy-saving, green innovation strategy, and environmental regulations, which significantly contribute to green innovation. Moreover, the study also aims to explore the impact of green innovation on firms' environmental performance, especially in the context of the hotel industry of Malaysia. To attain the study objectives, various hypotheses were developed and tested. H1 predicted a significant and positive relationship between environmental regulation and green innovation.

Table 3
Discriminant and divergent validity

Variables	CR	AVE	MSV	1	2	3	4	5	6
1. EC	0.93	0.813	0.219***	*0.908*					
2. GIS	0.81	0.511	0.219***	0.458***	*0.715*				
3. ER	0.95	0.845	0.153***	0.391***	0.381***	*0.916*			
4. GOC	0.81	0.529	0.219***	0.534***	0.370***	0.263***	*0.722*		
5. GI	0.82	0.546	0.219***	0.467***	0.423***	0.332***	0.513***	*0.734*	
6. EP	0.81	0.532	0.219***	0.349***	0.281***	0.233***	0.377***	0.465***	*0.725*

Notes: N = 473, ***P < 0.001; EC: energy conservation; GIS: green innovation strategies; ER: environmental regulations; GOC: green organizational culture; GI: green innovation; EP: environmental performance

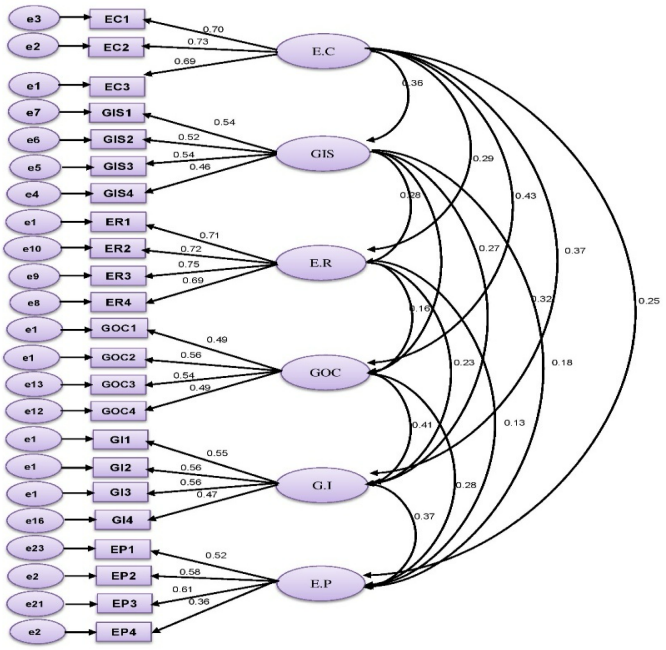

Fig.2. Six-factor measurement model

Table 4
Confirmatory factor analysis

Measurement model fit	*CMIN/DF*	*RMSEA*	*IFI*	*TLI*	*CFI*
Measurement model	1.898	0.044	0.970	0.964	0.970
The cut-off for good fit*	<3.00	<0.08	2'0.95	2'0.95	2'0.95

Note: *Cutoff criteria for fit indexes by McNeish, [37]

The results reveal that environmental regulations significantly and positively influence green innovation (b = 0.283, p < 0.001), as we have hypothesized. Environmental regulations and green

innovation are two key pillars of a sustainable environment for environmental development. The studies of Feng, Tang and Qiu also established environmental regulation as significant external pressure on organizations for green innovation. H2 predicted that organizational green innovation strategy positively influences green innovation. Results demonstrated a positive relationship between green organizational strategy and green innovation (b = 0.258, p < 0.001), which supports our hypothesized relationship. To stimulate green innovation, organizations must have to formulate a green innovation strategy. Malaysia's tourism industry companies have incorporated the green innovation strategy to gain a competitive advantage and overcome ecological pollution. However, green innovation must complement the company's strategic objectives to generate revenue. The study of Soewarno also proved that green organizational strategy positively impacts green innovation. Our study findings are also consistent with the study results of Asadi *et al*., [7].

Table 5
Test of hypotheses

Hypotheses and relationship	Estimate	SE	*P*	Result
H1: Environmental regulations → green innovation	0.283	0.049	***	Accepted
H2: Green innovation strategy → green innovation	0.258	0.041	***	Accepted
H3: Energy conservation → green innovation	0.371	0.050	***	Accepted
H4: Green organizational culture → green innovation	0.364	0.051	***	Accepted
H5: Green Innovation → environmental performance	0.256	0.040	***	Accepted

