

Developing an environmental management system for green casino hotel evaluation

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Cheong, Fan and Lee, Younghee, "Developing an environmental management system for green casino hotel evaluation" (2021). *Travel and Tourism Research Association: Advancing Tourism Research Globally*. 55.

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Abstract

This study developed the Environmental Management System (EMS) for a green casino hotel in Macau. The environmental practices of casino hotels are different from general hotels due to the distinctive patterns. Thus, the application of general EMS in casino hotels is not suitable. The casino hotel EMS indicator was initially selected from ISO 14000 and nine representative green hotel evaluation systems. The Delphi method and systems approach worked with government officials, academics, and hotel managers to modify the questionnaire with 38 experts to determine the preliminary EMS evaluation framework. The results reveal indicators suitable for use, and indicators should be implemented in Macau's casino hotel industry first. The EMS of this study provides management enlightenment for the government, hoteliers, and consumers to improve environmental management in the systems theory perspective from social, economy, and the natural environment.

Keywords: Environmental management system (EMS), green casino hotel, systems theory, Delphi, Macau

1. Introduction

Due to increased environmental awareness, companies and individuals have started a series of actions (Kaiser, 2007). More and more hoteliers support green movements. In response to consumer concerns, hotels are actively changing their business practices by paying attention to environmental protection practices (Pizam, 2009; Jauhari and Manaktola, 2007). For instance, major hotel chain, such as Marriott, Starwood, Hilton, Shangri-La, Fairmont, and Ibis, emphasized environmental practices (Chan, 2013; Butler, 2008). A green hotel manager is eager to implement projects to protect the planet (Green Hotel Association, 2016). The service of green hotels focuses on energy-saving and implementing carbon reduction measures, and the protection of natural ecosystems. Green hotels are expected to become a trend in the tourism industry around the world.

The main challenge of applying environmental management system (EMS) in large casino hotels is high quality. An army of staff who fight every day under the quantity

and quality requirements and the expectations of casino customers. The demand for large-scale and high quality involves multiple work tasks, and more than 30 million tourists visiting Las Vegas each year require high-level managers and staff. Living in casino hotels provides guests with the opportunity to interact with luxury experiences, including different aspects of services and various luxury goods. These interactions can enhance the satisfaction of casino guests but increase the wastes of resources.

In the existing EMS, there are certain shortcomings and inapplicability for a casino hotel. Because casino hotels are distinct from general hotels in terms of green practice, the implication of the EMS for green practices in general hotels may not be suitable for a casino hotel. Therefore, this study firstly develops a specific environmental performance standard for a casino hotel. Although many international standards can assess an organization's environmental performance (e.g., ISO 14000 and 14001), there are a lack specificity in casino industries. Secondly, there is a need to assess the appropriateness of existing green hotel standards for developing the suitable EMS of casino hotels.

In addition, existing studies often analyze the environmental management system and the systems theory separately, with little research attempting to integrate the two aspects (Patton, 2002). In this study, ISO 14001 is considered as the basis for establishing EMS indicators. This study analyzes the feasibility and importance of each indicator. Currently, there is a lack of scientific and systematic assessment of the green casino hotel EMS. As casino hotels operate 24 hours through a three-shift system, it consumes a large number of energies. Thus, it's necessary to develop a green casino hotel. And this study has three objectives:

1. To construct the indicators of EMS for a green casino hotel.
2. To develop a framework of EMS for green casino hotels.
3. To provide management suggestions for the future development of green casino hotels.

2. Literature review

2.1 Barriers for applying EMS in casino hotels

On the demand side, although customers' awareness and interest in “greener” products have generally increased, this preference maybe not quickly shifted to consumption in the casino tourism environment. The main reason is that tourism is mainly hedonistic (Mak et al., 2012), and a lot of casino hotel tourists, maybe not enduring “inconvenience” or “difficulties” while traveling. There is a universal concept

that “environmental protection” tends to bring a certain extent of inconvenience and austerity, which is in distinct contrast to the enjoyment character of tourism. Eventually, some casino hotel owners and managers are concerned that “green practices” may lead to a decline in service quality to an extreme extent.

