Implementation of Green Hotel Management 5-Star Hotel in Jakarta, Case Study: The Dharmawangsa Hotel Jakarta

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Abstract. The hospitality industry is one of the main parts in the development of tourism, thus spending a lot of resources and energy on earth. Since the hospitality sector is such a large component of the tourism industry, more focus is given to the impact it has on the environment. This research aims to examine the implementation of Green Hotel Management at The Dharmawangsa Hotel where the selection carried out in an environmentally friendly nature includes from efficiency initiatives, conservation practices. This research conducted by qualitative research method. Information is obtained through case analysis and interviews with hotel manager with guidance from literature review. This research revealed that implementation green hotel management which includes environmentally hotel operational, land use, energy efficiency, air quality, water efficiency, and waste management at The Dharmawangsa Hotel Jakarta has been successful in conducting environmental conservation activities aimed at developing sustainable tourism activities and gain competitive advantages. Through the management of operational activities have been directed to the development of hotels that are sustainable and environmentally to reduce the impact of environmental damage from current natural conditions.

1. Introduction
Environmental issues have begun to become a thing of interest in relation to the hotel industry, according to research by there is 75% environmental pollution caused by operational activities for energy, fuel, which have a negative impact on the environment [1]. The climate change is one of major environmental effects of hotels contribute to problems in international scope should be considered [2]. Based on research average in five star hotel the water consumption per guest per night is between 170 and 440 litres and releases between 160 kg and 200 kg of CO2 per square metre of room floor area per year and produce 1 kg of waste per guest per night [3]. Electricity consumption dominates energy use by 70% in hotels in major cities, with the proportion of energy cost as shown in the chart below. This includes the cost of using water. In terms of energy users, the air system consumes approximately 65% of the total energy used by the hotel [4].

Based on the assessment results from the National Green Hotel Award 2013 there are 10 best hotels, one of them is The Dharmawangsa Hotel where the selection conducted assesses from the application of environmentally friendly hotel principles including from efficiency initiatives, conservation and management practices in all elements such as land, energy, water, materials, air and environmental health, as well as environmental management.
The Dharmawangsa Hotel representing Indonesia at the ASEAN Green Hotel Award in Chiang mai, Thailand in January 2018. The Dharmawangsa Hotel is the only hotel from Jakarta that entered the top ten at the ASEAN Green Hotel Award in Chiang Mai, Thailand and won the Awarded with ASEAN Green Hotel Standard Award 2018-2020. This research exploring about implementation of green hotel management concept at The Dharmawangsa Hotel Jakarta".

2. Literature Review

2.1. Green Environment Management
Tourism is one of the largest industries in the world and is growing at a rapid rate according to [5]. This environmental concern has translated into the green management movement in the tourism industry. On the one hand green management aims to reduce the environmental impact of excessive consumption of durable goods, energy use, water wastage and increased pollutants to air, water and soil [6]. Environmental management serves to protect local and natural resources to benefit travelers who respect the environment and local communities as they increasingly raise awareness of environmentally friendly practices [7]. Quite a number of best practices are undertaken in the hotel sector in this regard that 85% of leisure travellers consider themselves environmentally conscious, that is, ‘green’ consumers it will render the sector more sustainable and environmentally friendly [8].

2.2. Green Hotel
Green hotel defines as a hotel to create a good environment and encourages its staff and customers to participate in activities. It is also necessary to pay attention to every operational activity to reduce environmental impact [9]. Green hotel also to conserve water and energy constructively and reduce solid waste to preserve the environment [10]. Green hotel defines as “a hotel that evaluates surrounding ecological condition before starting construction and tries not to aggravate impacts on environment”. Therefore, the environment will not be affected while developing tourism industry [11]. Meanwhile according to [12] green hotel is a hotel or resort that has policies and implementation of sustainable activities. These include implementation of environmentally hotel management, environmentally hotel operations, land efficiency, efficiency of the use of building materials, energy efficiency, air quality, water efficiency and waste management. The main spirit of green hotels aims to reduce the environmental impact and energy consumption while providing products and services to customers. Green hotel can be defined as a program to save water and energy, reduce waste and environmental impact through the participation of staff and customers.

