

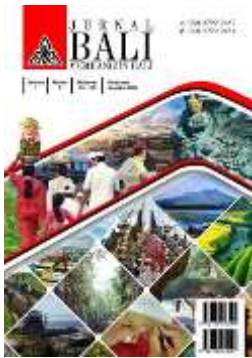


Evaluation of Green Hotel Performance in Bali using the Green SCOR and AHP Methods

Anak Agung Istri Anindita Nanda Yana¹, Nur Mayke Eka Normasari²

^{1,2}Universitas Gadjah Mada, Yogyakarta, Indonesia

Email: ¹anakagungistri.aninditanandayana@mail.ugm.ac.id, ²mayke@ugm.ac.id



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Abstract

Purpose: The purpose of this study is to evaluate the Green Supply Chain performance of hotels in Bali.

Research methods: This study uses primary data obtained from questionnaires using a sample of three division heads per hotel and secondary data obtained from past hotel data. The data is processed using excel.

Results and discussion: Two hotels obtained results of 66.48 and 75.02. These scores fall into the Average and Good grades. There needs to be some prioritized improvements with SNORM scores below 60 from two different hotels, namely water used, energy used, % suppliers with an EMS or ISO 1400 certification, supplier lead time, delivery item accuracy, and source flexibility.

Implication: Recommendations that can be given are the use of PLTS, other water sources, and good communication with suppliers.

Keywords: GSCM, GSCOR, AHP, hotel

Evaluasi Kinerja Hotel Hijau dengan Metode Green Score dan AHP di Bali

Abstrak

Tujuan: Penelitian ini bertujuan untuk mengevaluasi kinerja Green Supply Chain hotel yang ada di Bali.

Metode penelitian: Penelitian ini menggunakan data primer yang diperoleh dari kuisioner menggunakan sampel tiga orang kepala divisi per hotelnya dan data sekunder yang diperoleh dari data masa lalu hotel. Data tersebut diolah menggunakan excel.

Hasil dan pembahasan: Dua hotel memperoleh hasil 66,48 dan 75,02. Nilai ini termasuk dalam nilai Average dan Good. Perlu ada beberapa perbaikan yang diprioritaskan dengan nilai SNORM dibawah 60 dari dua hotel berbeda, yaitu water used, energy used, % supplier with an EMS or ISO 1400 certification, supplier lead time, delivery item accuracy, dan source flexibility.

Implikasi: Rekomendasi yang dapat diberikan yaitu dengan penggunaan PLTS, sumber air lain, serta komunikasi yang baik dengan supplier.

Kata kunci: GSCM, GSCOR, AHP, hotel

INTRODUCTION

Bali is one of the most favored tourist destinations in Indonesia. This is due to the increasing popularity of the island of Bali on the international stage because Bali is considered to have a fairly complete tourist destination. Starting

from beaches, mountains, waterfalls, rice fields, culture to nightlife. Bali is widely known by domestic and international tourists. Tourists who visit Bali carry out various activities, namely, holidays, sports and business trips. Based on Central Statistics Agency (2024), Bali is visited by more than 300,000 international and domestic tourists every month. The large number of visitors coming to Indonesia, especially Bali, will increase Indonesia's foreign exchange as well as employment opportunities for the majority of people in Bali related to tourism.

Most tourists who come to Bali need a hotel to stay and rest. Apart from resting, many tourists visit Bali just to stay at a hotel or what is now often called a staycation. Bali has many hotels with costs ranging from cheap to very expensive. Hotels in Bali have various facilities according to the market and area the hotel is located. For example, many hotels in the Ubud area have yoga facilities together in the morning or a spa on the river bank because the Ubud area is synonymous with nature and tranquility, making it more suitable for a staycation. Meanwhile, hotels in the Kuta or Seminyak area tend to be more compact due to the behavior of tourists who live in Kuta or Seminyak doing activities outside the hotel, such as night clubs or beach clubs, surfing, or just shopping in the Kuta area.

