Developing an Environmental Management System for Evaluating Green Casino Hotels

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Abstract: In the field of tourism, casino hotels consume considerable energy and water resources. They differ from general hotels due to their specific features; consequently, the environmental practices of casino hotels differ from those of general hotels. Thus, the application of a general hotel’s environmental management system (EMS) to a casino hotel is not suitable. To this end, in this study we developed an EMS for green casino hotels in Macau. We selected the casino hotel EMS indicators from ISO 14000 and nine representative green hotel evaluation systems. We additionally employed the Delphi method to determine the preliminary EMS evaluation framework. Based on our findings, indicators in 10 dimensions were identified and prioritized according to their relative importance and feasibility. The EMS developed in this study provides management suggestions for governments, hoteliers, and consumers to improve environmental management.

Keywords: environmental management system (EMS); green casino hotels; systems theory; Delphi; Macau

1. Introduction

Today, hotel managers and owners are more aware of the importance and benefits of adopting environmental strategies (or so-called “green strategies”) in their operations [1–3]. Several internationally recognized green hotel programs certify properties, including ISO14001, Green Globe 21, Energy and Environmental Design Leadership (LEED), EU Ecological Management and Audit Scheme (EMAS), TripAdvisor GreenLeaders, Green Seal, and Green Key [4,5]. Despite these efforts, previous studies shown that in many cases, environmental strategies often yield to other operational issues: a big gap remains between the management attitude in the hotel industry and the adoption of environmental strategies [6–8].

Customers are increasingly becoming more environmentally conscious and are preferring green products and services. Being green is thus advantageous, especially as a marketing strategy. Environmental practices distinguish greens from non-green casino hotels and benefit green casino hotel marketing [7]. Furthermore, making casino hotels green produces numerous benefits, such as enhancing the company’s image, reducing operating costs, and gaining positive public attention [9–11]. Kim et al. (2019) [12] found that the business of green casino hotels is a niche in the competitive hotel industry.

Previous environmental strategies usually considered the three R principle: reduce, reuse, and recycle [11]. Today, however, environmental strategies mainly focus on an overall environmental management system (EMS). We recognize the implementation of official environmental policies or an EMS as a successful ecological strategy. The aim of an EMS is to encourage organizations to reduce and control their environmental impact. According to Chan (2008) [8], some of the main reasons that hotels use an EMS include building a positive image, gaining economic rights, and addressing environmental issues. Hotels with an EMS or official ecological policies tend to achieve better environmental performance [13].

"sustainability"
In existing EMSs, there are certain shortcomings and practices that are inapplicable to casino hotels [8]. Casino hotels differ from general hotels in terms of green practices (see Table 1), and thus, the specific aspects of an EMS for the latter may not be suitable for the former. Although many international standards assess the environmental performance of organizations (e.g., ISO 14000 and 14001), there are no specific assessments for the casino industry. There is a need to assess the appropriateness of existing green hotel standards to develop a suitable EMS for casino hotels. This study, therefore, aims to develop a specific environmental performance standard for casino hotels.

The hotel industry is also adopting various measures for either environmental considerations or economic reasons, or to establish a positive image. Some hotels have gone a step further and adopted voluntary self-discipline measures such as the international environmental management system (EMS) standard ISO 14001 to develop a systematic approach to improving environmental performance. For example, Hong Kong’s Island Shangri-La Hotel, Kowloon Shangri-La Hotel, Hotel Nikko Hong Kong, and InterContinental Jiafu Hong Kong have all passed ISO 14001 certification. Due to pressure from customers [14], supplier requirements to comply with formal EMS standards [15], and a more systematic approach for shareholders, companies will consider using formal EMS standards or obtaining certification, and government regulatory agencies, insurance companies, and financial institutions will assess their commitment to improving environmental performance [16]. Despite these pressures, as of the end of December 2005, 138 countries/regions had issued at least 111,162 ISO 14001 certificates [17], but many hotels did not adopt a formal EMS. When the hotel industry’s motives for adopting an EMS were investigated, it was unexpectedly found that nearly 40% of the respondents stated that their hotels did not have one. In addition, only 10.6% of hotels with an EMS passed ISO 14001 certification [8].

Studies have often analyzed EMS and systems theory separately, and few studies have attempted to integrate the two aspects [18]. To the author’s knowledge, there is no scientific and systematic assessment of an EMS for green casino hotels. As casino hotels operate 24 h a day through a three-shift system, they consume large amounts of energy. It is thus necessary to develop a green casino hotel EMS. In this study, ISO 14001 is considered as the basis for establishing EMS indicators, analyzing the feasibility and importance of each indicator. To this end, this study has three objectives:

1. To construct indicators of EMS for green casino hotels;
2. To develop an EMS framework for green casino hotels; and
3. To provide management suggestions for future development of green casino hotels.