3. Research Method
This research was conducted by qualitative research method. Information is obtained through case analysis and interviews with hotel manager with guidance from literature review. Qualitative research is often described taking the perspectives and accounts of research participants as a starting point and related as naturalistic, interpretative approach, concerned with exploring phenomena “from the interior” [13]. Based on an overview from the hotel manager along with a literature review. Authors investigated problems
related to the implementation of the green hotel concept such as environmentally hotel operations, land use, energy efficiency, air quality, water efficiency, waste management at The Dharmawangsa Hotel Jakarta.

4. Discussion

4.1. Environmentally Hotel Operational Management

Sustainable procurement policy is an important part of direct environmental management at The Dharmawangsa Hotel. Selection, purchase of goods from suppliers and selection of operational goods in eco and environmentally friendly approach. The principle of purchase criteria green concept such as quality, tailoring to benefits or uses, energy efficiency, recycled products, "ecolabel" certification, avoid disposable products. In the selection and appointment of suppliers of goods, some of the requirements of selected suppliers are those that meet the standards of eco friendly design. Currently, the hotel no longer uses plastic but uses paper bags and in the future will use cassava models. Cassava bag is no longer made from plastic but made from cassava and easily soluble in hot water and made from organic materials. Furthermore, based on the interview with the management said that in the future the packaging of paper bag hotel will be innovated into merging boxes with paper bags into one to reduce the use of paper.

![Figure 2. Paper Bag](image)

4.2. Food Safety Management

Food safety and hygiene means taking the necessary precautions to ensure that food is good for human consumption and does not pose an environmental health hazard. Food control that has been done so far by the management of The Dharmawangsa Hotel uses hygiene principles with HACCP (Hazard Analysis and Critical Control Point) approach. The structure in the food production section, especially in the kitchen area of The Dharmawangsa Hotel based on observations in the field using durable building materials, and easy to clean so that the disinfection process can be done to the production area. partitions and floors use soundproofing and non-toxic materials, wall and partition areas have heights suitable for food production activities, have a drainage system in the floor disposal in the production process. In relation to facilities for employee hygiene the management ensures the importance of employee hygiene level can be maintained so that food contamination can be avoided. One of them is by providing hands wash and equipped with soap and a hygienic tissue.

![Figure 3. Hand Wash Area](image)

4.3. Pest Control Management

In food production pests become one of the priorities because it is related to food safety and hygiene. The process of breeding pests can occur if in the storage room and the production part becomes a source of food for the pest itself. To avoid this management has implemented good hygiene procedures to avoid an environment conducive to pests. Cooperation with PT. Rentokil Indonesia for pest management conduct control in several areas such as guest room, floor corridor, pantry, lobby, public area, jakarta restaurant, kitchen jakarta, sriwijaya restaurant, kitchen sriwijaya, area toilet, fb store, gardemanger, room service, butcher, pastry, fruit room, main kitchen, employee cafeteria, swimming pool & bar, receiving area, garbage area, nusantara ballroom, majapahit ballroom, recycle room, laundry, lockers, office, parks and outdoor areas.
4.4. Green Hotel Campaign Implementation
The application of green hotel campaign conducted for guest rooms at The Dharmawangsa Hotel by not reducing the comfort and satisfaction of guests staying some examples of activities carried out is to put the recommendation of Hotel Directory Book located in the guest room to participate in the green hotel campaign for the use of linen in the room, efficiency of electrical energy and water use. In Food and Beverage departments such as restaurants do not provide plastic either in the form of bags or food storage boxes. Alternatives are used using paper storage so that it is easily decomposed by the environment. Then for mineral water served to guests either in the room or in the restaurant no longer provide bottled mineral water from plastic but using glass where mineral water made from glass can be reused by mineral water suppliers. Especially for the meeting room the hotel will use water jug and water goblet instead of drinking bottles so as to encourage hotel guests to care for the environment and maintain nature. Some programs that have been done include organizing activities in improving the ability of staff in practicing green hotel programs such as routine management to conduct activities by making campaigns related to nature sustainability, energy saving programs through media installed in the staff area so that it can be seen for hotel staff, business partners and suppliers where all staff are involved in the creation of such campaigns and get an assessment by management.

