

Conference Paper

The Effectiveness of the Environmental Management System (EMS) Implementation in Green Supply Chain: A Case Study

Sarbani Daud, Nurfaizah Yusof, and Mazita Mokhtar

Faculty of Industrial Management, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Gambang, Pahang, Malaysia

Abstract

Environmental awareness rapidly increased worldwide these recent decades. Likewise, individuals but also business organizations have begun practicing "Green" initiatives in their organization's operations to reduce environmental impact. The implementation of the Environmental Management System (EMS) in the Green Supply Chain (GSC) is an approach to adopt the green initiatives in the business operations that beneficial to the organization, not just regarding the environmental benefits, but economic and social as well. In an example where EMS improves the environmental performance of the organization, previous research suggests that improvements not only occur within the limits of the organizational operation but also need to be extended throughout the supply chain. The effectiveness of EMS implementation in the green supply chain boosts the environmental performance of the organization. Ultimately, EMS and GSCM practices are complementary to each other. Organizations that implemented EMS have more signs of improving the environment not only at the boundaries of their organizations but also across their network of buyers and suppliers. This research explains the debate by empirically assessing the relationship between EMS and GSCM practices.

Keywords: Environmental Management System, Green Supply Chain Management, Sustainability, Environmental Performance, Continuous Improvement.

1. Introduction

In this era of globalization, environmental awareness has been increased since it is becoming an important global issue not only in daily activities but also in any organization's operations of the supply chain. The public nowadays becomes more sensible with the environmental issues and global warming that are resulting the consumers questioning about the sustainability of the product they are purchasing and how green the product is. Implementing environmentally friendly practices in the supply chain's operations is becoming more essentials to drive success in the company. The "Green" initiatives are implemented in the organizations by merging the environment thinking

Corresponding Author:

Sarbani Daud
sarbani@ump.edu.my

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into supply chain management that covers the dimensions of environmental and economics (design of the products or services, resources, and selection, manufacturing process, logistics, and transportation) (Green Jr, Zelbst, Meacham, & Bhadauria, 2012)

The implementation of Environmental Management System (EMS) is no longer a new subject since it is a requirement for organizations to comply with applicable laws, and other environmentally oriented regulations and policies, and also constraints from an organized group that made organizations shifting in adopting the Environmental Management System (EMS) in their Green Supply Chain Management (GSCM). EMS addresses the process standard on how overall business activities, including products and services, will affect the environment. ISO 14000 are guidelines to achieve good EMS and minimize the negatives impacts of the organization operations on the environment that covered two areas of the series standard, which are organization evaluation standard and product evaluation standard. The integration of EMS elements and Green Supply Chain Management (GSCM) in business strategy organization is to balance the social and economic factors in orders to reduce the environmental impacts(Hui, Chan, & Pun, 2001).

The Green strategy was introduced to improve the businesses world reputation. The expertise as a pillar, quality of the product, and customer services are not sufficient anymore. Organizations are moderating the profit and playing their role in spreading environmental awareness in recent decades. In other words, organizations are expressing through actions that not only being environmentally friendly is required, but also to preserve the environment is predominant. These practices would give benefits to organizations and firms develop environmental management strategies in response to the changes in environmental requirements and their impacts on supply chain operations.(Cooper & Ellram, 1993)

1.1. Problem Statement

The integration of Environmental Management System (EMS) and Green Supply Chain Management (GSCM) has been implemented commonly in any large organizations today especially when their company's operations relate to the environment to reduce the environmental effect. However, some research was conducted, and the result showed that not all the environmental management systems helped the organization to improve the environment and their business performance. The implementation of EMS becoming less effective in some organizations due to external and internal factors such as (industrial associations, types of equipment for environmental monitoring, training,

and education competition, and top management support). These organizations also still have a limited basic understanding of how important the EMS in their green supply chain and not fully practicing it in their operations (Famiyeh, Kuttu, & Anarfo, 2014). Therefore, a study is needed to clarify whether applying the EMS in the green supply chain can reduce the environmental impact and driven to the success of green initiatives. This would lead the study to discuss how effective the implementation of the Environmental Management System (EMS) in Green Supply Chain

1.2. Objective

The objectives of this case study are to compare the Environmental Management System (EMS) with Green Supply Chain Management (GSCM) and to establish their relationship in an organization's operations. Another objective is to measure the effect of the Environmental Management System (EMS) in Green Supply Chain Management (GSCM).

1.3. Scope of the Study

The focus of this study is on the Environmental Management System (EMS) in the Green Supply Chain of one selected well-known chemicals company in Malaysia. A case study will be conducted in BASF PETRONAS Chemicals Gebeng Site, based in Kuantan, Pahang. The performance of the EMS in their green supply chain operations will be measured based on their effectiveness of the implementation towards the 'environmental effect. This study can improve the company's performances and proliferate the awareness about the green initiatives in the organization operations. The information gained from this case study can help better understanding of other company as well about the importance of EMS in the green supply chain.