Table 1. EMS framework for development of green casino hotels.

| Dimensions | 67 Indicators |
|------------|---------------|
| 1. Environmental policy | 1. Devise an environmental policy *  
2. Provide hotel’s mission statement to suppliers */**  
3. Specify goals of environmental policy | 1.4 Environmental policy conforms with existing environmental regulations  
1.5 Overall objective of environmental management is feasible and measurable **  
1.6 Hotel has established a plan for environmental issues ** |
| 2. Water resources | 2.1 Install low-flow showerheads and faucets  
2.2 Incorporate eco-friendly water-saving toilets  
2.3 Install monitoring system to record and track consumption  
2.4 Install metering equipment in areas consuming higher amounts of water ** | 2.5 Install leak detection system and provide regular maintenance  
2.6 Install water recycling system  
2.7 Install sewage disposal system  
2.8 Install sewage emission monitoring system  
2.9 Provide option and rewards for not changing towels */**  
2.10 Provide option and rewards for not changing bed sheets */** |
### Table 1. Cont.

| Dimensions                                | 67 Indicators                                                                                                                                 |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 3. Energy                                 | 3.1 Install monitoring system  
3.2 Invest in metering equipment to identify areas with high power consumption **  
3.3 Manage electricity capacity of each department by management system  
3.4 Install sensor system with timers  
3.5 Maximize use of daylight **  
3.6 Try to maintain natural ventilation in parking lot */**  
3.7 Maintain ventilation, air-conditioning, heating, and ice-generating equipment  
3.8 Ensure that all windows of cooling equipment are closed  
3.9 Make urgent investment in renewable energy generation |
| 4. Solid wastes                            | 4.1 Disposable items should not be used  
4.2 Use appropriate distribution, storage, and management systems to reduce food waste  
4.3 Organic wastes can be converted into compost **  
4.4 Refillable containers should be used **  
4.5 Establish double-sided photocopying system, or reuse paper and envelopes *  
4.6 Save vast amounts of data electronically, without paper  
4.7 Public areas, kitchen, and back office should have recycling bins |
| 5. Indoor environment (health and safety)  | 5.1 Install air filter cleaning equipment in smoking areas *  
5.2 Construction and decorating should use low-vitality organic materials  
5.3 Minimize use of toxic chemicals  
5.4 Use moderate lighting in certain areas inside hotel  
5.5 Provide healthy and comforting indoor environments, and monitor frequently  
5.6 Establish controls for noise volume within statutory standards  
5.7 Monitor noise levels frequently  
5.8 Minimize chance for pathogens to spread in guest rooms */** |
| 6. Green purchasing                       | 6.1 Acquire lasting goods that can be reused and recycled  
6.2 Reduce purchase of products with excess packaging  
6.3 Prioritize partnering with suppliers that have declared environmental policies */**  
6.4 Purchase local goods whenever possible */**  
6.5 Use replacements for chemical cleaning agents and disinfectants  
6.6 Capitalize on purchasing products with national certification symbol |
| 7. Corporate management                   | 7.1 Environmental policies can be executed effectively under corporate management systems  
7.2 Hire environmental managers and regularly record progress of implementation  
7.3 Ensure staff are aware of environmental objectives and responsibilities  
7.4 Reduce costs by minimum harm to the environment  
7.5 Provide a concept of green consumption and follow it actively  
7.6 Aim for customer satisfaction with hotel’s environmental policies of more than 80% *  
7.7 Conform with environmental laws or obtain relevant certification marks *  
7.8 Perform corresponding update work related to environmental requirements */** |
| 8. Staff education                         | 8.1 Conduct training programs and workshops on environmental education  
8.2 Educate employees fully on company’s environmental policies or laws *  
8.3 Encourage staff to develop habits to optimize the use of resources  
8.4 Reward staff when suggestions improve sustainability  
8.5 Motivate staff to use public transportation ** |
| 9. Public and community relationships     | 9.1 Promote green hotel concept  
9.2 Actively participate in environmental protection-related and green activities  
9.3 Donate surplus materials *  
9.4 Active participation in public affairs of the local community |
| 10. Consumer education                    | 10.1 Exhibit green messages in public areas, rooms, and websites  
10.2 Exhibit signs to inform guests about saving resources  
10.3 Conduct collaborative activities to include guests in recycling  
10.4 Provide customers with public transportation * |

* Sixteen inconsistent indicators set by this study based on Macao Green Hotel Award. ** Sixteen indicators may not suitable for casino hotels.
2. Literature Review

2.1. Environmental Management Systems

Like quality management systems, EMSs have been increasingly used by tourism companies, especially hotel companies, since the 1990s. An EMS manages the company’s environmental performance and continuous improvement according to plans and strategies [3].

The main reasons for carrying out an EMS are to formally confirm environmental commitments and to carry out ecological practices [3]. Also, EMSs are seen as tools to improve the company’s internal management. In the sense that hotels are often unfamiliar with systems and planned ways of working, it also provides significant incentive to formally define duties and tasks in a documented management system.

2.2. Barriers for Applying Environmental Management Systems in Casino Hotels

Although customer awareness of and interest in “greener” products has generally increased, their preference for such products may not appear anytime soon in the casino tourism environment. This is because casino tourism is mainly hedonistic [19]. Numerous casino hotel tourists do not want to endure “inconvenience” or “difficulty” while traveling [13]. There seems to be a notion that “environmental protection” brings with it a certain amount of inconvenience and austerity, which is in contrast to the hedonistic character of casino tourism. Consequently, some casino hotel owners and managers are concerned that green practices could lead to a sharp decline in service quality [13].

There are several external and internal obstacles to applying EMSs in the casino hotel industry. Hsiao et al. (2014) [20] provided a comprehensive list of indicators for using EMSs in inclusive hotels; however, they include 16 indicators that are unsuitable for casino hotels.

Unsuitable indicator 1: There is a widespread promotional campaign to promote the hotel’s environmental policy to stakeholders, such as staff, customers, and suppliers.