Although the tourism industry generates a lot of foreign exchange for the country, the tourism industry, especially the hotel industry in the world, contributes to carbon emissions which represent 1% of total global emissions, water consumption also reaches 5% of global water consumption. As well as large amounts of food waste. This is due to competition and competition for the best level of service and products as well as high quality to ensure customer satisfaction (Alreahi *et al.*, 2023)

Currently, consumer awareness of the importance of environmental preservation is one of the challenges that must be faced by companies in the hotel industry. Implementing green hotels is one solution that can be done to sell products while still protecting the environment. Several studies have also concluded that people are now starting to be aware of the environment and are willing to pay more expensive fees to stay in green hotels. According to Kang *et al.* (2010), tourists today are willing to pay more for environmentally friendly products and services. Rahman & Reynolds (2016) conducted research in the United States regarding respondents' willingness to make sacrifices for the environment and found that respondents were willing to pay more to stay at a green hotel. Dodds & Holmes (2016) also explains that companies that have a green orientation and can communicate sustainability effectively tend to achieve greater profits. The implementation of green hotels is also supported by the government by giving awards to environmentally friendly hotels (Datiktravel, 2017).

Green hotels can be achieved by carrying out green supply chain management. Green supply chain management includes all programs, initiatives and management activities aimed at running, controlling and improving supply chain operations effectively while still paying attention to the environment (Micheli *et al.*, 2020). Astawa *et al.* (2021) explains that implementing green supply chain management can increase competitive advantage. Green supply chain management in the hotel industry is considered a proactive approach in dealing with environmental impacts. However, implementing green supply chain management is full of challenges starting from

the flow of environmentally friendly materials originating from suppliers who implement environmentally friendly systems and ending with providing environmentally friendly products and services after going through environmentally friendly processes. Apart from that, green supply chain management must also determine the amount of product that suits the supplier's needs so that the product is not wasted and becomes waste.

The application of GSCM in developing countries still applies general GSCM components, namely technical aspects such as green design, green manufacturing and reverse logistics. The aim of implementing GSCM in developing countries is to emphasize process optimization by adopting techniques to achieve green goals. Meanwhile, for developed countries, GSCM also applies non-technical practices such as those related to behavior. For example, commitment to top management, supplier involvement, and customer involvement. These non-technical activities are usually neglected in emerging markets such as India and Brazil (Liu *et al.*, 2020).

If done well, GSCM can positively influence financial performance because savings can be achieved along the supply chain, from reducing resource wastage and energy consumption, saving time, eliminating waste and improving the quality and properties of products to match what the hotel needs to deliver. produce its products and services (Chen *et al.*, 2021). Apart from that, GSCM can also attract more tourists because it has advantages that are difficult for other companies to compete with so it can increase revenue.

To assess whether a company has implemented GSCM well, it is necessary to carry out a performance evaluation for green practices in the hotel supply chain. This performance evaluation can be used by companies to increase innovation and increase the company's opportunities to remain competitive with other companies. This performance evaluation is very useful for finding out problems that occur from upstream to downstream so that it can be used as input in making decisions.

The green SCOR method is one of the popular methods used to evaluate green supply chain performance. This method provides a structured framework for assessing supply chain sustainability which includes various aspects such as managing waste, energy conservation, and using environmentally friendly materials. The green SCOR method divides supply chain flows based on plan, source, make, deliver, return, and enable (APICS, 2017). Meanwhile, performance consists of reliability, responsiveness, agility, cost and asset management. The GSCOR method is used in this research because the comparison between options or alternatives becomes clearer. The scores given for each criterion can help in determining the best option based on relative performance. Assessing hotel performance becomes easier and clearer. The SCOR method is also more flexible and adapted to hotel business needs and processes.

