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Performance evaluation and measurement of SMEs king of honey using the green SCOR method

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ABSTRACT

Assessment of the application of the concept of Green Supply Chain Management (GSCM) in each business unit is something that is important to do considering that currently environmental issues are a very urgent matter. Therefore, this study will focus on assessing the GSCM process and measuring performance to determine the value of GSCM performance in King of Honey SMEs. The method used in this research is Green SCOR with 6 management processes, namely plan, source, make, delivery, return, and waste. From the research conducted, the priority level of GSCM indicators and the value of GSCM performance on King of Honey SMEs are generated. The results of this study showed that the total performance value of GSCM King of Honey in September was 86.03, October was 86.45 and November was 86.48.

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1. INTRODUCTION

MSMEs are more business units compared to large-scale industrial businesses and have the advantage of absorbing more labor and being able to accelerate the process of equity as part of development [1]. In addition to getting benefits in the economic field, it also results in huge losses if the process of managing a product in MSMEs does not pay attention to adequate environmental protection. These losses can be caused by environmental damage, thereby increasing knowledge and awareness about the environment, and increasing efforts to reduce environmental pollution [2]. This growing concern has led to the emergence of new concepts such as Green Supply Chain Management (GSCM), green efficiency, and cleaner production [3]. The concept of GSCM is indispensable to create a competitive advantage for organizations in achieving innovative strategies [4]. The application of GSCM can minimize waste production and maximize environmental performance [5].

Several studies have been conducted regarding the application of GSCM to SMEs. In a study conducted by [6], an assessment of the GSCM process was carried out to improve the performance and competitiveness of Batik Bakaran SMEs using the Green Supply Chain Operations Reference (Green SCOR) model [7] and the Analytical Hierarchy Process (AHP) method. Related research was also conducted by [8], researchers assessed the level of GSCM implementation in Pekalongan batik SMEs using the GreenSCOR approach and mapped the results using the Importance Performance Analysis (IPA) approach.

Two previous related studies both assessed the implementation of GSCM in SMEs or batik SMEs. Based on several related studies, it was found that many have conducted research on batik SMEs because they produce several substances from the production process that can affect the environment and there is still a lack of research that raises topics related to SMEs in other fields, one of which is honey. In this study, we will evaluate the implementation of GSCM using the GreenSCOR and AHP models in honey SMEs. MSME honey used in this research is MSME "King of Honey" which is an MSME in Kudus City that sells a product in the form of livestock honey which is processed naturally for health.

The application of Green SCOR to the Green SCM concept can be used to analyze existing supply chains regarding their long-term sustainability and for the development of sustainable supply chain management systems [9]. Whereas AHP is a set procedure to form and analyze complex results, based on arithmetic hierarchies and mindsets [10]. The Green SCOR and AHP methods are methods that have proven effective as solutions to problems related to supply chains and can increase initiatives towards GSCM to increase company competitiveness [11].

2. METHOD

2.1 Study literature

This research begins with a literature study. Literature study is a series of activities related to the methods of collecting library data, reading, and taking notes, as well as processing research materials [12] [13]. The literature study in this research was conducted by reading scientific articles to understand the indicators that influence the successful implementation of Green Supply Chain Management (GSCM) in various industrial sectors.

2.2 Data collection

Data collection in this study was carried out by giving a questionnaire to the MSME King of Honey to measure the performance of GSCM in MSMEs. The questionnaire given is based on the GSCM indicators. Green SCOR is an SCOR framework that provides various performance measures for evaluating supply chains related to the environment [14]. Green SCOR has 5 variables, namely plan, source, make, delivery, and return [15]. While the dimensions of the Green SCOR are reliability, responsiveness, flexibility, cost, and assets [16]. This study uses 6 Green SCOR variables, namely plan, source, make, delivery, return, and waste. By using the 3 dimensions of the Green SCOR, namely reliability, responsiveness, and defective product recyclable.