Hotels with an EMS or official ecological policies tend to achieve better environmental performance [21]. Additionally, the choice of green casino hotels is an irreversible trend and a great way to balance environmental protection and consumption. However, at present, casino hotels lack the operation and components to promote environmental policies. Thus, it may be challenging to publicize ecological policies to attract customers, suppliers, and employees.

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

Formal procedures are invaluable for stakeholders committed to environmental improvement; this policy should reflect the top management’s promise to comply with appropriate laws, improve continuously, and control pollution. Therefore, a casino hotel can use environmental policies as a base EMS indicator [22]. However, there is seldom any mention of the feasibility and measurability of the casino hotel’s environmental management goal. This could be because it is difficult to apply this indicator with a casino hotel EMS.

Unsuitable indicator 3: The hotel has formally established an action plan for environmental issues.

Environmental management is a fundamental problem encountered in the hotel industry. Many hotels take regular ecological management measures to address the growing concerns about sustainable products and services [23]. However, hotels in Macau are far behind developed regions in formulating and adopting environmental operations and policies, because green practices in the city were not prioritized until 2007 [24]. Therefore, the need to develop action plans for potential ecological problems for casino hotels may be an obstacle.
**Unsuitable indicator 4**: Casino hotels located in areas that consume higher amounts of water can be identified by installing metering equipment; this way, resources can be managed effectively.

The casino hotel industry uses a significant amount of water, thus paying attention to environmental management is crucial. However, casino hotels may be disinclined to install metering equipment in areas with high water consumption for tracking and management, citing the time and effort required to install such equipment.

**Unsuitable indicators 5 and 6**: Allow guests to choose to not change their towels every day, and allow guests to choose to not change their bed linens daily.

Travel companies must differentiate themselves from competitors by developing competitive advantages to charge high prices [23]. For example, Galaxy Entertainment Group includes well-known luxury hotels that provide first-class services. However, a casino hotel may not have a formal, continuous water-saving process in place because it reduces the quality of the customer experience [25]. Therefore, casino hotels hesitate to offer guests the choice of not changing their towels and bed linens every day.

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

The casino hotel industry’s initial response to environmental needs was slow, until environmental consciousness projects emerged in the 1990s [24,26]. The perceived inconvenience of green behavior may have a direct influence on green practices [27]. As casino hotels operate 24 h a day, it is difficult for them to learn to use installed metering equipment to manage and track areas with high energy consumption.

**Unsuitable indicators 8 and 9**: Maximize the use of daylight, and maximize the use of natural ventilation.

The studies of Kularatne et al. (2019) [28] estimated the non-operating income of hotels, restaurants, stores, and attractions in casinos, which are often built indoors and tend to favor electric over natural lighting and ventilation.

**Unsuitable indicator 10**: Casino hotels can convert organic wastes into compost.

Casino hotels consume large amounts of non-durable products, energy, and water due to their characteristics, functions, and nature [26]. Converting organic or kitchen wastes into compost can solve the problem of solid waste to some extent. However, most casino hotels lack the space to operate such a system.

**Unsuitable indicator 11**: Casino hotels should use refillable containers such as shower bottles.

We observed that the primary reasons hotels choose certain containers are ease of use and hygiene issues. Paper and plastic containers are preferred because they are easy to use [22]. Appropriate procurement policies can emphasize reusable, recyclable, and energy-efficient equipment and goods, suitable containers, and reduced detergent use that can prevent pollution and waste. However, because of health safety concerns (e.g., staying sanitary), it is difficult for casino hotels to use refillable containers.

**Unsuitable indicator 12**: Casino hotels should supply guest rooms with independent air-conditioning systems to minimize the spread of pathogens.

It is imperative to set strict air quality standards in order to minimize health risks. The improvement of public spaces should therefore be accompanied by the purification of outdoor and indoor air and the minimization of ambient air. People could thus continue to enjoy tourism safely [2]. However, due to a lack of finances and techniques, and stakeholder pressure, casino hotels might have difficulty setting up independent air-conditioning systems in guest rooms.

**Unsuitable indicator 13**: Ensure that all suppliers have a declared environmental policy.
Green procurement refers to providing quality products and services while improving efficiency, being environmentally responsible, and reducing costs and waste [2]. However, some local suppliers are small and may not have environmental policies similar to those of giant suppliers. Additionally, when the number of suppliers is limited, cooperating with only those who have declared ecological policies may not be practical or provide guarantees.

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

Global development toward sustainable and locally produced foods explores the interactions among tourism, sustainable food, and customer loyalty. However, due to the trend of farm integration and industrialized farming, the development of locally produced and sustainably procured food and materials is restricted by the particular situation of the local geography [25]. Furthermore, casino hotels usually purchase imported products [2]. Therefore, it is somewhat difficult for them to rely on only local goods.

Unsuitable indicator 15: There is adequate insurance coverage, including accidental and environmental damage insurance.

Some leading enterprises use environmental policies to enhance their corporate image, improve operational efficiency, and develop new opportunities and products to gain a competitive advantage [27]. However, as environmental concerns are not as prominent in the casino hotel industry as they are in general hotels, ecological damage insurance may not be common in casino hotels [29].

Unsuitable indicator 16: Staff should be motivated to use public transportation.

Research has shown that employees’ environmental behavior is affected by personal and organizational factors [28,30,31]. Sandvik et al. (2011) [32] point to the impact of oversight support on employee “ecological initiatives” and environmental policies. However, driving oneself is considerably popular among hotel employees, thus it might be challenging to encourage them to shift to using public transportation [19].