4.5. Corporate Social Responsibility
CSR activities commonly referred to as "Corporate Social Responsibility" is literally corporate social responsibility to work together to rejuvenate the environment around the company due to the company's activities or activities. The Dharmawangsa Hotel activities of social responsibility program such as greening the surrounding area, providing charity to the local community, providing counseling or training, preserving flora and fauna.

4.6. Awards
4.6.1. ASEAN Green Hotel Award (2018-2020)
The Dharmawangsa Hotel was awarded the ASEAN Green Hotel Standard Award for the period 2018-202 along with its victory in the Indonesia Green Hotel Awards announced on September 28, 2017 in Jakarta. The award was held on January 26, 2018 at the "ASEAN Tourism Forum" in Chiang Mai, Thailand and was attended by the Minister of Tourism of the Republic of Indonesia, Mr. Arief Yahya. ASEAN Green Hotel Standard is an ASEAN initiative dedicated to promoting sustainable tourism through the adoption of environmentally friendly practices and energy conservation in the ASEAN Green Hotel practice.

4.6.2. Green Hotel Award 2017
The Ministry of Tourism held in 2017 Indonesian Tourism Enchantment Appreciation, as a tribute to the tourism industry. One of the interesting awards is the Green Hotel Award which is an award given to the hotel industry in the country that implements environmentally friendly principles. Green Hotel Award 2017 is expected to increase the concern of hotel businesses towards community involvement as well as efforts to preserve nature and culture of the surrounding environment.

4.6.3. Award from the Ministry of Environment and Forestry 2014-2015
PROPER is the Company's Performance Rating Assessment Program in Environmental Management developed by the Ministry of Environment since 1995 to encourage companies to improve their environmental management. Based on the results of The Dharmawangsa Hotel obtained a blue rating where PROPER Blue: is the company has made environmental management efforts required in accordance with the applicable provisions or regulations and has fulfilled all aspects required.

4.7. ASEAN Tourism Standard
Asean Green Hotel Standard encourages tourism through the adoption of environmentally friendly practices and energy conservation in the ASEAN Green Hotel Practice. This standard relates to the important operational elements of Green Hotel related to green product, human resources and environmental management. With regard to this The Dharmawangsa Hotel has awarded as ASEAN Green Hotel Standard.

4.8. Land Uses Management
There are four indicators used by management in optimizing the land use within the hotel area for example, the distribution of green base area zoning, accessibility for guests and employees, landscaping design on land and rain runoff water management. The information of the amount of green zone of the entire land in the hotel amounted to 30% of the existing land area of 4.2 hectares. Another thing is to maximize the use of open space and ornamental plants in such a way that is useful for the beauty of landscapes. Landscaping design in the form of vegetation in the main circulation of pedestrians shows the presence of protection from heat due to solar radiation and from strong winds. There are 2 kinds of technology used by The Dharmawangsa Hotel in reducing water discharge in case of rain, the first is to make biopori holes. Based on observations there are 100 biopori hole points made by the management of both inside and outside the hotel area. While the second creates a shelter for rain runoff water located in the back of the hotel or known as the Water Absorption Pond.

4.9. Energy Efficiency Program
Energy efficiency is very important because it is useful to save resources. Energy efficiency is very crucial for hotels because it can reduce operational costs unwittingly caused by energy savings to reduce costs. The results of the energy load report conducted by The Dharmawangsa Hotel resulted in a detailed evaluation of the current status of energy efficiency. The diagram shows the energy load report of each hotel component as a percentage of the total cost. Here is the data on energy load based on the period January-December 2019.

![Energy Load Graph](image)

**Figure 6.** Energy Load Graph
Focus of energy saving at The Dharmawangsa Hotel can be given to equipment that uses electricity sources from Electric State Company (PLN) for a significant result of 68.5% in 2019, then LPG and diesel. In addition, it can also start from the air conditioning system, as it uses the largest electrical energy in the hotel building. Intensity of electricity consumption is a term used to know the amount of energy consumption in a system building. In fact the intensity of energy consumption is the result of the difference between total energy consumption over a certain period one year and the area of the building. The calculation of ECI as follows:

$$ECI = \frac{Kwh \ Total}{Building \ Area}$$

ECI unit is kWh/m² per year. The following will be explained about ECI in hotel rooms during 2019 at The Dharmawangsa Hotel.