Note: ***$P < 0.001$

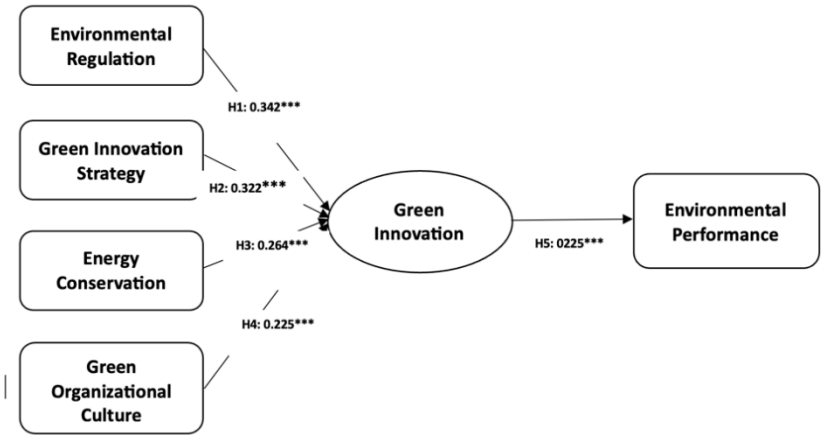

Fig. 3. Results of hypothesis testing

H3 predicted a positive effect of energy conservation on green innovation. Results reveal a significant and positive impact of green innovation's energy efficiency (b = 0.371, p < 0.001). These study findings are consistent with the study of Gerstlberger which explored a positive correlation between energy conservation and green innovation. Sun *et al*., [61] also established a positive relationship between green innovation and energy efficiency. Green innovation helps in the efficient use of resources and reduces environmental pollution by improving production efficiency, energy-saving, and emissions reduction.

The H4 of the study predicted a significant and positive impact of green organizational culture on green innovation. Results also support the predicted relationship as there is a significant and positive effect of green organizational culture on green innovation ($b = 0.364$, $p < 0.001$). Numerous past studies have investigated green organizational culture as a critical predictor of green innovation. A study by KüçükogVlu and Pınar founds a positive correlation between green organizational culture and green innovation. The positive relationship between sustainability and green innovation is more robust in the presence of green organizational culture. Green organizational culture and innovation reinforce its competitive advantage. Green organizational culture positively affects green performance. The current study results are also aligned with the study of Hardika which also found a positive influence of green organizational culture on green innovation.

The H5 predicts a significant and positive direct effect of green innovation on hotels' environmental performance. Consistent with the study hypothesis, results ($b = 0.256$, $p < 0.001$) demonstrate green innovation's significant and positive direct effect on the hotel industry's environmental performance. The primary purpose of green innovation is to enhance both the environmental and environmental performance of firms. Companies need to find out whether incorporating green innovation will or will not increase their environmental productivity. Extensive research has been conducted to understand the relationship between green innovation and the company's profitability. Nevertheless, these studies were unable to reach a unanimous conclusion.

One study suggests that companies face inefficiency and lack of productivity if they engage in green innovation. Another study concludes that green innovation positively impacts performance. Similarly, Fernando discovered that green innovation can improve business performance and service innovation. Green innovation positively influences the firm's social, environmental, and environmental performance [7]. The study of El-Kassar and Singh also found a significant effect of green innovation on overall organizational sustainable performance. Furthermore, the current study finding is also supported by Saudi and Zhang.

6. Implications and limitations

Drawing on the transaction-cost environmental theory and green innovation, we examined the impact of green innovation on the Malaysian hotel industry's environmental performance. The study findings suggest several theoretical as well as practical implications. There is limited research on the hotel industry's green innovation and environmental performance [7]. The concept of green innovation for the hotel industry is initially evolving. Therefore, the study findings present significant theoretical and practical implications for the hotel industry managers and policymakers, and they can get substantial benefits using these. From a theoretical perspective, the suggested model and the defined internal and external factors that influence green innovation can help hoteliers and policymakers understand the factors related to implementing the initiatives in the hospitality industry as there is a past study investigating the influencing factors in adopting green innovation leading to environmental performance, especially in the context of the Malaysia hotel industry. Hence, this study contributes significantly to the existing knowledge, theory, and practice body.

Environmental performance seems to be a critical factor that influences the implementation of green innovation. The environmental performance evaluation of different hotel industries by de Azevedo Rezende shows that hotels with the highest environmental practices are generally more profitable than hotels with low green practices. So, hotel managers must develop strategies to reduce wastage and protect natural resources to cope with the prevailing ecological problems. In reality, hotel managers must develop readiness for green innovation in their industry and make practical improvements to contribute to a sustainable environment. In the meantime, the government must

show commitment, make strategies, and take meaningful actions to engage the hospitality industry in implementing green practices to ensure sustainable business growth. By switching and transforming to green businesses, companies will become more profitable than traditional organizations.

Despite significant implications, this study has numerous limitations that suggest opportunities for future researchers. First, this study is limited to hotels operating in the only city of Kuala Lumpur, Malaysia. For more generalized results, future research can be done by incorporating hotels in other cities. Second, the study is conducted in Malaysia, and this research can be replicated in different cultural and environmental contexts. Further studies can be conducted in any other developed country. Moreover, this study addresses only the hotel industry, and future studies could be made to investigate green practices in SMEs. Furthermore, the research has highlighted the four major strategies that can lead to green innovation, but still, many green initiatives or strategies are ignored. The researchers aiming to explore the factors behind green innovation can extend the model by adding more strategies leading to green innovation.

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