All in all, there are some external and internal obstacles when applying EMS in the casino hotel. Hsiao et al. (2014) provides a comprehensive list of indicators for using EMS in inclusive hotels but may include some indicators that are not suitable for casino hotels. The 16 indicators that are not suitable for casino hotels are mainly divided into the following eight dimensions:

Table 1 Indicators not suitable for casino hotels

Dimensions	16 indicators
1. Environmental policy	1.1 A widespread promotion campaign to promote the hotel’s environmental policy to stakeholders, such as, staff, customers, and suppliers 1.2 The overall objective of environmental management is both feasible and measurable 1.3 The hotel has formally established an action plan for the environmental issues that are most likely
2. Water resource	2.1 Areas consuming higher amounts of water can be located by installing metering equipment; this way, resources can be managed effectively 2.2 Allow guests to choose by not changing their towels every day 2.3 Allow guests to choose by not changing bed linen daily
3. Energy	3.1 Invest in metering equipment to identify areas with high power consumption, and manage such areas resourcefully 3.2 Maximizing the use of daylight 3.3 Maximizing the use of natural ventilation
4. Solid wastes	4.1 Organic wastes can be converted into compost 4.2 Refillable containers such as, shower bottles should be utilized
5. Indoor environment (health and safety)	5.1 To minimize the spread of pathogens, the guest rooms are supplied with an independent air-conditioning system
6. Green purchasing	6.1 Ensure that all suppliers have a declared environmental policy 6.2 Capitalize on purchasing local products, such as, food and materials
7. Corporate management	7.1 There is adequate insurance coverage, which includes, accidental insurance and environmental damage insurance
8. Staff education	8.1 Motivate the staff to use public transportation

Unsuitable indicator 1: A widespread promotion campaign to promote the hotel’s environmental policy to stakeholders, such as, staff, customers, and suppliers

At present, casino hotels lack the operation and components that promote environmental policies (Environmental Council, 2005). Thus, it may be challenging to publicize ecological policies to all customers, suppliers, and employees.

Unsuitable indicator 2: The overall objective of environmental management is both feasible and measurable

There is seldom mention of the feasibility and measurability of the casino hotel's environmental management goal (Brown et al., 2006). It is supposed that this indicator may be difficult for casino hotel EMS to apply.

Unsuitable indicator 3: The hotel has formally established an action plan for the environmental issues that are most likely

The current survey results show that Macau hotels are far behind developed regions in formulating and adopting environmental operations and policies (Mensah et al., 2004). This due to the current model of the environment, and the general situation in the city.

Unsuitable indicator 4: Areas consuming higher amounts of water can be located by installing metering equipment; this way, resources can be managed effectively

Casino hotels may show an inconvenient attitude regarding to the time and trouble required to install metering equipment in areas with high water consumption for tracking and management (Tat, Capella, & Tung, 2007).

Unsuitable indicator 5 & 6: Allow guests to choose by not changing their towels every day; Allow guests to choose by not changing bed linen daily

Evidence shows that casino hotels may not continuously have a formal water-saving process because this reduces the quality of the customer experience (GEG, 2017).

Unsuitable indicator 7: Invest in metering equipment to identify areas with high power consumption, and manage such areas resourcefully

The inconvenience of green behavior may have a direct influence on green practices (Han, 2011). It is difficult for casino hotels to learn and become familiar with the installed metering equipment to manage and track areas with high energy consumption (Diamantis, 2009; Choi, Kim, & Agmapisarn, 2019).

Unsuitable indicator 8 & 9: Maximizing the use of daylight; Maximizing the use of natural ventilation

As the hotels, restaurants, stores, and attractions in casinos are often built indoor and tended to be favored over more electric power in lighting and ventilation (WEFA Group, 2007; Wright, 2005).