### Table 2. Room Energy Consumption Intensity (ECI)

| Month     | Total Kwh | Area m² | ECI   |
|-----------|-----------|---------|-------|
| Jan       | 271.180   | 9172    | 29.6  |
| Feb       | 247.392   | 9172    | 27.0  |
| Mar       | 271.624   | 9172    | 29.6  |
| Apr       | 270.541   | 9172    | 29.5  |
| May       | 312.388   | 9172    | 34.1  |
| Jun       | 238.352   | 9172    | 26.0  |
| Jul       | 268.188   | 9172    | 29.2  |
| Aug       | 247.873   | 9172    | 27.0  |
| Sep       | 227.725   | 9172    | 24.8  |
| Oct       | 247.617   | 9172    | 27.0  |
| Nov       | 264.045   | 9172    | 28.8  |
| Dec       | 258.098   | 9172    | 28.1  |
| **Total** | **3.125.023** | **9172** | **340.7** |

Based on the measurement of the average amount of Energy Consumption Intensity (ECI) in the last 12 months of 2019 per year of 340.7 kWh/m² /yr. According to the results of a study conducted by ASEAN-USAID in 1987 whose report was only issued in 1992, the target of the large intensity of electricity consumption (ECI) for Indonesia according to the Directorate of Energy Development
a. ECI for office (commercial): 240 kWh/m² per year
b. ECI for shopping center: 330 kWh/m² per year
c. ECI hotel / apartment: 300 kWh/m² per year
d. ECI for hospitals: 380 kWh/m² per year.

Although the results of the calculation of ECI The Dharmawangsa Hotel showed slightly exceeded the standard for hotel buildings of 300 kWh/m²/yr of 340.7 kWh/m² so that it can be classified in the criteria of electricity use is still within a fairly efficient limit.

4.10. Energy Intensity per Guest Room

Authors are trying to get the calculation of electrical energy per guest rooms to get the amount of kWh per m² so that it can be analyzed whether the amount is in accordance with the target of the energy efficiency program that has been implemented. The data required in this calculation is the number per kwh m² of all hotel rooms in 2019 and the number of rooms sold.

| Month | Total Kwh | Room Sold | Energy Intensity per guest room |
|-------|-----------|-----------|--------------------------------|
| Jan   | 271.180   | 1930      | 141                            |
| Feb   | 247.392   | 1682      | 147                            |
| Mar   | 271.624   | 1871      | 145                            |
| Apr   | 270.541   | 1901      | 142                            |
| May   | 312.388   | 1742      | 179                            |
| Jun   | 238.352   | 1340      | 178                            |
| Jul   | 268.188   | 1913      | 140                            |
| Aug   | 247.873   | 1411      | 176                            |
| Sep   | 227.725   | 1404      | 162                            |
| Oct   | 247.617   | 1965      | 126                            |
| Nov   | 264.045   | 2363      | 112                            |
| Dec   | 258.098   | 2146      | 120                            |
| Total | 125.023   | 21668     | 144                            |

Based on The Dharmawangsa Hotel's Guidelines for Energy Conservation Implementation, based on the average Energy intensity per guest room value for guest rooms in 2019 is 144 kWh/m², it is classified as "efficient". In this case the management of The Dharmawangsa Hotel has successfully managed the use of energy rationally and improved its performance of energy efficiency without affecting the quality and quantity of service to guests.

4.11. Indoor Air Quality

Indoor Air Quality in the hotel is a problem that needs attention because it will affect human health. Problems of indoor air quality are generally caused by several things, such as lack of air ventilation (52%), the presence of indoor sources of contaminants (16%), contaminants from the outdoors (10%), microbes (5%), building materials (4%), others (13%). Based on the results of the test to 6 sample locations in The Dharmawangsa Hotel for air bacteria is in accordance with the required standards, the Jakarta Health Laboratory Center which is below 700 CFU/m³. Total Plate Number (ALT) is an indicator of the presence of heterotrophic microbes including bacteria and molds that are sensitive to disinfectant processes such as coliform bacteria, disinfectant resistant microbes such as spore formation and microbes that can develop rapidly in processed water without residues. Total Plate Number is a quantitative method used to determine...
the number of microbes in a sample. Using indoor plants to improve the quality of the internal environment by absorbing pollutants and do not use pesticides on indoor and outdoor plants so as not to contribute to indoor pollution.