2.3 Data processing

The data processing in this study uses the Green SCOR and AHP methods which are used to analyze the application of the green supply chain and to see the indicators that have the most influence on the successful implementation of GSCM. The consistency test is the step of multiplying the consistency index with the priority of the relevant criteria and adding up the time results [17]. In the SCOR standardization process, the following calculations are applied:

$$Snorm = \frac{SI - S\min}{S\max - S\min} \times 100 \quad (1)$$

Where:
SI = Actual indicator value that has been achieved
S min = The worst performance value of the performance indicators
S max = The best performance value of the performance indicators

To calculate the final value of green supply chain performance, the formula is used:

$$P_i = \sum_{j=1}^{n} = S_{ij} W_j \quad (2)$$

Where:
Pi = total green supply chain performance variance
N = number of performance goals
Sij = i score green supply chain in performance objective j
Wj = objective performance value

From these calculations, performance indicators will be generated. If the value is <40 then the performance achievement can be categorized as very low (poor), whereas if the value is >90 then the

performance achievement can be categorized as very good. The weighting of key performance indicators aims to determine the importance of Key Performance Indicators (KPI) [17]. The performance indicator monitoring system can be seen in Table 1.

Table 1. Performance indicator monitoring system

Table of Monitoring System Performance Indicators	
Monitoring System	**Performance Indicator**
<40	Poor
40–50	Marginal
51–70	Average
71–90	Good
>90	Excellent

Source: Pulansari & Putri, 2020

Analytical Hierarchy Process (AHP) is a multi-criteria decision-making tool that is used in decision-making and identifies the weight of importance of the decision-making criteria and the relative ranking of the appropriate options [18]. In this study, the AHP weighting is used to determine the importance of the criteria that affect the GSCM. The scale used for weighting in the AHP method consists of 1 to 9.

3. RESULTS AND DISCUSSIONS

The results in this study there are 4 environmentally friendly performance processes used, namely.

3.1 Performance

3.1.1 Procurement Table

From the results of the environmentally friendly procurement process, there are criteria for materials that pass QC higher than other criteria, as shown in Table 2. This shows that King of Honey SMEs are quite selective in choosing materials to be used as products.

Table 2. Procurement process results

Cat	Priority	Rank
QC pass material	42.6%	1
ISO standard chemicals	10.2%	3
Recycle	40.1%	2
Oder via e-mail	7.2%	4

3.1.2 Production Table

From an environmentally friendly production process, it can be interpreted that the criteria for a product free of harmful substances dominate more than other factors. This shows that MSME King of Honey is very concerned about product safety in terms of product content so that it is free from harmful substances [19]. The results of the production process can be seen in Table 3.

Table 3. Results of the production process

Cat	Priority	Rank	(+)	(-)
Quality product	14.7%	1	5.4%	5.4%
Free of harmful substances	65.1%	3	27.3%	27.3%
Faster than target	4.7%	2	2.8%	2.8%
Efficient material	15.6%	4	4.3%	4.3%

3.1.3 Shipping Table

In the delivery process, it shows that MSMEs pay more attention to flexible packaging design than product delivery above the target that has been set. However, it cannot fulfill if the delivery is on a large scale. The results of the delivery process, shown in Table 4.

Table 4. Results of the delivery process

Cat	Priority	Rank
Faster delivery	30.8%	1
Large-scale distribution	9.6%	3
Flexible packaging design	9.6%	2

3.1.4 Return Table

The return process shows that the minimum return criteria have the highest priority value, which is 69.1%. This means that King of Honey SMEs are better able to meet the specifications of buyers' requests and the quality of their products is guaranteed so that buyers are satisfied and ultimately have minimal returns. The results of the return process can be seen in Table 5.

Table 5. Results of the return process

Cat	Priority	Rank	(+)	(-)
Updating products	16.0%	2	1.2%	1.2%
Waste recycling	14.9%	3	1.1%	1.1%
Minimal retail	69.1%	1	5.1%	5.1%

3.2 Performance Indicator

The results of this study contained 13 GSCM performance indicators. These performance indicators can be seen in Table 6.