2.3. Systems Theory

Systems theory focuses on promoting useful interventions and recognizes that the world views of different stakeholders vary greatly but are equally important [33]. This theory is particularly suitable for current post-modern situations, which are highly complex, and the emerging characteristics of most social organizations engaged in dynamic innovation. In this regard, the method needs to generate an optimized solution that considers the views and interests of all parties involved in and is affected by EMS activities and processes. This perspective includes making appropriate choices in extremely complex situations and understanding realities [34].

Systems theory is useful for studying the interrelationships and existing connections among systems and observing complex and interrelated events and issues. Additionally, it can stimulate self-reflection and critical discussion among various participants, thereby providing an ideal environment for sharing knowledge [34]. This approach also provides opportunities for collaboration for interrelated behaviors and can help build an EMS framework.

However, this theory has been rarely applied in the tourism industry. Sandvik et al. (2011) [35] used a systems approach to analyze the inclusive tourism business, and it can be further applied to numerous innovations and interventions in the tourism industry. This theory unites the concepts of diversity, relationship, synergy, communication flow, and interdependence [29]. Based on Lee et al.‘s study (2018) [36], we can use the systems approach to analyze key issues and make meaningful interventions in sustainability.

This study proposes a system-oriented sustainability framework for green casino hotels. We regard the EMS as one system. The framework includes three general environments: (1) social, (2) economic, and (3) natural. Under each major dimension, this paper proposes the most relevant indicators for green casino hotels. We designed system-specific
key indicators to compare the functions and objectives of different EMSs (i.e., casino hotel and general EMSs).

The social environment influences by the casino include: (1) public security is becoming worse, (2) work time is unfixed. On the institutional side, indicators such as regulatory framework and management efficiency should be included [37].

Casino activities, such as gambling and various services, create business income for the local area, and contribute to the value-added effect of the casino hotel. In turn, this income is used for purchasing. The personal income of employees is further used in the local economy to purchase goods and services, thereby creating employment opportunities throughout the economy [37]. Finally, negative impacts are generated through (1) consumer goods prices rise, and (2) material and service shortage. The above explanation is called the multiplication effect [37].

The casino influenced the natural environment in seven aspects, (1) the noise pollution is getting worse, (2) the air quality is being lowered, (3) traffic congestion in the urban area is getting worse, (4) casino overloaded public facilities, (5) the environment is polluted (e.g., water, land), (6) the trash is becoming greater, and (7) changes to natural resources [37] (see Table 2).

| Environment | Items |
|-------------|-------|
| 1. Social   | 1. Public security is becoming worse  |
|             | 2. Work time is unfixed               |
| 2. Economic | 1. Prices of consumer goods are rising |
|             | 2. There is a shortage of materials and services |
| 3. Natural  | 1. Noise pollution is getting worse    |
|             | 2. Air quality is getting worse        |
|             | 3. Traffic congestion in the urban area is getting worse |
|             | 4. Casinos overload public facilities  |
|             | 5. The environment is polluted (e.g., water, land) |
|             | 6. Trash is becoming greater           |
|             | 7. Natural resources are changing      |

Items from Wu and Chen (2015) [37].

3. Methodology
3.1. Delphi Method

The Delphi method has proven useful for collecting information and building models [31]. Delphi serves the purpose of this study, as it encourages community input for problem-solving and idea generation [31], such as determining the sustainable tourism indicators and the environmental impact of tourism [38]. This method has been widely used in many different forms to study the tourism environment [37].

In essence, the Delphi method can be seen as qualitative research. However, we designed different questionnaires; using a quantitative questionnaire does not imply that the methodology is quantitative. For instance, Lee et al. (2018) [39] stated that a common way to provide feedback to experts is through descriptive statistics. Thus, in qualitative research (e.g., Delphi surveys), numerical or grade questions and scales are often used. The combination of rating scales and open-ended questions, therefore, seemed appropriate [40]. The method has been used to assess the environmental impact of future development [31]. Therefore, the Delphi method seemed to be the most appropriate to determine and analyze the EMS indicators for green casino hotels for the next decade.

A criticism of the Delphi approach is that the decision-making process is generally not as transparent as face-to-face meetings, and the results may be influenced by the researchers because they are the only ones who know the responses to individual surveys. This may lead to a decrease in participants’ trust in the process and results. In this study, the themes were jointly developed by ISO 14000 and nine representative green hotel assessment
systems. Therefore, the panel members reported that they were confident in the research results presented to them at the end of the process. However, it is important to note that when using the Delphi method, the coordinator who analyzes the data and develops each follow-up questionnaire plays a very important role in the entire process. Researchers must ensure that they do not let their own opinions, biases, and preconceptions about the issues under consideration affect the way they develop the questionnaire and interpret the results in each iteration. In this regard, determining the process of screening and selecting the most important topics before starting to use the Delphi method helps to ensure that researchers’ biases are under control.

3.2. Sampling

Prior studies have demonstrated that a 3-stage Delphi exercise is sufficient to obtain a high degree of team consensus [30]. The additional consensus obtained in the second round of Delphi negotiations will bring significantly reduced returns [4]; that is, as additional surveys are included in each round of the study, the number of group members who return to the questionnaire will decrease [4]. This can be offset using some form of incentive to complete the questionnaire (usually money). However, this was not available in this case. We established 3 small groups and 70 experts in Macau, from June 2020 to August 2020. This was done to increase the recognition of application and theoretical input, and the need for professional knowledge. The data of interviewees were as follows: 5 green hotel promotion officers, 61 casino hotel managers, and 4 scholars in the field of green hotels. The questionnaire was sent to each respondent 3 times. In the first round, the first author distributed 70 questionnaires and received 50 (return rate of 71%). In the second round, the researchers distributed all 50 questionnaires and received 40 (return rate of 80%). In the third round, 40 questionnaires were distributed and 38 were returned (return rate of 95%).