2. Literature Review

2.1. ISO 14000 Environmental Management System (EMS) as a Management Tool for Continuous Improvement.

The Environmental Management System (EMS) is one of the quality management tools that consist of a few elements, such as environmental policy, plans, implementations corrective actions, management review, and continuous improvement. These elements are interrelated to each other to achieve the goals of EMS to reduce the environmental

impacts of the organization’s operations towards our environments. The ISO 14000 were established in 1996 for the development of an effective EMS by International Standards Organizations as a guideline to improve the environment (Tung, Baird, & Schoch, 2014).

EMS ISO 14000 implementation follows the standard of conventional improvement cycle called Plan-Do-Check-Act cycle. The Plan-Do-Check-Act cycle model (PDCA) was introduced by W. Edwards Deming in 1939 for learning and improvement and referred to as a “process approach” or the continuous improvement process (Moen, 2009).

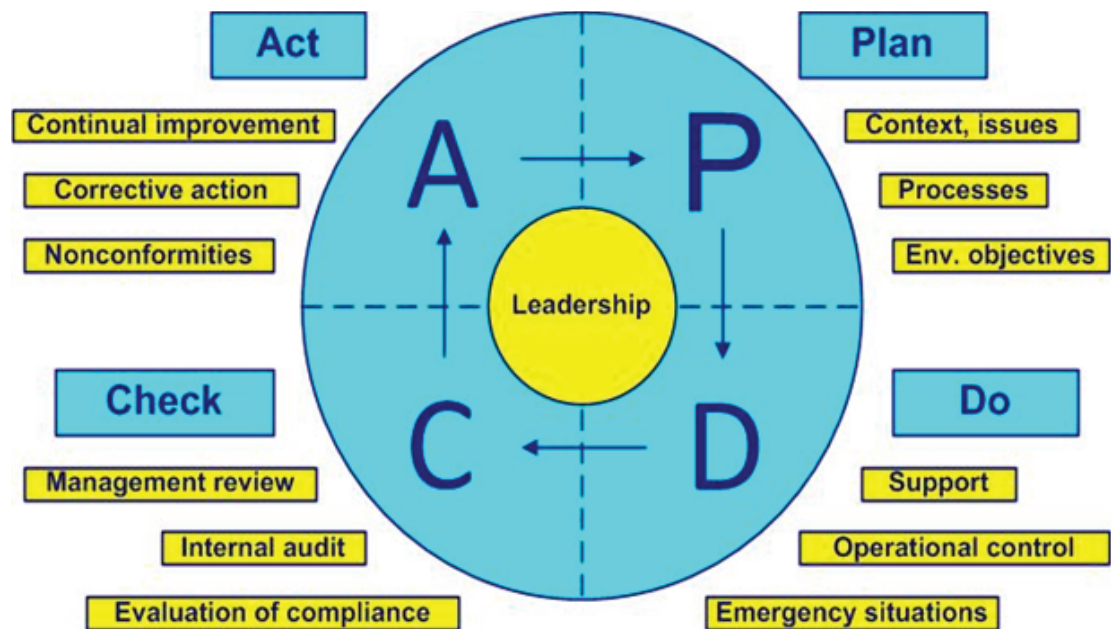


Figure 1: The PDCA Cycle according to ISO 140001: 2015.

Source:

Plan: Organizations are required to identify the objectives and determine their EMS scope. Organization’s goals and the process should be aligned with the environmental policy that had been set to achieve the environmental targets. The ISO 140001 environmental policy showed the management commitment, leadership, and direction for the ecological activities (Clause 4.1 – 7.5).

Do: The processes of EMS are implemented and to ensure the negatives impact towards the environment can be controlled, operational control is needed and executed as a starting point (Clause 8 – 8.2).

Check: The performance evaluations method takes place which monitor, measure, analysis, and evaluate the performance of the organization comply with the environmental policy. The performances are checked and recorded by an EMS audit to ensure that the EMS conforms to plans is being properly implemented and maintained. Audit should cover the scope, frequency, methodologies, responsibilities, requirement, and reporting

results. The management reviews are included in the final part of the evaluation to ensure the continuing suitability, adequacy, and effectiveness of EMS, and it is really important for the continuous improvement of the organizations (Clause 9 – 9.3).

Act: Non-conformance, corrective, and preventive actions take place in this final part. Improvements are made regarding the performance evaluation's results. This PDCA cycle of improvement showed that on the Act stage, the plans could be modified and the cycle can start from the beginning again (Clause 10.2).

