

Performance Measurement in Oil and Gas Industry Using Green Score Method (Case Study: PT X)

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Abstract:- The emergence of industries in Indonesia which have been developing for approximately 50 years in Indonesia apart from having a positive impact on the nation and the State, also has a negative impact on environmental problems, especially the problem of industrial waste. Development that aims to prosper the community in the end actually destroys life support systems, in this case the environment. Green supply chain management requires industrial activities to improve the balance between marketing performance and environmental issues which give rise to new issues such as saving energy use and reducing pollution in an effort to improve competitive strategy. Companies feel the need to improve their network or increase their supply chain for waste reduction and operational efficiency, including the delivery of products and services. PT. X is a company engaged in the oil and gas sector with its core business as solar fuel storage. Until now the company still does not have a Green Supply Chain Management performance measurement system which is the dominant operational activity for the company so that the company does not know which activities in its supply chain need to be improved to improve the company's GSCM performance. The results of this study identified 25 performance indicators from 5 appropriate processes used in measuring the performance of GSCM PT. X. Overall the company's GSCM performance earned a score of 81.23 which is in the "good" category, but there are three indicators that have a poor performance value and then formulation of improvements is carried out which results in priority corrective actions through asset management training that considers environmental aspects as a form of improved management supply chain and corporate environment as a whole and sustainably.

Keywords:- Oil and Gas, Performance Measurement, GSCM, Green Score.

I. INTRODUCTION

The emergence of industries in Indonesia that have been developing for approximately 50 years in Indonesia apart from having a positive impact on the nation and the State, also has a negative impact on environmental problems, especially the problem of industrial waste. In addition, the use of natural resources is not efficient so that the condition

of natural resources is increasingly limited, especially non-renewable natural resources [6].

Development that aims to prosper the community in the end actually destroys life support systems, in this case the environment. Development must continue without forgetting environmental management. In general, sustainable development relies on the economy, the environment, and socio-culture [10]. Economic development which is solely aimed at obtaining profits without regard to the sustainability of nature and the environment will have a negative impact not only on nature but also on society. Therefore, economic growth alone is not enough, development that is environmentally sound or friendly is needed [2].

Green supply chain management requires industrial activities to improve the balance between marketing performance and environmental issues which give rise to new issues such as saving energy use and reducing pollution in an effort to improve competitive strategy [2]. Companies feel the need to improve their network or increase their supply chain for waste reduction and operational efficiency, including the delivery of products and services. Based on this, the purpose of the green supply chain is to consider the environmental effects of all products and processes, including environmental influences originating from goods/products and processes ranging from raw materials to finished products, and the final disposal of these products.

PT. X is a company engaged in the Solar fuel storage business located in East Kutai Regency, East Kalimantan Province. The stored fuel capacity is 75 million liters, using three tanks with a capacity of 25 million liters each. One of the company's vision and mission is to pay more attention to environmental aspects where the company has made efforts to protect the environment by managing environmental management systems, community development and CSR. However, currently PT. X still does not have a performance measurement system so that it cannot know which performance parts of the green supply chain management need to be improved to create comprehensive and sustainable environmental management improvements in the company's supply chain activities. Therefore, this research will be conducted to be able to provide information to companies regarding the current performance conditions of environmentally friendly supply chain management (Green Supply Chain Management) through the GSCM performance

measurement system which is then used as a basis for recommending improvements to GSCM performance as a form of improving operations and environmental management. Company as a whole and sustainably [3].

II. MATERIAL AND METHOD

The concept of GreenSCOR is very simple. The goal is to create an analytical tool that provides a clear view of the relationship between supply chain functions and environmental issues. Thus being able to improve organizational management of both [7].

SCOR is used as the basis for developing the GreenSCOR model. The principle of GreenSCOR is to integrate the SCOR model with environmental concepts [1]. GreenSCOR development occurs in four basic steps, namely:

- Collecting data from green supply chain management’s company through a document study on each performance indicator activity [5].
- Carrying out the normalization process for its performance indicator that has been assessed using this formula :

$$S_{norm} (skor) = \frac{(Si - Smin)}{(Smax - Smin)} \times 100$$

Explanation :

- Si = Actual Indicator achieved
- Smin = Worse performance achievement
- Smax = Best performance achievement

- Calculate GSCM performance

GSCM Performance measurement can be calculate by following this formula:

$$P_i = \sum_{j=1}^n S_{ij}W_j$$

With the analysis of the results as follows [9]

Table 1 Performance Indicator Monitoring System

Monitoring System	Performance Indicator
< 40	Poor
40 – 50	Marginal
50 – 70	Average
70 – 90	Good
> 90	Excellent

- Conduct descriptive analysis of the achievement of internal company targets as well as comparisons (benchmarking) with similar regulatory standards for each performance indicator in the green SCOR performance measurement system.