Table 6. GSCM performance indicators

Variable	Dimension	*Performance Indicator*	Equality
Plan	Reliability	Forecast accuracy	100 - (500-400/500 x 100%) = 99.8%
		Raw material planning accuracy	100-(500-600/500x100%) = 99.8%
Source	Reliability	Delivery quantity accuracy by supplier	100-(1000-1000/1000x100%) = 100%
		Order delivered faultless by supplier	100-(0/1000 x 100%) = 100%
	Responsiveness	Timely delivery performance by supplier	100-(1000-1000 x 100%) = 100%
Make	Reliability	Product defect from production	(10/500) x100% = 2%
		Number of trouble machines	0
Deliver	Defective product recyclable	Delivery quantity accuracy by the company	100-(500-1000/1000x100%) = 99.5% 100-(1000-1000/1000x100%) = 100%
		Order delivered faultless by the company	100-(30/500x100%) =94% 100-(10/1000x100%) =99% 100-(7/1000x100%) =99.3%
Return	Reliability	Return rate from customer	0/500x100% = 100%
		Defective product recyclable	20/500 x 100% = 4% 20/1000 x 100% = 2% 20/1000 x 100% = 2%
Waste	Reliability	Percentage of solid waste recycling	10/13 x 100% = 77%
		Percentage of wastewater recycling	20/25x100% = 80%

The GSCM performance value can be determined by multiplying the final value of the performance indicator from the normalization results of snorm de bour with the AHP weight of each performance indicator.

The multiplication results are added together to find out the total value. The results of the calculation of the GSCM performance value can be seen in Table 7.

Table 7. Calculation results of GSCM performance values

Performance Indicator	Final score			AHP	GSCM Performance Value		
	September	October	November		September	October	November
Forecast accuracy	99.8	99.8	99.8	0.062	6.19	6.19	6.19
Raw material planning accuracy	99.8	99.8	99.8	0.032	3.19	3.19	3.19
Delivery quantity accuracy by supplier	100	100	100	0.063	6.3	6.3	6.3
Order delivered faultless by supplier	100	100	100	0.067	6.7	6.7	6.7
Timely delivery performance by supplier	100	100	100	0.023	2.3	2.3	2.3
Product defect from production	98	98	98	0.089	8.72	8.72	8.72
Number of trouble machines	100	100	100	0.014	1.4	1.4	1.4
Delivery quantity accuracy by the company	99.5	100	100	0.109	10.84	10.9	10.9
Order delivered faultless by the company	94	99	99.3	0.088	8.27	8.71	8.74
Return rate from customer	100	100	100	0.124	12.4	12.4	12.4
Defective product recyclable	4	3	3	0.082	0.33	0.25	0.25
Percentage of solid waste recycling	77	77	77	0.124	9.55	9.55	9.55
Percentage of wastewater recycling	80	80	80	0.123	9.84	9.84	9.84
GSCM Total Performance Value					86.03	86.45	86.48

Based on the calculation results of GSCM performance values in Table 7, the total value of GSCM performance in September was 86.03, October was 86.45 and November was 86.48. This shows that the performance of GSCM on SMEs King Of Honey can be said to be good because it produces a value between

71-90 but it is still not very good, because it has not reached a value of > 90. There are 3 performance indicators that need to be improved, namely Defective product recyclable because the number of products used is still small that can be recycled, then Percentage of solid waste recycling, namely the current packaging in the form of single-use plastic bottles to make it a solid waste, and Percentage of wastewater recycling where liquid waste in the form of propolis is just thrown away.

4. CONCLUSION

GSCM is indispensable to create a competitive advantage for organizations in achieving innovative strategies, to minimize waste production and maximize environmental performance. This study uses the Green SCOR method with 6 categories, namely plan, source, make, delivery, return, and waste. This research was conducted by giving a questionnaire to King of Honey SMEs for the assessment of the GSCM process and performance measurement to determine the GSCM Performance Value. There are 3 performance indicators that need to be improved, namely Defective product recyclable, Percentage of solid waste recycling, Percentage of wastewater recycling. The recommendation for improvement for the MSME King of Honey is to replace the current packaging which is in the form of single-use plastic bottles into glass bottles. This is because glass bottles can be used repeatedly and are safer because unlike plastic bottles, the chemical content will contaminate honey when exposed to heat. In addition, liquid waste in the form of propolis which was previously just thrown away should be used because propolis can be processed into medicine, cosmetics, and soap.

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