Measuring green supply chain performance is needed to find out which green supply chain activities are good and which need to be evaluated. By measuring green supply chain performance, hotels can take concrete steps towards sustainability, manage their environmental impact, meet market demands, and have a positive impact on the surrounding community. Measuring supply chain performance will be carried out using the green SCOR method and integrated with the AHP model to weight each work attribute. The GSCOR method is used in this research because the comparison between

options or alternatives becomes clearer. The scores given for each criterion can help in determining the best option based on relative performance. Assessing hotel performance becomes easier and clearer. The GSCOR method is also more flexible and adapted to hotel business needs and processes. With this supply chain performance measurement, it is hoped that we can find out the extent to which hotels in Bali have integrated sustainable practices in their supply chains and can help hotels in Bali to develop more effective strategies in achieving their sustainability goals in the green supply chain.

Based on all the explanation above, it can be stated that the purpose of this study is to evaluate the Green Supply Chain performance of hotels in Bali.

RESEARCH METHODS

This research was conducted at two hotels in Bali with environmentally friendly hotel branding. This research was conducted to evaluate the performance of green supply chain management of hotels in Bali so that the hotel is expected to be able to correct its shortcomings so that it is hoped that customer satisfaction will increase and be accompanied by an increase in profits.

The data used in this research uses primary data given to the heads of the procurement, HRD and engineering divisions. The questionnaire contains pairwise comparisons between key performance indicators at level 3, between criteria at level 2 and between business processes at level 3. This questionnaire uses a scale of 1-9 with scale 1 indicating the lowest level while scale 9 indicates the highest level. Table 1 is an explanation of the pairwise comparison scale. Apart from using primary data, this research also uses secondary data, namely using past data for the past year. The data required is actual data from key performance indicators in percent or days.

After that, the questionnaire results data was weighted at each SCOR level using the AHP method in Excel software (Puspitasari, 2022). After the calculations are carried out for each indicator, normalization is carried out using the Snorm de Boer formula to equalize the parameters because the parameters for each performance indicator are different. The snorm de Boer formula can be seen in Figure 1. After obtaining the normalized value for each performance indicator, the weight of the performance indicator is multiplied by the actual normalized performance value. The results of these multiplications are added up to obtain the SCOR value for the hotel. Then the value is adjusted to the monitor system table.

Table 1. Pairwise comparison scale

Intensity of interest	Definition
1	Equally important compared to others
3	A little more important compared to the others
5	Quite important compared to others
7	Very important compared to others
9	Extreme importance compared to others
2, 4, 6, 8	The value between two adjacent assessments
Reciprocal	If element i has one of the numbers above compared to element j, then j has the opposite

value when compared to i

(Source: Saaty, 1990)

Higher is better

$$S_{norm} = \frac{S_i - S_{min}}{S_{max} - S_{min}} \times 100$$

Lower is better

$$S_{norm} = \frac{S_{max} - S_i}{S_{max} - S_{min}} \times 100$$

Figure 1. Snorm de Boer formula
(Source: Jane, 2020)

RESULTS AND DISCUSSION

Validated KPIs

Key performance indicators based on approval from hotel officials resulted in 13 approved KPIs. Table 2 is the result of the key performance indicators that have been discussed

Table 2. Key Performance Indicators

No.	KPI	Unit
1	Energy used	%
2	Water used	%
3	Delivery item accuracy by supplier	%
4	% supplier with an EMS or ISO 1400 certification	%
5	Supplier lead time	day
6	Source flexibility	%
7	Timely item accuracy by supplier	%
8	% of solid waste recycling	%
9	% of water waste recycling	%
10	Make liquid emission	%
11	% error free returns shipped	%
12	% of complaints regarding missing environmental requirement from product	%
13	% of employee trained on environmental requirement	%

(Source: Interview results, 2014)

SCOR Hierarchy

The hierarchy of core processes, performance attributes and measurement metrics is in Figure 2. This hierarchy is used to calculate the final value of supply chain performance. The weight of each level is part of the weight value at the previous level.