Unsuitable indicator 10: Organic wastes can be converted into compost

Convert organic or kitchen wastes into compost can solve some solid waste problems, but currently, most casino hotels lack space to operate such a system (Parker & Chung, 2010).

Unsuitable indicator 11: Refillable containers such as, shower bottles should be utilized

It was observed that the primary reason for hotels to choose containers was the ease of use and health issues (Erdogan & Baris, 2007). Because of health concerns, it is hard for casino hotels to use refillable containers.

Unsuitable indicator 12: To minimize the spread of pathogens, the guest rooms are supplied with an independent air-conditioning system

The improvement of public spaces should be accompanied by the purification of outdoor and indoor air and the minimization of ambient air. However, due to finance, technique, and stakeholder pressure, casino hotels might have difficulty setting up independent air-conditioning systems in guest rooms (Wang et al., 2018).

Unsuitable indicator 13: Ensure that all suppliers have a declared environmental policy

Some local suppliers are small, so they haven't environmental policy as some "supplier giants" do (Hussain, Abudullah, & Malik, 2016; Al-Aomar & Hussain, 2017). Besides, when the number of suppliers is limited, only cooperation with suppliers who have declared ecological policies cannot be guaranteed.

Unsuitable indicator 14: Capitalize on purchasing local products, such as, food and materials

The development of locally produced and sustainably procured food, and materials are limited by the particular situation of local geography (DSPA, 2005). Furthermore, casino hotels usually purchase imported products. Therefore, it is somewhat difficult for them to rely on local goods merely.

Unsuitable indicator 15: There is adequate insurance coverage, which includes, accidental insurance and environmental damage insurance

Some leading enterprises use environmental stresses to enhance corporate image, improve operational efficiency, and develop new opportunities and products to gain a competitive advantage (Taylor et al., 2002). However, as environmental concerns are currently not as prominent in the casino hotel industry, the company has ecological damage insurance that may not be usual in the casino hotel.

Unsuitable indicator 16: Motivate the staff to use public transportation

Self-driving is increasingly popular among hotel employees, so it might be challenging to encourage them to use public transportation (Chou, 2014).

2.2 Necessity of green casino hotels

The impact of global tourism growth on the environment has become an essential issue for the hotel industry (Berezan, 2013). Increasingly customers like green services or products and ecological companies to meet their needs (Kim & Han, 2010). Due to

increased awareness of ecology and environmental protection and depletion of resources, the management team of numerous hotels has established the goal of founding hotels with 3R (recover, reduce and reuse) capabilities (Lee & Cheng, 2018). This concept later led to the green hotel. Green hotels are managed and developed in an environmentally friendly manner, reflecting natural characteristics, health, comfort, and freshness of the environment, and providing guests with green services or products (Australian Tourism Council, 1998). While enjoying natural luxury, guests can also get life and education experience and environmental protection courses nevertheless, green operation way may be difficult for casino hotels to apply.

It is evident from the above discussion that the casino hotel needs first to identify critical environmental factors and their impacts, thus systematically formulating an EMS. Subsequently, it reviewed the changes in other requirements and regulations related to establishing different ecological targets and indicators (Chan & Hawkins, 2012). If the casino hotel has clear goals and objectives, its employees and management do not ignore the implementation process of EMS. They can achieve environmental goals by working together on various ecological management plans. But as the latest ISO 14001 was revised in 2015, it might not meet current green casino hotel operation needs.

3. Methodology

3.1 Mixed methods

Specifically, the method of this research is twofold. First, it attempts to stimulate critical thinking and reflection on EMS development policies through a systematic approach. Secondly, it attempts to re-emphasize the versatility of the system approach, especially at the regional level, through the Delphi approach to conceptualize and apply environmental management systems and development strategies.