Snowball Sampling

Snowball sampling is used when the characteristics of objects are difficult to locate [41]. Through the mechanism of recommendations and referrals, the method provides researchers with an ever-expanding set of potential respondents in a cheap and effective way [42]. Additionally, previous studies suggested that snowball sampling is appropriate when the purpose of the research is to test the hypothetical relationship between variables and structure, which is the main focus of this research [43,44]. Therefore, even though the snowball sampling technique is not considered to be as effective as the random sampling method, it is still the best method for this study.

Although the participants were experts in various fields and had different backgrounds, most of the experts were Chinese, and therefore may be biased toward Asian views on this topic. However, the various indicators that were identified and the huge differences in the evaluation of their importance show that the lineup of experts selected as information sources was sufficiently diverse. Although the number of experts participating in this study was small, the experts presented a multifaceted picture of interrelated indicators. Larger samples and different experts could introduce additional aspects (indicators) or provide a clearer ranking of importance ratings (quantitative), but it is likely that they would not be completely different. Our research is not intended to provide final answers to questions about the future of environmental protection in the global casino hotel industry; on the contrary, we are trying to provide preliminary insights. This research can be seen as the first step in trying to face a challenge at the meta level, and should be expanded in future qualitative and quantitative studies.

3.3. Indicators for EMS in Casino Hotels

We selected the indicators of a casino hotel EMS from ISO 14000 and 9 green hotel evaluation systems: South Pacific Tourism Organization, Coalition for Environmentally Responsible Economies, State Economic and Trade Commission, Caribbean Hotel Association, Benchmark Hotel website, Global Stewards, State Economic Commission, Grecotels,
and Green Hotels Association. Overall, we based the selection of indicators on operability and feasibility [37]. The results initially reached 67 indicators in 10 scales, as shown in Table 3.

| Table 3. Descriptive statistics of indicators. | Importance Mean ± SD | Feasibility Mean ± SD |
|---------------------------------------------|-----------------------|-----------------------|
| 1. Formulate policies for environmental protection or 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 wastepaper, etc., and conduct harmless and resource disposal * | 4.78 ± 0.57 | 4.02 ± 0.67 |
| 9. Introduce an environmentally friendly accommodation plan or reward mechanism | 4.47 ± 0.55 | 3.78 ± 0.66 |
| 10. Allow customers 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. Provide 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 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 water in disposable plastic bottles | 4.50 ± 0.50 | 4.13 ± 0.81 |
| 19. Conduct regular repairs, inspections, and maintenance work for noisy facilities | 4.57 ± 0.50 | 4.05 ± 0.61 |
| 20. Establish outdoor lighting restrictions during specific evening hours ** | 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 |

* Top five most important indicators. ** Top five most feasible indicators.

3.4. Questionnaire Design

After completing the preliminary investigation, we drafted the first round of the postal questionnaire, which was based on a broad list of influences obtained from the tourism industry. The list was gathered from a comprehensive literature search, and we added any new indicators that emerged from the respondents’ answers. In interpreting the results, the subsequent responses to the initial survey were considered useful [31].

We invited experts to make necessary revisions to the EMS indicators in the first questionnaire round. Based on their comments, we decided whether to modify any initial indicators [37]. The survey required experts to analyze the feasibility and importance of applying each indicator to casino hotels in Macau in line with the purpose of this open-ended questionnaire, which was to recommend the development of an EMS for casino hotels. In this way, experts continued to reach consensus on the indicators.

3.5. Data Analysis

One of the goals of this research was to better understand the environmental indicators of casino hotels. It was essential to pay attention to the correlations among variables expected to affect the EMS. In this sense, a review of the correlation coefficients between variables could provide key insights.

This study used a 5-point Likert scale to measure the indicators. The second part of the questionnaire was used to measure the relationships between the indicators and the different environments. The items in the social, economic, and natural environments were adapted from Wu and Chen (2015) [45]. We used SPSS version 24.0 for Windows (IBM Corp., Armonk, NY, USA) to test the construction effectiveness of the project and conducted Pearson correlation analysis to test the relationships between the EMS indicators and the social, economic, and natural environment in developing an EMS for green casino hotels.
We evaluated the feasibility and importance of the implementation of indicators on a 5-point Likert scale. Statistically, most studies use standard deviation and mean to identify results from the Delphi method [46]. The average value reflects the experts’ view of each indicator, and the standard deviation reflects the degree of divergence of expert opinions. As mentioned earlier, after the first round of questionnaires was returned, we suitably modified the content of the indicators based on the experts’ suggestions [40]. The standard deviation and average score of each indicator were calculated based on feasibility and importance. The second round of questionnaires included the first round of averages for the experts’ reference. If an indicator had an unusually sizable standard deviation in the first round, this indicated that the experts had contradictory opinions [37].

Based on the stability assessment of the final rating, the third round achieved convergence [40]. The score was compared with the previous round to see if it changed less than 15% [40]. If it did, this indicated that the expert opinion reached convergence (that is, the saturation point). The basic principle of selecting indicators when forming a casino hotel EMS was that the results should have a strong concentration trend. The average value of the indicator must be higher than the total average, and the indicator must be chosen by more than 50% of the experts [40]. The results would then represent a consensus on the standards for establishing an EMS for green casino hotels in Macau.