4.12. Water Efficiency

Below is a recapitulation of water usage used for hotel rooms for one year in 2019 at The Dharmawangsa Hotel.

| Month | Water Expenses | Total (m³) |
|-------|----------------|-----------|
| Jan   | 57.131.003     | 5.574     |
| Feb   | 29.477.209     | 2.876     |
| Mar   | 51.216.671     | 4.997     |
| Apr   | 64.466.948     | 6.289     |
| May   | 41.810.549     | 4.079     |
| Jun   | 37.754.959     | 3.683     |
| Jul   | 53.346.511     | 5.205     |
| Aug   | 42.659.014     | 4.162     |
| Sep   | 46.167.400     | 4.504     |
| Oct   | 45.800.130     | 4.468     |
| Nov   | 51.203.474     | 4.995     |
| Dec   | 46.799.402     | 4.566     |
| Total | 567.833.272    | 55.398    |

Based on the data the calculation of Water Consumption Intensity for use in the hotel room. Water Consumption Intensity is a number that shows the volume of water consumed (m³) for each room sold per year. The data required in this calculation is the consumption of water in the m³ and the number of rooms sold. Here's the formula for calculating Water Consumption Intensity

$$WCI = \frac{\text{Total usage (m³)}}{\text{Room Sold}}$$

| Month | Total m³ | Room Sold | WCI |
|-------|----------|-----------|-----|
| Jan   | 5.574    | 1930      | 2,9 |
| Feb   | 2.876    | 1682      | 1,7 |
| Mar   | 4.997    | 1871      | 2,7 |
| Apr   | 6.289    | 1901      | 3,3 |
| May   | 4.079    | 1742      | 2,3 |
| Jun   | 3.683    | 1340      | 2,7 |
| Jul   | 5.205    | 1913      | 2,7 |
| Aug   | 4.162    | 1411      | 2,9 |
| Sep   | 4.504    | 1404      | 3,2 |
| Oct   | 4.468    | 1965      | 2,3 |
| Nov   | 4.995    | 2363      | 2,1 |
| Dec   | 4.566    | 2146      | 2,1 |
| Total | 55.398   | 21.668    | 2,6 |
Based on the data, it can be seen that the average value of WCI for hotel rooms in 2019 was 2.6 m$^3$. Although the average WCI according to the standards set by the management is 2.2 m$^3$/room/year but in the implementation is still in the category is still said to be quite efficient especially in the use of water consumption in hotel rooms.

4.13. Waste Management

Waste audits are a structured process for identifying and measuring the source amount and type of waste produced in hotels. The purpose of waste audit is to profile the type of waste and give the impact of the economic value of the waste produced. Doing this will help identify waste source areas and have opportunities to reduce, reuse, or recycle waste materials. It will also help collect basic data to measure the effectiveness of existing 3R programs.

**Table 6. Waste Sales Revenue**

| Item | Jan | Feb | Mar | Apr | May | Jun | Total |
|------|-----|-----|-----|-----|-----|-----|-------|
| Paper | 887,700 | 540,100 | 703,700 | 490,800 | 361,100 | 1,345,200 | 548,900 |
| Plastic | 186,500 | 54,300 | 263,120 | 147,900 | 181,600 | - | 37,900 |
| Bottle | 243,330 | 171,000 | 170,000 | 194,600 | 74,600 | 130,500 | 220,700 |
| Metal | 1,217,100 | 2,345,000 | 883,000 | 1,222,000 | 697,100 | 1,322,500 | 426,600 |
| Food Waste | 100,000 | 170,000 | 170,000 | 190,000 | 141,000 | 110,000 | - |
| Oil | 2,305,000 | 1,120,000 | 1,520,000 | - | 3,100,000 | 3,000,000 | - |
| Other | 70,000 | 97,000 | 121,000 | 185,000 | 167,000 | 304,000 | 182,000 |
| Linens | 50,000 | - | 50,000 | - | - | - | - |
| Flavours | 110,000 | 160,000 | 105,000 | 140,000 | - | - | - |
| Total | 2,452,200 | 5,175,200 | 4,173,400 | 3,124,400 | 3,845,800 | 4,449,200 | 1,970,600 |

The results obtained from waste management during 2019 with total profit value reach Rp 46,076,750 with a waste exchange program to the dealer incurs a relatively small cost. The usual that appears is projected to be only around 0.5% of the estimated revenue that can be generated. With this program that applied by the management have benefits from the sale of waste was quite high profitable.