3.1.1 Systems approach

System theory is rarely applied in the tourism industry. Laws (1997) uses a system model to analyze the inclusive tourism business. There is still room for application in more innovations and interventions in the tourism industry. This theory adapts to the concepts of diversity, relationship, synergy, communication flow, and interdependence (Engel et al., 1997).

This study proposes a system-oriented sustainability framework for green casino hotels. The EMS is regarded as one system. The framework includes three general environments, namely (1) social environment, (2) economic environment, and (3) natural environment. Under each major dimension, this paper proposes the most relevant indicators for the green casino hotel. The system-specific key indicators are

designed to compare the functions and objectives of different EMS (i.e., casino hotel EMS and general EMS).

This research proposes an EMS model of casino hotels. The model uses regression analysis to predict various links and channels of casino hotel EMS. It also recognizes, the need for a two-way relationship between casino hotels and staff and other stakeholders by examining the correlation between EMS indicators and different environments influenced by a casino hotel. Also, the environmental management system must conform to the development plan and tourism development policy. Therefore, the environmental management system is essential for environmental development, because it considers the different views and interests of various stakeholders involved in tourism development.

3.1.2 Delphi method

Delphi method has proven useful for information collection and model building (Green et al., 1990). This serves the purpose of this study because its work promotes community input for problem and idea solving (Green, 1990), like determining the developing sustainable tourism indicators and the environmental impact of tourism (Miller, 2001). Delphi method has been widely used in a tourist environment in many different forms (Hsiao, Chuang, Kuo & Yu, 2014).

In short, Delphi is a systematic, interactive method that can obtain predictions from a group of experts (Wright & Rowe, 2001). Participants are encouraged to modify their previous answers based on feedback from other unnamed members and conduct two or more surveys during the revision process. The answers gradually reach consensus (Hsiao et al., 2014). Therefore, the Delphi is a process aimed at obtaining the most reliable consensus of the expert group through a series of controlled feedback and in-depth questionnaires (Helmer et al., 1983). This method is suitable for developing indicators in a new system (Miller et al., 2001).

3.2 Questionnaire design

After completing the preliminary investigation, the first round of the postal questionnaire was drafted. The questionnaire is based on a broad list of influences obtained from the tourism industry. These lists come from a comprehensive literature search and also adds any new impacts discovered by respondents. However, in interpreting the results, the subsequent responses to the initial survey are useful (Green & Moore, 1990).

In the early stage, experts are invited to make necessary revisions to the EMS indicators of the first round of questionnaires. Based on expert comments, the author decides whether to modify the initial indicator (Yu, 2014). The survey requires experts to analyze the feasibility and importance of applying each indicator in Macau casino

hotels. The purpose of this open-end questionnaire is mainly to recommend the development of the Macau casino hotel EMS. In this way, expert consensus continues to reach on the indicators.

3.2.1 Indicators for applying EMS in casino hotels

The indicators of the casino hotel EMS are selected from nine green hotel evaluation systems and ISO14000. These systems are the South Pacific Tourism Organization, Coalition for Environmental Responsible Economies, the State Economic and Trade Commission, Caribbean Hotel Association, the Bench-markhotel.com website, Global Stewards, the State Economic Commission, Grecothels, and Green Hotels Association. Overall, the selection of indicators is based on operability and feasibility (Yu, 2014).

3.3 Sampling

Delphi technology requires that participants be selected in advance based on their knowledge of the subject to be assessed. The model treats EMS as a comprehensive framework. Therefore, for this purpose, qualified researchers are intentionally selected as samples. According to the standard, participants should have experience in casino hotels or green hotel management. The Delphi technique shows a sample range of 10 to 30 participants, although most Delphi studies use 15 to 20 respondents (Ludwig, 1997).

Based on the recommendations of Lee and King (2009), three small groups and 50 experts be established to increase the recognition of application and theoretical input and the need for professional knowledge. The personal data of the interviewees are as follows: green hotel promotion officer, casino hotel managers, and scholars in the green hotel field. The questionnaire is sent to each respondent three times. In the first round, the researcher distributed 70 questionnaires and received 50 questionnaires, with a return rate close to 71%. In the second round, the researchers distributed all 50 questionnaires and received 40 questionnaires, with a return rate of 80%. In the third round, the rate of return was 95% (i.e., out of 40 questionnaires, 38 returned).