4. Results

Using the Delphi method, we utilized the judgments of experts, based on three rounds of questionnaires, to modify the initially chosen EMS indicators. The foundation of index modification was not difficult to comprehend, as users could act flexibly. In the original survey, there were 8 dimensions, with 16 indicators; 5 other indicators resulted from the initial series of expert consultations. Investigators entered the next series of the survey, which contained 21 indicators.

4.1. Importance and Feasibility of EMS Indicators for Green Casino Hotels

The average value of all 21 indicators was higher than 4.5, showing that different experts regarded them as significant or very significant. The average standard deviation of each indicator was 0.59, proving strong consensus among the experts on the significance of these variables.

Due to severe contamination issues, the experts concluded that recording monthly water utilization for supervision goals and providing relevant guidelines to employees (such as decreasing energy, saving water, decreasing food squander, and decreasing air contamination resulting from transportation) are important goals for the environmental management of companies. They also agreed that certain factors are significant, even if they negatively affect client comfort.

For the accessibility of the green hotel EMS outline variables, the average value was over 4.0; the experts evaluated the scope of implementing those variables, from low to high achievability. There were different views on the accessibility of operations (average standard deviation, 0.65). The indicators follow the principles of reduce, reuse, and recycle. The experts generally believed that it is relatively easy to implement environmentally sound methods to manage solid waste and make restaurants green. Additionally, the issue of solid waste is apparent, thus it is essential to classify and reuse waste.

Macau’s casino hotels are limited by climate and landform. It is necessary to use natural light and ventilation to conserve power, follow government policies, and adapt energy-reduction techniques to the surrounding conditions [37].

The average value indicates that, although certain indicators are extremely significant, the possibility of implementing these indicators is not high, and vice versa. We divided the variables into four categories according to the significance and accessibility of operations (see Table 4): low significance with high execution, high significance with high execution, low significance with low execution, and high significance with low execution.
Table 4. Importance and feasibility of 21 environmental management system indicators.

| High Importance and High Implementation                                                                                     | Low Importance and High Implementation                                                                 |
|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| 1. Provide employees with relevant guidelines (such as saving energy, saving water, reducing food waste, and reducing air pollution caused by transportation) | 1. Formulate policies for environmental protection or sustainable development                           |
| 2. Record monthly water consumption for monitoring purposes                                                                | 2. Designate an environmental manager or representative to coordinate environmental protection plans  |
| 3. Post notices (for example, to remind employees or customers to save water, or encourage employees and customers to not waste food) | 3. Record monthly power consumption for monitoring purposes                                              |
| 4. Recycle wastepaper, plastic bottles, aluminum/iron cans, batteries, lead–acid batteries, etc., and properly dispose of hazardous materials | 4. Require employees to use public transportation or employee buses, walk, or carpool to work as much as possible to reduce air pollutants caused by driving private cars |
| 5. Provide non-smoking rooms or non-smoking floors                                                                        | 5. Take appropriate measures to reduce the consumption of water in disposable plastic bottles (e.g., by not providing plastic bottles of water, installing direct drinking water dispensers, etc.) |
| 6. Encourage suppliers to provide and use products and equipment with environmental, water-saving, or energy-saving labels | 6. Place or plant vegetation within the hotel area to provide customers with a comfortable environment |
| 7. Comply with environmental protection laws and regulations and environmental pollution control guidelines issued by the Macao SAR government |                                                                                                          |
| 8. Purchase more energy-efficient equipment (such as light-emitting diode (LED) lighting fixtures)                        |                                                                                                          |
| 9. Carry out regular repairs, inspections, and maintenance work on noise-emitting facilities to avoid noise from damaged parts |                                                                                                          |
| 10. Establish outdoor lighting restrictions during specific evening hours and turn off or moderately dim light-emitting facilities or equipment such as outdoor lighting/spotlights/luminous advertising signs/electronic displays from 11 pm to 6 am. Reduce unnecessary lighting, and avoid using dynamic or flashing lights and signs | |
### Table 5. Framework of EMS indicators suitable for green casino hotels.