The following are the main benefits of the GreenSCOR model [4]:

- Enhancing environmental management performance
- Supply chain management performance improvement.
- Increasing initiatives regarding green supply chain

III. RESULT AND DISCUSSION

Based on its type, this research is a descriptive research that uses a quantitative approach. This research was conducted using a survey method using structured questionnaires and guided free interviews. Interviews were conducted with 5 expert employees of PT X who had structural positions preceded by a survey method using a questionnaire to find out the performance scores and weights of each performance indicator.

A. Variable Indicator

Table 2. Variable Indicators based on GreenSCOR Best Practices

Variable Construct	Matrix	Variable Indicator
Plan	Responsiveness	Availability of a mission statement on the sustainability aspect (P1)
	Flexibility	Availability of an internal environmental reward system (P2)
	Responsiveness	Availability of environmental audit system (P3)
	Reliability	Availability of environmental evaluation scheme (P4)
	Reliability	Availability of Standard Operating Procedures (SOP) for collection of facilities at the end of their useful life (P5)
	Asset	Availability of process optimization for waste reduction (P6)
	Reliability	Availability of waste management scheme (P7)
Source	Responsiveness	Supplier precentation which have Enviromental Management System or ISO 14001 (S1)
	Responsiveness	Percentage of suppliers that meet the percentage of suppliers that meet agreed environmental criteria (S2)
	Reliability	Percentage of the amount of hazardous materials in inventory of the total amount of material in inventory (S3)
Make	Responsiveness	Remedial Rate of habitat damage due to company operations (M1)
	Reliability	Leakage rate in the production pipeline (M2)
	Reliability	The level of waste generated during production (M3)
	Reliability	The level of hazardous materials produced (M4)
	Responsiveness	Number of violations of environmental regulations (M5)

	Responsiveness	The level of exhaust emissions in the production process (M6)
	Asset	Total energy consumption (M7)
	Asset	Total water consumption (M8)
Deliver	Reliability	Soil Pollution Level due to oil spills (D1)
	Reliability	Water pollution level due to oil spills (D2)
	Asset	Vehicle emission levels for transport and material handling (D3)
Return	Asset	Amount of non-product output returned to the process by recycling, refurbishing or reusing (R1)
	Asset	The total percentage of waste that can be recycled back from the total existing waste (R2)
	Reliability	The rate of return of material inventory to suppliers (R3)
	Reliability	Percentage of hazardous waste stored of the total generated (R4)

B. Weighting Using AHP

Based on the results of the questionnaire that was given to expert respondents at PT X, the importance level weighted for each GSCM process and performance indicator was obtained. The weighting process carried out consists of two levels, first level which is the weighting carried out for six

GreenSCOR perspectives, namely plan, source, make, deliver, return, and enable. Second level, weighting is carried out for each variable indicator in each perspective locally [8]. Based on the results of the performance appraisal questionnaire that has been normalized using the Snorm De Boer normalization formula of 25 variable indicators.

Table 3. Final Score

Performance Indicator Code	Normalization Value	Indicator Weight	Indicator Score	Process value	Process weight	Process Score	Performance GSCM Value
P1	100	0.176	17.60				
P2	100	0.038	3.80				
P3	100	0.126	12.60				
P4	100	0.122	12.20	81.00	0.562	45.52	
P5	0	0.19	0.00				
P6	100	0.176	17.60				
P7	100	0.172	17.20				
S1	31.25	0.439	13.72				
S2	84.38	0.392	33.08	67.27	0.158	10.628	
S3	100	0.168	16.80				
M1	83.68	0.24	20.08				81.23
M2	100	0.19	19.00				
M3	80	0.128	10.24				
M4	99,84	0.12	11.98	85.79	0.136	11.67	
M5	100	0.144	14.40				
M6	71	0.085	6.04				
M7	22.83	0.054	1.23				
M8	76.13	0.037	2.82				
D1	90	0.39	35.10				
D2	90.67	0.514	46.60	89.85	0.068	6.11	
D3	85.71	0.095	8.14				
R1	88.89	0.33	29.33				
R2	97,62	0.352	34.36	95.40	0.076	7.25	
R3	100	0.067	6.70				
R4	100	0.25	25.00				

C. Analyze

From the final results of measuring the performance value of PT X, in accordance with the definition of the value category from the performance indicator monitoring system table according in table 1, it can be concluded that the overall GSCM performance at PT X is included in the "Good" or "" category. Good" with performance details in the process of planning, sourcing, delivering, making in the "Good"

category and the return process in the "Excellent" category, but in the performance of each indicator there are 3 performance indicators, namely the availability of Standard Operating Procedures (SOP) for collecting facilities at the end of period of use (P5), percentage of suppliers holding environmental management system certification or ISO14001 (S1) and total energy consumption (M7), which fall into the "Poor" category.