3.4 Data analysis

The feasibility and importance of the implementation of 16 unsuitable indicators be evaluated on a five-point Likert scale. Statistically, maximum studies use standard deviation and mean to modify the Delphi approach (Scheibe, 1975). The average value reflects the expert's view of each indicator. The standard deviation score reflects the degree of divergence of expert opinions. After returning to the first round of questionnaires, the author suitably modifies the content of the indicators based on the expert suggestions (Scheibe et al., 1975). The standard deviation and average score of each indicator be calculated, based on its feasibility and importance. The second round

of questionnaires includes the first round of averages for expert refer. If an indicator has an unusually sizeable standard deviation score in the first round, experts have very different opinions.

Based on the stability assessment of the final rating, the second and third rounds of questionnaires achieve convergence (Scheibe et al., 1975). If the percentage change in the index's importance score is less than 15%, this study follows Scheibe et al. (1975) to compare with the previous round questionnaire. Finally, the basic principle when forming a casino hotel EMS is that selection indicators have a strong concentration trend. The average value of the indicator must be higher than the total average, and the number of experts choosing the project must be higher than 50% (Scheibe et al., 1975). Therefore, the results represent a consensus on the standards for establishing a green casino hotel environmental management system model in Macau.

One of the goals of this research is to understand the indicators of casino hotels better. It is essential to pay attention to the correlation between the variables expected to affect the EMS. In this sense, a review of the correlation coefficients between variables may provide critical insights.

4. Results and discussion

The judgments by the expert based on three rounds of questionnaires of Delphi were utilized to modify the initially chosen indicators of EMS. The foundation of index modification is not hard to comprehend as users can act flexibly. Within the original survey, eight dimensions have existed, with 16 indicators in total. Five other variables occurred among the initial series of expert consultations. Investigators entered the next series of the survey, which contained 21 indicators.

4.1 The importance and feasibility of EMS indicators for green casino hotel

Since the average value of all these items is higher than 4.5, it shows that different experts regard them as significant or very significant. The average standardized deviation of each indicator is 0.59 proving that experts have a strong consensus on the significance of these variables. Because of severe contamination issues, experts conclude that record monthly water utilization for supervision goals and provide relevant guidelines to employees (such as decreasing energy, saving of water, decreasing food squander, and decreasing air contamination resulted from transportation) are important goals for companies in environmental management. Experts also agree that certain factors are significant, even if they harm the comfort of clients.

For the accessibility of the green hotel environmental management system outline variables, the average value is over 4.0, which shows that experts have evaluated the scope of implementing those variables, starting from ordinary ones to easy ones. However, different views on the accessibility of operations (the average standardized deviation is 0.65). The first two indicators follow the principles of reuse, recycling, and reduction. Experts generally believe that it is relatively easy to implement environmentally sound methods to manage solid waste. In particular, it is believed that making the restaurant green is easy to achieve. Also, solid waste is obvious, so the classification and reuse of waste are truly essential. Macau's Casino hotels are limited by climate and landform. Once they need to use natural light and ventilation to acquire power conservation, government strategies, energy-reduction techniques, and the surrounding conditions are also extremely essential and require modification (Hsiao et al., 2002).