The PDCA cycle methods can help an organization to improve the overall process and increase the effectiveness of EMS implementation in its operation. This beneficial method protecting the environment and reduce the environmental impacts (Eng Ann, Zailani, & Abd Wahid, 2006)

2.2. Green Supply Chain in Supply Chain Management.

The concept of supply chain management was introduced in 1980 by R.K Oliver and M.D Weber from the logistics field. The supply chain concept includes the logistic and operation management where defined as the flow of process production from raw material to the end products or services and delivered to the end customers. The natural resources are extracting and exploiting in this process. Supply chain's environment burden will be influenced by the extracting the resource, to manufacture, using and reusing, recycling and disposing of in the stage of product's life cycle (Zhu & Sarkis, 2004)

Environmental sustainability is the ability to keep maintains natural resources and protects them for the next generations. The supply chain's process in an organization's operations gives impact to the sustainability of the environment where extremely exploitations towards natural resources threatening the environment and jeopardizing the eco-system. The environmental thinking was applied in the supply chain management and the whole process operations for sustainable development. Integrating the Green Supply Chain in the organization's operation generate the "Green" initiatives that not only strengthen the economy that bring the profit to the organizations but also maintaining the sustainability of natural resources and reducing the risks to the environment(Hervani, Helms, & Sarkis, 2005)

In general, Green Supply Chain management defined as the integration of environmental thinking in supply chain management from the beginning of production's process to the final product and delivery to the end customers(Srivastava, 2007). Green Supply itself refers to "how innovations in supply chain management and industrial purchasing

may be considered in the context of the environment”(Quarshie, Salmi, & Leuschner, 2016).GSCM plays a huge role past recent decades because of the acceleration of environmental degradation, increase in pollution, excessive pressure from consumers and deescalating raw material; accumulate more waste, environmental standards and the legal regulations (Negi & Anand, 2015).

2.2.1. The Best Practices in the Green Supply Chain Integrative review

The successfully implemented the green supply chain practices can help organizations gain a competitive advantage and increase sustainability development. Hence, several best practices in green supply chain implementation were identified.

First of all, the business goal must be aligned with the Green Supply Chain System. It is impossible to achieve the goals of green initiative if the business goals are separated with the green supply chain. These both should be parallel to each other to make it successful. Business goals should not only merely for profit yet have to identify the role of the environment of their business's operation. The company has to create the strategic value of the environment that not against the concept of the green supply chain(Chen, Shih, Shyur, & Wu, 2012).

Secondly, the supply chain must be evaluated as a single life cycle system. This is mainly because the supply chain is a group of operational processes that relate to one another to create one chain or a system, from raw material to the end product and delivered to the consumer. The system consisted of the output of one operation and was using as the input for another operation(Blass & Corbett, 2018). This whole business operation process involves high costs. The operation process should minimize the wrong input and output and maximize the good of outputs. The company needs to recognize the end-to-end impact of the green supply chain to grab the competitive advantage and able to reduce the costs of the business operation process.

Thirdly, the continuous improvement of green supply chain analysis should be aimed at waste material and energy, as well as underutilized resources. Green supply chain analysis giving room to overlook processes, materials, and operational elements. It is important for the company to examine its supply chain operation process where the green initiative should apply to enhance their business. The green process improvement approach started with identifying the waste streamline in each of the operations processes. The analysis also involved measured or identified the opportunity cost of the