| Dimensions                          | 44 Indicators                                                                 | Priority | Second Wave |
|-------------------------------------|-------------------------------------------------------------------------------|----------|-------------|
| 1. Environmental policy            | 1.1 Formulate policies for environmental protection or 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 resources                  | 2.1 Record monthly water consumption for monitoring purposes                 | V        |             |
|                                     | 2.2 Provide the option and rewards for not changing sheets and towels         | v        |             |
|                                     | 2.3 Install metering equipment in areas that consume higher amounts of water  | v        |             |
|                                     | 2.4 Install a leak detection system and provide regular maintenance           | v        |             |
|                                     | 2.5 Install low-flow showerheads and faucets                                  | v        |             |
|                                     | 2.6 Incorporate eco-friendly water-saving toilets                            | v        |             |
|                                     | 2.7 Install a sewage disposal system                                         | v        |             |
| 3. Energy                           | 3.1 Record monthly power consumption for monitoring purposes                 | V        |             |
|                                     | 3.2 Establish outdoor lighting restrictions during specific evening hours     | V        |             |
|                                     | 3.3 Maintain ventilation, air-conditioning, heating, and ice-generating equipment | v         |             |
|                                     | 3.4 Install a sensor system with timers                                       | v        |             |
|                                     | 3.5 Ensure that all 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 water in disposable plastic bottles water         | V        |             |
|                                     | 4.3 Reduce food waste with appropriate distribution, storage, and management systems | v         |             |
|                                     | 4.4 Use electronic data storage without 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 on noisy facilities | V        |             |
|                                     | 5.2 Provide non-smoking rooms or floors                                       | V        |             |
|                                     | 5.3 Place or plant vegetation within the hotel area                           | V        |             |
|                                     | 5.4 Establish controls for noise volume within statutory standards            | V        |             |
|                                     | 5.5 Install air filtering equipment in smoking areas                          | v        |             |
|                                     | 5.6 Minimize use of toxic chemicals                                          | 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 that 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 Provide adequate insurance coverage, e.g., accident 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, employee buses, etc.      | V        |             |
|                                     | 8.4 Conduct training programs and workshops on environmental education        | v        |             |
| 9. Public and community relationships | 9.1 Participate actively in public affairs of the local community             | v        |             |
|                                     | 9.2 Donate surplus materials                                                  | v        |             |
|                                     | 9.3 Actively participate in environmental protection-related and green activities | v        |             |
|                                     | 9.4 Promote the green hotel concept.                                         | v        |             |
| 10. Consumer education              | 10.1 Post notices                                                            | V        |             |
|                                     | 10.2 Provide guests with public transportation information (MRT, bus, shuttle, etc.) | v         |             |

Ten dimensions and 44 variables (most with a mean value over 4.5) were generated by regression and correlation analysis to evaluate an EMS for green casino hotels in Macau. We chose seven indicators from the water resource dimension; six indicators from the indoor environment dimension; five indicators from the energy, solid waste, and green purchasing dimensions; four indicators from the environmental policy, staff education, and public and community relationship dimensions; and two indicators from the corporate management.
and consumer education dimensions (Table 5). It is worth noting that 17 indicators were classified as essential and highly accessible, which are the top priorities for hotel managers ("Priority" column). Managers can use the other 27 indicators as second-stage targets to implement environmental improvements in casino hotels, because these indicators are important but not feasible (see the second wave).

5. Discussion

Environmental technology is commonly used to regulate air-conditioning, thermal power generation, lighting, electric motors, power generation, and water supply [47]. Despite the benefits, many general green hotels remain hesitant to implement new environmental technologies. Some general green hotel operators stop or postpone mainly for economic reasons.

Many hotel businesses have implemented environmentally friendly technologies to help them meet their sustainability targets when introducing an environmental management scheme. According to Zilio et al. (2017) [48], approximately 80% of hotels understand the benefits of using sustainable facilities and technologies to improve their environmental efficiency. Light-emitting diode lamps, fluorescent tubes, occupancy detectors, indoor smart key systems to monitor energy use, water-cooled refrigerators, and food decomposers are examples of these technologies [48]. Some high-end Macau casino hotels have used building management systems to power their air-conditioning systems and occupancy sensors to switch off lighting and other electrical equipment when rooms or corridors are empty. For example, Galaxy Macau expects to increase its profit margins and financial returns; it uses green materials and installed groundbreaking environmental conservation innovations such as Peltier headboard coolers, energy-saving pattern recognition solutions, and solar hot water collector systems [31]. City of Dreams Macau uses food decomposers to liquefy food scraps before disposing of them in order to reduce food waste [31].

The implementation of environmental technology is hindered by government and initial funding [12]. Regarding government funding, a hotel manager’s decision may be influenced by the lengthy and complicated administrative process of implementing this technology (for example, the approval process for using hotel space for new facilities) [12]. Furthermore, installing environmental technology (such as heat pumps, computerized energy management systems, and occupancy sensors) is costly [12]. Certain equipment, such as food decomposers and heat pumps, require a large installation space. Hotel managers will struggle to successfully implement these technologies if they do not have enough space and resources. These findings support the observations of Zhang et al. (2018) [49] 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 factors that have a negative impact on creating green assets. As a result, in addition to providing initial assistance, simplifying the government’s administrative procedures is vital to successful adoption. Users will easily embrace new technology if local governments have sufficient support in terms of applicable laws, regulations, and information [49].

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 will be affected. The indoor temperature may be higher (25 °C) than the comfort zone (21–23 °C) expected by customers. To address these issues, casino hotel managers should educate their customers by developing successful marketing strategies that promote the hotel’s green facilities, services, and other activities [4,47], and hope guests will be more accepting of the green hotel initiative. Furthermore, providing guests with rewards such as cash discounts or meal coupons can be an effective way to encourage them to actively engage in those activities. 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, and established an incentive mechanism to provide a MOP 5 discount
to encourage guests to purchase takeaway meals in their own reusable food containers. However, currently, this practice is not popular in Macau casino hotels.

6. Conclusions

This research proposes an EMS for casino hotels. We used regression and correlation analyses to predict various links and channels of the EMS. The EMS must conform to the development plan and tourism development policy. Therefore, the EMS is essential for sustainability development because it considers the different views and interests of various stakeholders involved in tourism development. This study has implications for various stakeholders.

6.1. Academic Implications

The results demonstrate that there is a strong relationship between an EMS and the environment. This finding confirms the systematic EMS for green casino hotels suggested in this work and provides sufficient evidence to prove the impact of casino hotels on the social, economic, and natural environments [6]. Therefore, it is crucial that casino hotels develop a complete green package composed of these sub-dimensions. This study differs from previous works emphasizing specific aspects of green services and their impact on consumers [34,38,47,50]. It proposes that consumers should address green environments together, rather than separately, to make effective judgments regarding green casino hotels. Therefore, this research contributes to the EMS literature from the perspective of systems theory by proposing green solutions that do not harm or negatively impact the environment [22]. The research results also show that an EMS generated through the Delphi method is helpful in establishing the desired behaviors, as envisaged by the different environment paradigms [4,15,51].