Table 2 Descriptive statistics of indicators

Indicators	Importance Mean±SD	Feasibility Mean±SD
1. Formulate policies for environmental protection or policies for sustainable development	4.50±0.60	4.02±0.78
2. Designate an "Environmental Manager" to coordinate environmental protection plans	4.42±0.79	4.07±0.78
3. Try to use natural light, and adjust the space layout	4.39±0.82	3.39±0.75
4. Ensure adequate fresh air in the hotel area	4.65±0.70	3.42±0.50
5. Provide employees with relevant guidelines	4.78±0.47	4.26±0.44
6. Record monthly water consumption for monitoring purposes	4.81±0.39	4.05±0.32
7. Post notices (e.g., remind employees or customers to save water)	4.71±0.65	4.02±0.88
8. Recycle waste paper, etc., and conduct harmless and resource disposal	4.78±0.57	4.02±0.67
9. Introduce an environmentally friendly accommodation plan or a reward mechanism	4.47±0.55	3.78±0.66
10. Customers should choose the frequency of changing sheets, towels, etc.	4.50±0.50	3.92±0.53
11. Record monthly power consumption for monitoring purposes	4.39±0.49	4.15±0.78

12. There are non-smoking rooms or non-smoking floors	4.68±0.47	4.13±0.77
13. Encourage suppliers to provide and use products with environmental labels	4.78±0.52	4.10±0.83
14. Try to buy as many local products as possible	4.39±0.88	3.94±0.69
15. Comply with the environmental protection laws and pollution control guidelines	4.76±0.71	4.18±0.39
16. Require employees to use public transportation, walk, or carpool	4.28±0.61	4.05±0.73
17. Purchase more energy-efficient equipment (e.g., light-emitting diode [LED] lighting fixtures)	4.57±0.50	4.10±0.64
18. Reduce the provision of disposable plastic bottled water	4.50±0.50	4.13±0.81
19. Take regular repairs, inspections, and maintenance work for noisy facilities	4.57±0.50	4.05±0.61
20. Establish outdoor lighting restrictions at specific hours in the evening	4.57±0.50	4.18±0.45
21. Place or plant plants within the hotel area	4.42±0.79	4.15±0.67

4.2 EMS evaluation framework suitable for green casino

hotels

Overall, the EMS indicators of green casino hotels (i.e., 44 indicators) seem to be more than a green hotel (i.e., 38 indicators) that show in Hsiao et al.'s study (2014). This shows that where there is an opportunity, there is a risk: the EMS of casino hotels may be more comprehensive (e.g., provide shuttle bus), or the EMS of casino hotels may be more difficult to implement certain indicators (e.g., use natural lighting). It is crucial to correlate the mean because this allows for a better comparison of indicators showing different dimensions when developing EMS for a green casino hotel.

By the Delphi and systems approach, the author found ten dimensions and 44 variables (most with a mean value over 4.5) for evaluating the green casino hotel EMS used in Macau. It is shown in Table 3 that based on the Delphi approach, regression analysis, and correlation analysis, the author choosing 7 indicators in the dimensions of water resource; 6 indicators from the dimensions of indoor environment; 5 indicators from the dimensions of energy, solid wastes, and green purchasing; 4 indicators from

the dimensions of environmental policy, staff education, and public and community relationship; 2 indicators in the dimensions of corporate management, and consumer education. It is worth noting that 17 indicators are classified as essential and highly accessible, which are the top priorities for managers of the hotel. Managers can use the other 27 indicators as the second stage targets to implement environmental improvements in casino hotels.