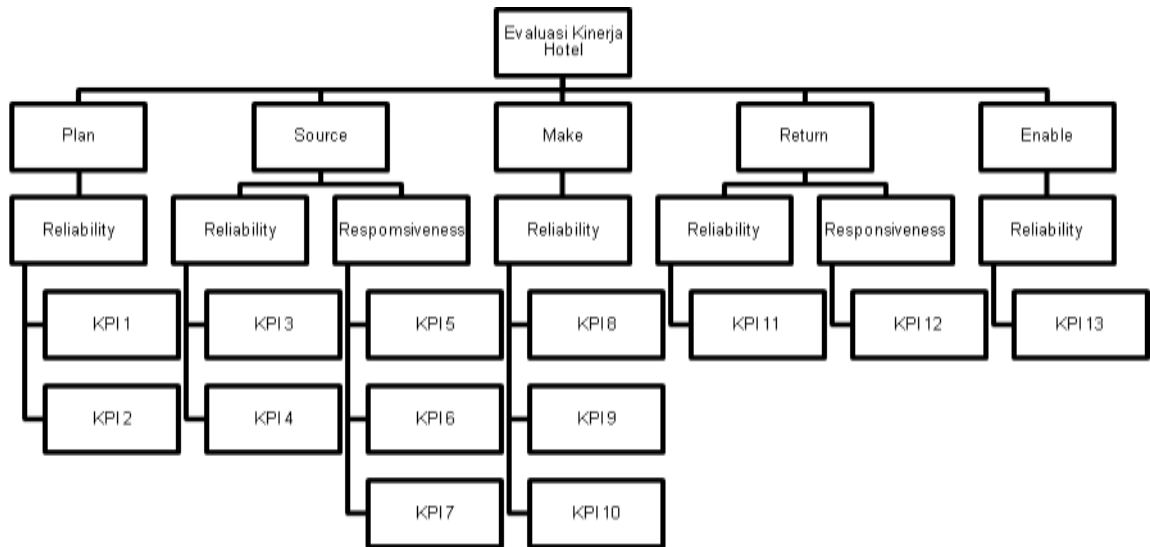


Figure 2. SCOR hierarchy
(Source: Interview results)

Total Supply Chain Performance Value

The first calculation is the calculation carried out at hotel A. The final calculation results for hotel A are in Table 3. The final KPI value calculation is obtained from multiplying the KPI weights with SNORM. Then the final criteria value is obtained by multiplying the criteria weights with the results of adding up the final KPI values in the criteria. The final value of the process is the result of multiplying the weight of the business process by the sum of the final values of the criteria in the business process.

Table 3. Final calculation value for hotel A

Business process	Criteria	KPI	SNORM	Calculation of KPI final value	Calculation of final criteria scores	Calculation of final process value
Plan	Reability	1	0	0.00	11.07	3.02
		2	30	11.07		
Source	Reability	3	98	60.74	56.23	9.91
		4	20	7.60		
	Responsiveness	5	0	0.00		
		6	90	27.78		
Make	Reability	7	70	26.91	82.10	17.46
		8	65	33.24		
		9	100	29.06		
Return	Reability	10	100	19.80	63.33	8.79
		11	95	95.00		

Business process	Criteria	KPI	SNORM	Calculation of KPI final value	Calculation of final criteria scores	Calculation of final process value
	Responsiveness	12	99	99.00	33.00	
Enable	Reability	13	100	100.00	100.00	27.30
Total						66.48

(Source: SPSS data processing)

The second calculation is the calculation carried out at hotel B. The final calculation results for hotel A are in Table 4. The final KPI value calculation is obtained from multiplying the KPI weights with SNORM. Then the final criteria value is obtained by multiplying the criteria weights with the results of adding up the final KPI values in the criteria. The final value of the process is the result of multiplying the weight of the business process by the sum of the final values of the criteria in the business process.