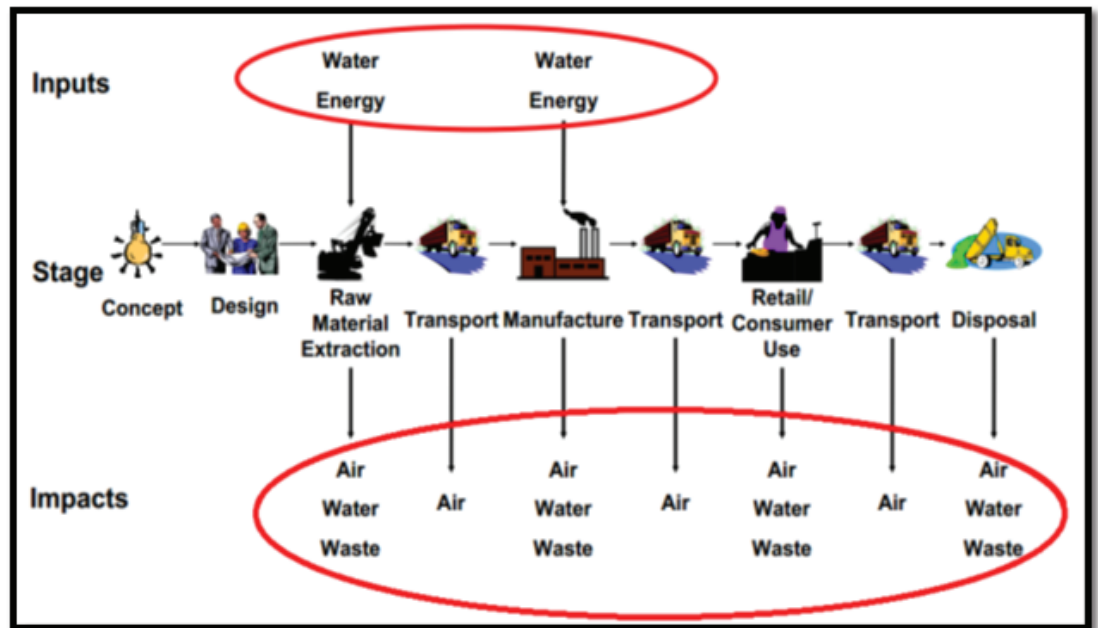


Figure 2: Environmental Life Cycle (Source: Negi (Negi & Anand, 2014)).

waste. The company may create innovation or do treatment to reduce waste and pollution. This strategy brings effectiveness and efficiency in managing the environmental effect (Song & Gao, 2018).

Another practice that should be implemented is waste reduction. 3R (Reuse, Recycle, Reduce) program is widely used all over the world for decades. This waste prevention programs helped the company to manage their waste and optimize the usage of resources. The company should examine how the material should be used, how products being purchased and how the business is running. Focusing on waste prevention programs propelled higher value improvements in every phase of the business operations process. Prevention and management are essential in minimizing the waste which helps the business to reduce the cost and associated societal and environmental harms of recycling, municipal composting, landfilling, and incineration (ten Hoeve, Bruun, Jensen, Christensen, & Scheutz, 2019).

2.2.2. Green Supply Chain Management Performance Measurement System

A company needs to evaluate its performance to measure the effectiveness of the management system are used in the company's operation. According to (Harrington, 1991), "Measurement is the first step that leads to control and eventually to improvement.

If you cannot measure something, you cannot understand it, you cannot control it. If you cannot control it, you cannot improve it.”

It is acknowledged that how supply chain management is essential to propel the competitiveness of the company and the measurement of the performance helped the company to enhance their effectiveness and efficiency (Kafa, Hani, & El Mhamedi, 2013). These recent years, the researchers discovered that the importance of studying performance measurement has inflated. The omission of this important element in supply chain management caused a lack of effectiveness in the management system (Hervani et al., 2005). The incomprehension of deciding on the number of metrics to be used and the deficiency of the technique that coherence between financial and non-financial performance measures are the reasons for this supply chain performance measurement requirement (Gunasekaran, Patel, & McGaughey, 2004).

The internal and external process in the green supply chain management should be evaluated, which any factors would affect the entire supply chain should be considered as well (Olugu, Wong, & Shaharoun, 2011). The previous studies explained the performance measurement system in different approaches. Many researchers identified GSCM as the power to improve competitiveness and to comply with the environmental regulations (Hervani et al., 2005). Performance measurement has the benefit of maintaining the GSCM process and determining the windows of opportunity for enhancement in the system. To ensure the effectiveness of the GSCM, the evaluation of the entire performance of the whole supply chain should be taken into account (Olugu et al., 2011).

The presence of ways to measure the sustainability performance in the supply chain falls in four groups: “(i) the use of the Global Reporting Initiative (GRI 2007); (ii) the use of the International Organization for Standardization (ISO) like ISO 14031 (ISO 2004);(iii) the use of performance measurement system like Green SCOR (SCC 2008), and Sustainability Balanced Scorecard (SBSC); (iv) The use of others approach such as decision-making tool.” There is no specific literature founded regarding the standards of measurement of the total impact of green supply chain management. However, despite that, regarding (Qinghua Zhu, 2007) highlighted more studies for the relationship between GSCM concepts and measurement performance of the system. The GSCM practices bring impact on the sustainability performance from three different perspectives of SD: “Economic, Environmental and Social.”(Kafa et al., 2013). Few things rest in isolation from historical precedent. Historical literature reviews focus on examining research throughout a period, often starting with the first time an issue, concept, theory, phenomena emerged in the literature, then tracing its evolution within the scholarship of a discipline. The purpose is to place research in a historical context to

show familiarity with state-of-the-art developments and to identify the likely directions for future research.

2.3. Integration ISO 14000 Environmental Management System (EMS) and Green Supply Chain

More than 88,800 organizations globally already adopt their Environmental Management System (EMS) to ISO 14000 in the year 2005 (Kamal & Fernando, 2015). Some of the organization implemented the EMS to win the competitive advantage, to improve their environmentally sustainable as well as to improve their environmental performance. The pressure from consumer and regulations from the government that organizations have to comply with also become the reasons why they implemented this ISO 14000 as guidelines to reduce the impacts on the natural environment.