Table 3 The framework of EMS indicators suitable for green casino hotel

Dimensions	44 Indicators	Priority	Second
1. Environmental policy	1.1 Formulate policies for environmental protection or policies for sustainable development	V	
	1.2 Comply with the laws and guidelines issued by the government	V	
	1.3 Provide the hotel's mission statement and environmental policy to suppliers		v
	1.4 The overall objective of environmental management is feasible and measurable		v
2. Water resource	2.1 Record monthly water consumption for monitoring purposes	V	
	2.2 Provide the option and rewards for not changing sheets, towels		v
	2.3 Installing metering equipment in areas consuming higher amounts of water		v
	2.4 The installation of a leak detection system, providing regular maintenance		v
	2.5 Installation of low-flow showerheads and faucets		v
	2.6 Incorporating eco-friendly water-saving toilets		v
	2.7 Installation of a sewage disposal system		v
3. Energy	3.1 Record monthly power consumption for monitoring purposes	V	
	3.2 Establish outdoor lighting restrictions at specific hours in the evening	V	
	3.3 Maintenance of ventilation, air conditioning, heating, and ice generating equipment		v
	3.4 A sensor system with timers can be installed		v
	3.5 Ensure that all the windows of cooling equipment are closed		v
4. Solid wastes	4.1 Recycle plastic bottles, etc., and conduct harmless and resource disposal	V	
	4.2 Reduce the provision of disposable plastic bottled water in hotels	V	
	4.3 Appropriate distribution, storage, and management systems can reduce food wastage		v
	4.4 Electronic data storage can be used without the use of paper		v
	4.5 Establish a double-sided photocopying system, or reuse paper, and envelopes		v
5. Indoor environment (health and safety)	5.1 Carry out repairs, inspections, and maintenance work for noisy facilities	V	
	5.2 There are non-smoking rooms or non-smoking floors	V	
	5.3 Place or plant plants within the hotel area	V	
	5.4 Establishing controls for noise volume within the statutory standards		v

	5.5 Install air filter cleaning equipment in the smoking areas	v
	5.6 The use of toxic chemicals must be minimized	v
6. Green purchasing	6.1 Purchase more energy-efficient equipment	V
	6.2 Encourage suppliers to provide and use products with environmental labels	V
	6.3 Prioritize partnering with suppliers who have declared environmental policies	v
	6.4 Capitalize on purchasing local products, e.g., food and materials	v
	6.5 Reduce the purchase of products with excess packaging	v
7. Corporate management	7.1 Designate an "Environmental Manager" or a representative	V
	7.2 Adequate insurance coverage, e.g., accidental insurance and environmental damage insurance	v
8. Staff education	8.1 Provide employees with relevant guidelines	V
	8.2 Post notices	V
	8.3 Require employees to use public transportation or employee buses, etc.	V
	8.4 Conduct training programs and workshops on environmental education	v
9. Public and community relationship	9.1 Active participation in public affairs of the local community	v
	9.2 Make donations of surplus materials	v
	9.3 Actively participate in environmental protection-related and green activities	v
	9.4 The green hotel concept should be promoted	v
10. Consumer education	10.1 Post notices	V
	10.2 Provide guests with public transportation information (MRT, bus, shuttle, etc.)	v

4.3 Differences between green hotel EMS and green casino hotel

EMS

Environmental technology is commonly used to regulate air conditioning, thermal power generation, lighting, electric motors, power generation, and water supply (Cheung & Fan, 2013). Despite these benefits, many general green hotels remain hesitant to implement new environmental technologies. The main reason why some general green hotel operators "stop" or "postpone" is economics.

Many hotel businesses have implemented environmentally friendly technology to help them meet their sustainability targets when introducing an environmental management scheme. According to Chen et al. (2005), approximately 80% of hotels understand the benefits of using sustainable facilities and technology to improve their environmental efficiency. Light-emitting diode lamps, fluorescent tubes, occupancy detectors, indoor smart key systems for monitoring energy use, water-cooled refrigerators, and food decomposers are examples of these technologies (Chan et al.,

2017). Some high-end Macau casino hotels have used building management systems to power the hotel's air conditioning system and occupancy sensors to switch off lighting and other electrical equipment when the room or corridor is empty. For example, Galaxy Macau expects to increase profit margins and financial returns. It has used green materials and installed groundbreaking environmental conservation innovations such as Peltier headboard coolers, energy-saving pattern recognition solutions, and solar hot water collector systems (Asia Pacific Business Traveler, 2012). City of Dreams Macau has used food decomposers to liquefy the remaining food before discharging it to reduce food waste (Chan et al., 2018).