Table 4. Final calculation value for hotel B

Business process	Criteria	KPI	SNORM	Calculation of KPI final value	Calculation of final criteria scores	Calculation of final process value
Plan	Reability	1	0	0.00	36.90	10.06
		2	100	36.90		
Source	Reability	3	60	37.19	58.75	10.80
		4	90	34.22		
		5	100	30.69		
	Responsiveness	6	40	12.35	13.08	
		7	80	30.75		
Make	Reability	8	70	35.80	84.66	18.00
		9	100	29.06		
Return	Reability	10	100	19.80	65.33	8.85
		11	98	98.00		
		12	95	95.00		
Enable	Reability	13	100	100.00	100.00	27.30
Total						75.02

(Source: SPSS data processing)

Based on the results obtained from the calculations in Table 3 and Table 4, it is known that the green score values for hotel A and hotel B are 66.48 and 75.02. This value is included in the Average and Good values in the work indicator monitoring system. This value shows that the company is implementing "green" methods in its business processes well. However, with so many existing competitors, the company can increase the SCOR value to above 90, namely the excellent category. This can be done by improving performance

indicators that are considered poor using a traffic light system, namely if the SNORM value ≤ 60 means the indicator is far below the target, if the SNORM value $60 < \text{indicator value} < 80$ it means the value has almost reached the target (close to the target), if the value SNORM ≥ 80 means the performance indicator has reached the target (Pulansari & Putri, 2019). Performance indicators that have not reached targets can be improved.

In carrying out its business processes, the company uses energy sources originating from PLN. The company is currently considering using other energy sources besides PLN to carry out its business processes, namely using solar energy (PLTS), but due to high capital and high energy requirements and the contribution value of using PLTS is still far from being able, the company cannot use 100% of its sources. the energy comes from PLTS. So the suggestion that can be given is to use several other alternative energy sources, such as using an energy source that comes from stove heat, namely a thermoelectric generator (TEG), because the use of stoves in hotels is quite significant, but TEG requires technological development so that it can be used efficiently.

At hotel A, the water used to carry out its business processes is PDAM water. However, the waste water is recycled by a third party. So the % of water waste recycling indicator is 100%. The suggestion that can be made is that the hotel can use water that comes from recycled rainwater to become the hotel's water source. However, rainwater sources can only meet part of the hotel's needs and cannot be used during the dry season.

To improve environmental preservation, it also comes from suppliers as in indicator number 4. Currently, many hotels use local suppliers to fulfill the raw materials needed in hotels. However, in Bali in particular, there are not many local suppliers who care about ISO or EMS certification, so it is difficult for hotels to find suppliers who already have this certification.

As in indicator number 6, many raw materials do not have more than 1 supplier so that suppliers can be arbitrary towards the company because the supplier feels that the company needs their products. Suggestions that can be made so that the total delivery of raw materials matches the order (indicator number 4) is to look for another supplier so that the company's power is higher than the supplier's power. Apart from that, there needs to be good communication coordination between the company and the supplier to reduce errors in the number of deliveries. If necessary, companies and suppliers can use third parties so as not to affect the relationship between parties. This third party is used to make appropriate agreements or MOUs for both parties which contain agreements regarding delivery waiting times (indicator number 7), product suitability (indicator number 3) and others which if violated can be given a warning or reprimand.

CONCLUSION

Based on the results of the calculations that have been carried out, several conclusions can be drawn, namely: (1) Based on the results of calculations using the GSCOR method, the values for hotels A and B are 66.48 and 75.02. This value is included in the Average and Good values in the work indicator monitoring system. (2) Based on 14 KPIs that have been verified by the company, there are 4 performance indicators at hotel A and 3 performance indicators at hotel B which have a value of less than 60, which is still below the

target, then 2 performance indicators at hotel A and 1 performance indicator at hotel B which has a SNORM value between 60 and 80, which means it has almost reached the target. (3) Recommendations that can be given are the use of PLTS, other water sources, and the need for good communication with suppliers.

Suggestions that can be carried out in further research are to develop the research by adding key performance indicators or by increasing the number of hotels studied or by using other research methods to evaluate the green supply chain in hotels so that the research results can be more informative and can be applied to other hotels.

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