The operational competencies required to engage with EMS might also support the organization's efforts to minimize the environmental impact along its supply chain. Organizations that practice EMS directly adapt the green initiatives within their organizational supply chain operations. Therefore, EMS carriers may rely more on knowledge-based capabilities that match them to work with their supplier and client networks to reduce the environmental impact of the entire world. On the other hand, organizations that choose to use EMS can withstand institutional pressure as an organization that practices the green supply chain management (GSCM), so they use environmental management practices at the same time (Darnall, Jolley, & Handfield, 2008).

The green supply chain management (GSCM) practices and environmental management system are complements to each other. These relationship influential implications for the environmental sustainability of the organization as both of them provide a more encyclopedia way of explaining and developing the sustainability amidst business networking organizations. On the flip side, the EMS implementation without the GSCM would be less useful to reduce the environmental impact because it would be impossible to achieve the environmental goals and the sustainability of environment without integrating with the GSCM practices (Malviya & Kant, 2015). The entire supply chain, including supplier and buyers, should have that responsibility to comply with the EMS and the GSCM practices to make integration of both management systems more effective and efficient.

There are few resemblances between the implementation of the environmental management system and the green supply chain management that make these two system management completing each other. The commitments of the organization are

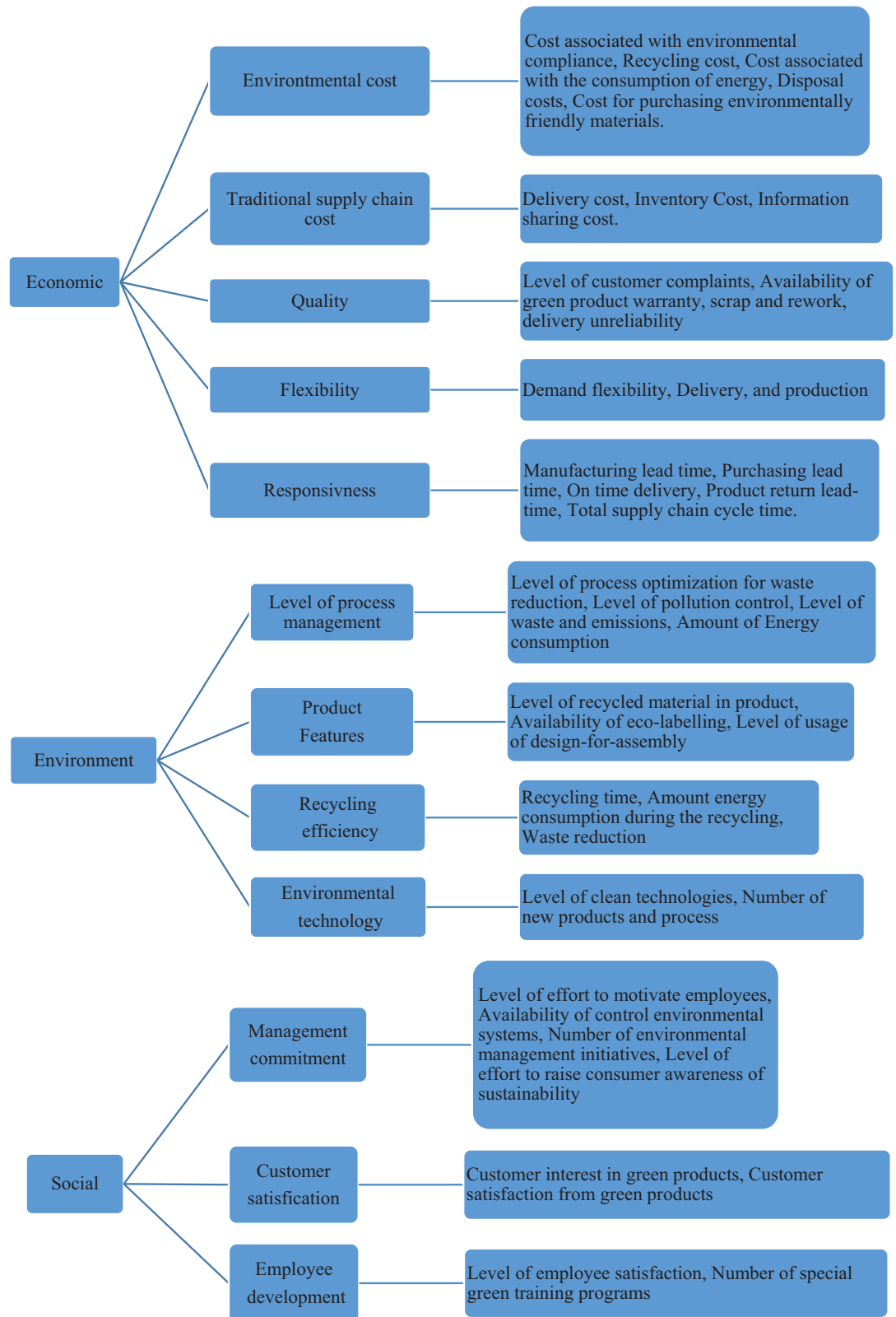


Figure 3: The Sustainability Performance Measures for Green Supply Chain Management (Source: Kafa (Kafa, Hani, & El Mhamedi, 2018)).