The implementation of environmental technology is hindered by government and initial funding (Chan, 2018). Regarding government funding, the hotel manager's decision could be influenced by the lengthy and complicated administrative process of implementing technology (for example, the approval process for using hotel space for new facilities) (Chan, 2020). Furthermore, installing environmental technology (such as heat pumps, computerized energy management systems, and occupancy sensors) is costly (Okumus, 2020). Certain equipment, such as food decomposers and heat pumps, necessitates a large amount of installation space. Hotel managers will struggle to successfully implement these technologies if they do not have enough space and resources. These findings support Zhang et al. (2011)'s observations that technological challenges, lengthy planning and approval procedures, a lack of understanding and needed expertise, inefficient implementation of green building regulations, and competing stakeholder interests are the primary negative impacts on creating green assets. As a result, in addition to initial assistance, simplifying government administrative procedures is vital to successful adoption. Users will easily embrace new technology if local governments have sufficient support in applicable laws, regulations, and information (Tan & Teo, 2000).

There is no doubt that such environmental safeguards can harm customer service. When a water limiter is mounted in a showerhead, the water flow and pressure can be affected. The indoor temperature may be higher (25°C) than the comfort zone (21-23°C) expected by casino hotel customers. To address these issues, casino hotel managers should educate their customers by developing successful green marketing strategies that promote the hotel's green facilities, services, and other green activities (Chan, 2013, 2014; Wang et al., 2018), hope guests will be more accepting of the green hotel initiative. Furthermore, providing casino hotel guests with rewards such as cash discounts or meal coupons can be an effective way to encourage them to engage in those activities actively. For example, Macau Hotel Okura cooperated with the Macau Government Tourism Office and won the "2015 Green Hotel-Gold Award" issued by the Environmental Protection Agency, thereby establishing an incentive

mechanism to provide a 5 MOP discount to Macau patacas to encourage guests to bring Takeaway on your reusable food container. However, currently, this practice is not popular in Macau casino hotels.

5. Conclusions

5.1 Academic implications

The results show that there is a strong relationship between EMS and the environment. This finding confirms the systematic green casino hotel EMS suggested in this work and provides sufficient evidence to prove the impact of casino hotels on different environments (Chen & Chang, 2012). Therefore, it is crucial that green casino hotels need to develop a complete green package composed of these sub-dimensions. Besides, it differs from previous work that emphasizes specific aspects of green services and their impact on consumers (Chan et al., 2016; Han et al., 2010; Kim et al., 2017; Teng, Wu & Liu, 2015). This study recommends that consumers handle the entire green environment simultaneously (rather than individually) to make judgments about effective delivery commitments. Therefore, this research contributes to the formation of EMS literature from systems theory by proposing green solutions to help not harm the environment or negatively impact the environment (Morgan and Hunt, 1994). The research results also show that EMS generated through systems theory is very helpful in establishing driven behaviors, as envisaged by the different environment paradigms (Morgan and Hunt, 1994; Reichheld, Markey, and Hopton, 2000; Yan, Xie and Chen, 2008).

5.2 Practical implications

The decision-makers commitment to sustainable growth keeps the factor to long-run business success and could also be a competitive edge (Enz & Siguaw, 1999; Mihalic, 2000). The study also explained the green strategy adopted by casino hotel operators from views of sustainable surroundings growth based on the systems theory.

5.3 Limitations and directions for future research

All research inevitably has limitations. Limited studies about green casino hotels exist in Macau. Because of the amounts of eco-friendly hotels in Macau, there are more owners than experts and scholars. Therefore, the results here should be considered exploratory. The research sample is the Macau casino hotel. Researches in the future may make further exploration by enhancing variables to satisfy specific requests of various places of casino hotels (i.e., Las Vegas, etc.) (Walker, 2006). At last, the research first constructed a theoretical EMS outline for green casino hotels. Future

researches will be beneficial to formulate indicators in the operating system to achieve the scale of green casino hotel gauges. It is expected to be able to offer the government an assessment of the casino hotel's environmental management performance. Hotel operators can also use self-environment assessment to get a clear understanding of improvement efforts.

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