Casino hotels have become a major challenge with regard to green services and products because people have raised questions about their short- and long-term benefits to society and the environment [15]. Therefore, it has become imperative to demonstrate that an EMS can be used to achieve such benefits [15]. Gaps still remain with regard to identifying the components of the green casino hotel service environment that can serve as physical evidence of green claims [15,39]. Based on the existing tourism and hotel literature, this research introduces a new concept of EMS for casino hotels, describing the actual moments when systems theory interacts with the environmental aspects of hotel services. The results show that an EMS is a multi-dimensional structure, and social, economic, and environmental protection are its three main dimensions [39]. The sub-dimensions of each main dimension of the EMS are statistically separable but inseparable in operation; that is, in any situation, the three dimensions and their components will appear at the same time [51]. Therefore, this work provides a systematic method to identify the EMS that can be formed when humans interact with various green environments. By treating the EMS as a three-dimensional structure and studying its relationship with humans and the environment in a single model, this research provides new theoretical insights. For example, as emphasized by affordability theory, the environmental and design-related green service elements identified in this work contribute to service design toward providing an effective service consumption experience [52].

Another unique implication of this study comes from the analysis of the adjustment effect of travel and its environmental value on the EMS development process. Moderation for travel purposes (e.g., leisure/business) and motivation (e.g., hedonism/utilitarianism) are not supported, indicating that an EMS would have a more significant impact on business travelers [53]. Mak et al. (2019) [54] stated that self-improvement values strongly drive tourists with hedonic motivations. They believe that green services (e.g., allowing customers to choose not to change towels/bed linens daily) cause inconvenience and are ignored to a large extent. People with stronger environmental values are more open to new experiences and are highly sensitive to green service elements [54–56]. Pro-environment behavior is a complex result driven by environmental attitudes and motivations, consider-
ing environmental value, travel purpose, and travel motivation. Environmental attitudes and motivations are relatively independent [5], as they are separate results of deep innate personal and social factors that may affect EMS development for casino hotels [2].

This research developed an original framework to analyze the development of sustainable casino hotels. Macau, as a global gambling city, can be regarded as a representative case to prove the applicability and practicality of the framework developed in this paper. Casino hotel represent a link connecting the local and global economy and an integration of the city and the hotel system. They have complex and dynamic characteristics. Although it is important to consider economic aspects, policymakers should not ignore the environmental and social issues in the sustainable development of casino hotels. Since social and environmental issues will eventually turn into economic losses, such as compensation and fines, it is pointless to focus solely on business and trade benefits. The reputation of a casino hotel in terms of green image and livability is also a valuable attribute that brings economic benefits. Casino hotels are sensitive and controversial, requiring vigilance and appropriate planning solutions. Regarding casino hotels as one system and the external environment as another system, the relationship between them, the focus of each system, and the entire casino hotel industry can be described and compared. In the long run, this approach will help in systematically planning casino hotels.

6.2. Practical Implications

We expected that companies would give more significance to surrounding regulations while focusing on prevention. To support this logic, we perceived voluntary regulations (such as certification, eco-labeling, and cooperative consensus) as the future foundation of source distribution [3]. Companies that use preventive logic will use more complex activities, such as staff and consumer education initiatives, to promote green practices. Here, the dynamic evolution of legislation is the driving force behind the allocation of resources. Below are recommendations for governments based on the results of this study. Casino hotels can create green competitiveness to gain an edge over their competitors [57]. Operators need to acknowledge the significance of preserving their surroundings by learning the potential influence of the hotel on the environment [58]. The hoteliers’ degree of understanding environmental protection will impact environmental government strategies [59]. Improving hotel managers’ knowledge of environmental problems could increase the possibility of competing for the Green Hotel Award and conforming with environmental legislation.

Green management depends on the management and the business, as well as on clients. Client training is therefore essential to support environmentally friendly methods to adjust consumption patterns. People who understand these methods can turn into green clients and utilize resources effectively, with minimal waste. This research methodology provides a way to instill in people the notion of green and increase their awareness of their behavior toward the environment. Thus, it obtains a balance between consumption and preservation of the surroundings. Tourists who prefer green hotels could be the most representative clients for environmental training.

6.3. Limitations and Directions for Future Research

This research has certain limitations. Limited studies exist about green casino hotels, and because of the large number of casino hotels and limited number of scholars who focus on green hotels in Macau, there were more managers than scholars as respondents. Therefore, the results should be considered exploratory. The research sample comprises casino hotels in Macau, which limits the generalizability of the findings. Future research can enhance the variables to satisfy the specific requests of other locations (e.g., Las Vegas, etc.) [60] and invite more scholars to be respondents.

Despite these limitations, this is the first study to construct a theoretical EMS outline for green casino hotels [61–63]. Future research can benefit by formulating indicators in the operating system to achieve the scale of green casino hotels [64–66]. We expect to
offer the government an assessment of the environmental management performance of casino hotels, while hotel operators can use the environmental self-assessment to gain a clearer understanding of how they can improve their green efforts [67–69]. A new group of environmentally conscious clientele will be a benefit to casino tourism.

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