essential to attain successfully the implementation. Stakeholders should work together,

participating, and sharing their knowledge of the organization's internal operations to reduce environmental impacts. It is also important to commit the organization to continuously improve environmental performance and comprehensive understanding and monitoring resources, constraints, production capabilities, and organizational processes. Apart from that, the successful adoptions need strong inventory control system. The system reduces excess stocks, and no input is needed in the production process. The company that depends on this system manages material, productive capabilities, and other information. The integration of EMS and GSCM practices motivate organizations to minimize the usage of input and reduce associated with input options (Darnall et al., 2008).

Both EMS and GSCM practices share the same continuous improvement model, EMS is a process management system that allows organizations to further reduce their impact on the environment. Likewise, GSCM adopts a continuous improvement process that decreases the supplier's input effect on the organization's end product. These two practices need an organization to think "holistically" about the environmental impacts of their organizations' operations. Implementation of EMS and GSCM strategically designs for the long term and develops the ability to evaluate their performance to achieve the goals. Organizations have also developed a culture that includes an internal assessment that helps drive the organization towards achieving better efficiency - in and around the operating unit which is essential for continuous improvement of environmental performance. It is essential to have good association across business units. For example, in adopting green supply chain practices, the organization must assert its product design unit with its marketing department and its suppliers to reduce waste at each point in the supply chain (Darnall et al., 2008).

One way the organization manages this relationship is to create a "product design team" that includes authorized from both internal units and suppliers, to talk through about environmental concerns throughout the process of product design. These teams constantly depend on life cycle analysis to guarantee the less impact of extracting raw materials into final disposal. The organization that complies with EMS can leverage their investments to train its employees to adopt GSCM. The improvement of environmental performance requires training for the employees to make them understand and practicing GSCM effectively and efficiently. By encouraging employees to work in teams and continuously improve their organization's environmental performance, the company can use pollution prevention skills and environmental knowledge on GSCM practices. Thus, EMS offers management structures to assist supply chain management decisions that affect the environment (Al-Sheyadi, Muyldermans, & Kauppi, 2019).

The organization needs to comprehend the integration of EMS and GSCM practices since there are pressures from the internal and external stakeholder to manage their environmental performance. The implementation of both EMS and GSCM practices can be one approach for organizations to show stakeholders that their environmental management practices are strong (Al-Sheyadi et al., 2019).

2.4. The Case Company

BASF PETRONAS Chemicals Sdn. Bhd is a huge chemical company integrated oils and gas that was established in 1997. This company is the collaboration between BASF SE Aktiengesellschaft of Germany and Petroliam Nasional Berhad (PETRONAS), Malaysia's National Oil Company located in Gebeng, Kuantan, Malaysia. They produce highly reactive polyisobutene (HR-PIB), which are essential for high-performance fuel and lubricants additives in market chemical products.

This plant is the first in South East Asia, produced about 50, 000 metric tons total annual capacity of HR-PIB with total areas 150 hectares Integrated Chemical Site including the port tank farm in the Kuantan Port. The BASF PETRONAS now has more than 12 plants, including Toray-BASF PBT Resins that integrated the Aroma Ingredients Complex (Citronellol and L-Methanol) (BASF PETRONAS chemicals, 2016). They are the largest integrated chemical site that is producing the raw materials for manufacturing industries such as adhesives, coatings, and other products that required chemical compositions (acrylics acid/esters, oxo-alcohols, syngas, plasticizers, and butanediols). The company also exported 80% of the products to the Asia Pacific region.

BASF PETRONAS has been received the ISO14001:2015 for its Occupational Safety & Health Management System and the ISO9001:2015 certification for its Quality Management System. In 2016, Kosher also certified their adherence to comply with the standards and received the Halal Certification for the Aroma Ingredients Complex plants(PETRONAS, 2017).

3. Methodology

This study used the qualitative research approach to collect information about the effectiveness of EMS implementation in Green Supply Chain. Data that are collected from this study are subjective. The interview technique was carried out on the focal person from the quality management department in BASF PETRONAS Chemicals Company. The significance of this technique where clear information could be obtained

since it is direct contact of verbal communication between partners (Langos, 2014). Data collection methods and tools like the research questions and a few additional questions are provided as a guideline to collect the data information accordingly to the scope and objectives of the study. Besides that, data collected in an observational study. Observation method can be used in setting the physical environment, social interactions, physical activities, non-verbal communication, planned and unplanned activities (Tracy, 2019). The study started with the particular observation inside of the chemical's plant of the company to obtain the information on how the company's operations aligned with the EMS 14000 policy and Green Supply Chain management. Then proceeded with the interview session with the person in charge in that company. The entire interview is recorded to keep the data information and as a proof to the authenticity of the information from the company.