4.14. Waste Handling Process of Hazardous and Toxic Materials

Hazardous and toxic waste materials are substances, energy or other components that due to their nature, concentration and amount can either directly or indirectly pollute the environment, and or harm the environment, health, and survival of humans and other creatures. Procedures for handling and storing hazardous waste at The Dharmawangsa Hotel are carried out according to the correct procedures so as not to pollute the environment and interfere with health. Procedures for handling waste hazardous and toxic material a. waste produced during production process stored in temporary waste container which has official permission from the relevant agency (Ministry of Environment), b. waste is stored in separate containers according to its type and classification, c. waste can be stored in temporary waste container up to a maximum limit of 1 year or adjusted to the capacity, d. waste is handed over to the official waste transportation and destruction operator and has permission from the relevant agencies, e. waste submitted to authorized operators is recorded in the log book and waste manifest, f. waste storage and delivery activities to waste operators are reported every 3 months to the relevant agencies.

**Figure 7. Hazardous and Toxic Waste Placement**
4.15. **Hotel Liquid Waste**

There are many purpose use of clean water at The Dharmawangsa Hotel such as showers, toilets, sinks for guests and employees and also other supporting facilities such as swimming pool, restaurant, kitchen, mosque, bath up, spa, laundry service, lounge (providing drinks for hotel guests), plant treatments inside and outside the hotel, hydrants and sprinklers for fire prevention. If the waste is absorbed in the soil and left for long period then directly the waste water will contaminate the quality of groundwater that can be reused for hotel operations. To prevent this from happening, procedures are needed in water conservation and wastewater handling so that the environment can remain optimally protected. Based on observations the management apply treatment of liquid waste hotel schemes to process liquid waste sourced from waste water, treatment units to water bodies. Before liquid waste is transferred to the body of water, it must be provided a control tub that serves as an effluent WasteWater Treatment Plant. The control tub has a role to play in WasteWater Treatment Plant effluent sampling as a step in evaluating performance. The wastewater treatment scheme can be seen in the image below.

![Waste Water Treatment Scheme](image)

In this waste water treatment scheme from several waste sources are accommodated in a container. From the collecting tub, waste water is flowed by pump to the Waste Water Treatment Plant which is located in the back area near Dharmawangsa apartment. First the wastewater from the containers is pumped into the oil fat separator to separate the remaining fat and also the floating dirt that is inseparable in the initial depositor trough including waste from blackwater and greywater. This scheme has benefits to protect the environment from industrial and domestic wastewater disposal pollution with large quantities and provide sustainable activities for the conservation of water sources with the process of reuse and recycle waste water at The Dharmawangsa Hotel.

5. **Conclusion**

We concluded that sustainable hotel practices not only mean consuming natural and cultural resources, but also conserving them, not only benefiting a few people, but aiming to contribute profits more broadly among stakeholders and communities. Basically if the hotel sector is managed sustainably, it will help in terms of nature conservation and cultural heritage, as well as encourage the development of more environmentally friendly infrastructure. Hotel management both as a tourism product in terms of buildings and operational activities should be directed to the development and management of hotels that are sustainable and environmentally sound to reduce the impact of environmental damage from current natural conditions. Implementation green hotel management so far by management puts environmentally friendly principles in addition to having competitiveness, also has a high selling value and educated guests. The high awareness of guests towards environmental preservation puts green hotels or eco-friendly hotels as a necessity. The Dharmawangsa Hotel itself is a luxury hotel that has large rooms, facilities, and building compared to other five star hotels in Jakarta. Of course, with the area spend more energy, water, garbage, waste, and building materials. This research revealed that implementation green hotel management which includes environmentally hotel operational, land use, energy efficiency, air quality, water efficiency, and waste management at The Dharmawangsa Hotel Jakarta has been successful in conducting environmental conservation activities aimed at developing sustainable tourism activities and gain competitive advantages.
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