The performance indicator for collecting facilities at the end of the use period (P5) gets a value of 0 which is included in the "poor" category. This is because even though PT X has referred to Work Procedure Guidelines (PTK) 007 First Revision of the Third Book concerning guidelines for managing contractor assets in cooperation contracts which contain that all assets that have been used for company operations must be reclaimed because they are state assets and to prevent environmental pollution by contaminated assets, however, the company does not yet have more detailed internal regulations in the form of a written Standard Operating Procedure (SOP) used to collect facilities after the end of their useful life. The company only receives equipment facilities after they are used without monitoring whether the amount and use in the field are in accordance with what was previously planned.

Currently PT X has 64 registered suppliers of goods and services to support operational activities and only 20 suppliers have ISO 14401 certification according to the national database of ISO 14001 certification from the Ministry of Environment. This condition gives a performance value to this indicator of 31 which is included in the "poor" category. PT X's difficulty in increasing the number of suppliers certified for environmental management is that there is no obligation for suppliers to own and attach them to tender documents. This is because most JOB P-PEJ suppliers are local goods and services providers who pay little attention to environmental management system certification, but companies have an obligation to prioritize local goods and services entrepreneurs as one of the actions to comply with regulations regarding Domestic Content Level (TKDN).

The reason this performance indicator has a "poor" value in GSCM performance is that the role of energy is very vital in carrying out production operations and if energy needs are not met it can result in sizable losses due to the company's production operations not running, therefore total energy consumption is adjusted to activity needs operations, besides that energy consumption does not have a direct impact on environmental damage to the company because most of the energy used comes from the plant built by PT X by utilizing raw gas that was previously burned into the air. In order to fulfill its commitment, PT X as an oil industry player who realizes that the upstream oil and gas sector, as a producer and user of energy on a large scale, should make energy conservation efforts with the aim of sustaining environmental quality and utilization of natural resources.

D. Improvement

➤ *There is no Standard Operating Procedure (SOP) for collection of facilities at the end of their use period*

For that finding, Environmental HRD, Material and Logistic department give the improvement design and provide an asset management training with a focus on environmental aspects. This training can be used as a basis for improving the company's human resources before carrying out the preparation of SOPs for collecting end-of-use facilities so that the actions taken by the company can be understood by the employees involved and the repairs run

more effectively. The written SOP considers each supervisor structurally as responsible and functional for administrative, technical, financial and HSE aspects in accordance with work targets, time, authority and responsibilities based on applicable regulations starting from the planning, implementation to physical completion. Supervision should be carried out routinely as well as specifically on the management of equipment facilities which are assets from the planning stage (pre audit), the implementation stage to the completion stage (current audit), the post completion stage which includes the stage of returning the remaining and finished equipment facilities. used. This is done to increase operating efficiency and minimize the impact of environmental pollution caused by equipment facilities contaminated with hazardous materials.

➤ *The percentage of environmentally friendly suppliers certified to ISO 14001 is still small.*

For that finding, the improvement is designing and providing outreach to local suppliers who are already registered but do not yet have environmental management certification regarding the benefits of ISO 14001 certification for cooperation between suppliers and companies as an effort to increase supplier awareness before companies make environmental management system certification a requirement for supplier tenders.

➤ *The company's energy consumption is still large and inefficient*

The improvement is the act of conducting an energy audit can be carried out by a third party or internal company which is expected to reduce losses due to inefficient use. The audit process can be in the form of inspections, surveys and energy flow analysis for energy conservation in buildings, processes or systems to reduce the amount of energy input into the system without causing a negative impact on productivity. So if after an energy audit is carried out, the company can find out how much energy consumption is used, and can find out if there are opportunities that we can save in energy use as findings, then these findings must be handled in a section related to HSE supervision. Prior to implementing energy management and obtaining ISO 50001 certification, the company must set up an Energy Team, determine the structure and membership based on the size and complexity of the organization, representatives from other related parts of production, finance, engineering, operations, senior management, purchasing, PPIC, cross-cultural cooperation. functional to achieve the same goal, namely energy efficiency.

IV. CONCLUSION

- The GSCM performance measurement system is in accordance with the business processes of PT. X consists of 25 performance indicators. Each process has an importance weight sequentially from the largest, namely, the planning process (Planning/P), the procurement process (Source/S), the production process (Make/M), the distribution process (Deliver/D) and the final process of return (Return/ R).

- From the measurement of GSCM performance values based on each performance indicator and process, the overall GSCM performance at PT X is included in the "Good" category, while the performance details in the planning, sourcing, deliver, make processes are included in the "Good" category and return process with the performance category "Excellent but in the performance of each indicator there are 3 performance indicators, namely the availability of Standard Operating Procedures (SOP) for collection of facilities at the end of their use period (P5), Percentage of suppliers who have environmental management system certification or ISO14001 (S1) and Total energy consumption (M7), which is included in the "Poor" category will then be used as the basis for formulating the direction of improving GSCM performance at PT X.
- The three indicators from the GSCM process of PT X which have a "Poor" category performance are used as stakeholder requirements which are the basis for formulating improvement directions.

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