4. Discussion

Organizations should be concerned about the environmental impacts of their business operation for the entire supply chain. The "Green" initiatives that applied in the supply chain process are important to reduce the effect on the natural environment. The integration of environmental management system (EMS) and green supply chain management (GSCM) in the organization enhanced the environmental performance.

BASF PETRONAS Chemicals Sdn. Bhd. has complied with the EMS ISO 14000 since they first established the joint venture between BASF SE and PETRONAS Malaysia in 1997 and had certified with ISO14001:2015 for their Occupational Safety & Health Management System and the ISO9001:2015 certification for their Quality Management System.

An interview session has been made with the focal person that responsible in the compliance management system, Ms. Asmindar Binti Hanapi, The Senior Executive of Quality Management in BASF PETRONAS Chemicals. She made a clear explanation about their organizations' supply chain operation that aligned with EMS and GSCM practices and given the researcher better understanding of how important the implementation of EMS in the green supply chain in an organization. As they are very committed on environmental awareness, their company has been aligning their company goals with the EMS and GSCM practices such as reducing the greenhouse gas emission by using the energy resources efficiently and control the air emission in their business operations.

Their EMS can be dissected from two viewpoints:

1. Compliance on ISO 14001 (system compliance, environment protection, etc)
2. Green Supply Chain (scheduled water waste, materials used for packaging, etc)

The environmental management system (EMS) ISO 14000 applied not only in the office but also in of their chemical plant. To comply with ISO 14001, they used Health, Safety and Environmental (HSE) policy as their guidelines. Under this policy, their company strives to provide environmental protection, internal planning, and execution as their part of the commitment to comply with the EMS ISO 14000. They are really committed to ensuring that the safety and environment are protected during the planning and execution of the organizations' business operation in compliance with all the relevant requirements. This is aligned with their organizations' goals and objectives where they want to have ZERO reportable adverse environmental impacts. The HSE team is a well-trained team that is responsible for looking up the environmental issues especially in the chemical plants. Apart from that, the company also act under The Environmental Quality Act (EQA) 1974, (Act 127) for the clean air regulation and schedule waste management. Every new project has to come out with the Environmental Impact Assessment (EIA) to ensure they fully comply with all the requirements that related to the environment, for example, the effect of the chemical substance that they used to the natural resources (air, water, and soil), or even the society.

The company has its own direction towards the sustainability environment protection to reserve the resources for the future as their trademark chemistry drives sustainability. They integrate sustainable development in the green supply chain to enhance more their environmental performance and achieving their goals to protect the natural environment. As mentioned before, they implement the EMS in the entire supply chain. The processes started with the sourcing, move to operation process and end with the product and deliver to the customer. The suppliers are given the CODE of Conduct for them to comply with the EMS ISO 14000 regulations and fulfill all the requirements to protect the resources and natural environment. In the operation process, they have to make sure to minimize and prevent pollution during the operation. For example, before them releasing the water from the chemical plants to the river, they have to undergo the water treatment process to make sure the water discharge from the plant to the river is clean and will not harm the environment. The schedule wastes need proper treatment before being transferred to the disposal place. They endeavor as possible as they can to reuse and recover all the waste and used them as an energy source to avoid waste and saving more costs. This as proof that their company very efficient in handling their waste production. The final unit in the supply chain is the logistic where the end products are delivered to the customer. To support the green supply

chain, their logistics management has to comply with the Ballast Waste Management and Anti-Dumping policy where this is very important for the shipments to follow the regulations to protect the marine ecological. The entire process of the whole supply chain is shown as below:

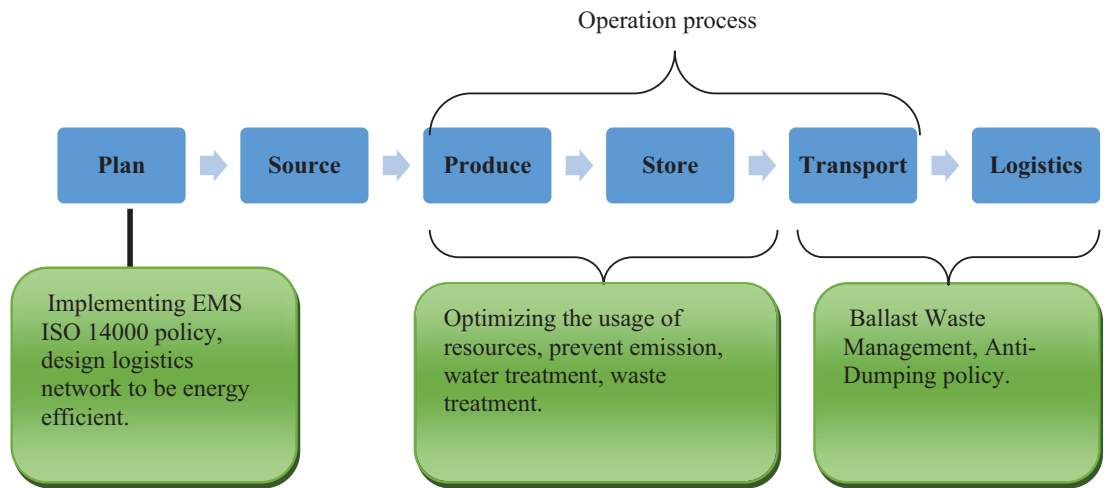


Figure 4: Overview of The Green Supply Chain Process in BASF Petronas Gebeng (Source: Authors' own work).

The compliance of EMS ISO 14000 as standard guidelines that the company used to achieve its goals of green initiatives in their business operation. The company has to identify its internal and external issues and relevant interested parties'. Other than that, the leadership management also important to drive the success of the implementation EMS in the company where the top management should provide clear direction to all employees to commit to the policy. Top management also needs to provide all the resources to establish a management system. The PDCA cycle is followed, from Plan-Do-Check-Act to continuously improve their environmental performance. The evaluation of the environmental performance will be assessed by the recognize auditor year. Their company needs to undergo the Environmental Aspects Significant Impacts Assessment to each of the operation processes to control and take actions due to any harm towards the environment.

One of the approaches that the company used to keep maintains the effectiveness of EMS implementation in GSCM by providing the employees with training programs related to the environmental. They are devoted to spreading environmental awareness among their employees. Moreover, they also provide programs that involved the society to be more concerned towards the environment. For example, mangrove planting and Kuantan river adoption. This shows that BASF PETRONAS Chemicals really committed to protecting the natural environment and eco-system.

In essence, the implementation of the environmental management system (EMS) in the green supply chain in BASF PETRONAS Chemicals Company is effective in terms of protecting the natural environment, improving the sustainability and also beneficial in reducing the costs. The researcher believes that it is really important to comply with the EMS ISO 14000 and follows the continuous improvement cycle that the company applied to boost the company performance.

5. Recommendation

The researcher has recommended the new idea to enhance their environmental performance by developing the new technology for incinerating hazardous waste. For instance, the chemical incineration processes treat the waste material from the operations and turn it into something useful for energy source or else further analysis to use the waste for future use. This could help save more natural resources and develops the sustainability of the environment. Apart from that, integrating the Corporate Social Responsibility (CSR) ISO 26000 with Environmental Management System (EMS) ISO 14000 can assist the company in term of risk management since ISO 26000 not only addresses to the social obligation yet still concerned about the environmental protection and sustainable development.

6. Conclusion

To put it succinctly, the integration between the green supply chain management system and the performance of the environmental management system as a dynamic exchange of links, materials, energy, and information exchange among them often occurs. This research discloses that organizations that practice EMS are more commonly practicing GSCM practices, no matter how long EMS has been provided. These results show that EMSs and GSCM are complementary to each other, and EMS executives have a stronger probability of improving the environment not only within the boundaries of their organizations but across their network of buyers and suppliers. The effects might be a holistic improvement in environmental sustainability due to existing mechanisms to improve environmental performance across the network.

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Appendix 1 – Interview Transcripts

a) How does the business goal in the company aligned with the Environmental Management System (EMS) in the Green Supply Chain?

Answer: BASF PETRONAS Chemicals Company has been aligning their company goals with the EMS and GSCM practices such as reducing the greenhouse gas emission by using the energy resources efficiently and controls the air emission in their business operations.

b) How does the Environmental Management System (EMS) affect the Green Supply Chain in the company's operations?

Answer: The compliance of EMS ISO 14000 as standard guidelines that the company used to achieve its goals of green initiatives in BASF PETRONAS business operation. The entire supply chain has to follow and obey all the policy that has been documented in the early stage of EMS implementation in the company.

c) What are the challenges for the company to maintain the effectiveness of the Environmental Management System in the Green Supply Chain?

Answer: The challenges that have to encounter to maintain the effectiveness of the EMS in GSCM is they have to make sure the suppliers, contractors, and also the buyers obey with the environmental policy that has been set. They have to maintain their company reputation that aligned with the company goals related to environmental protection.

d) How does the company evaluate the effectiveness of the EMS in their Green Supply Chain operations?

Answer: The evaluation for the environmental performance of the company will be review and check by the expert, the recognized auditor from Germany. The auditor will review the environmental performance of the company every year and measure the effectiveness of the EMS in the GSCM operations as well.

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