

THE APPLICATION OF GREEN SUPPLY CHAIN MANAGEMENT IN ELECTRONIC INDUSTRY INDONESIAN : A LITERATURE REVIEW

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ABSTRACT

Green supply chain management (GSCM) has known as an environmental supply chain innovation which integrates environment in supply chain management. Currently, most organization consider GSCM in their businesses as responsibility to sustainability of environment. They realize that the benefits by adopting green system in technology of their businesses will impact significantly to their supply chain, from supplier to end-customers. GSCM has been accredited by the leading organization and become a new systematic approach in supply chain management. GSCM even is becoming a trending topic to discuss by researchers. The research is focused on the application of GSCM in the developed and developing countries involving the research related to sustainable social and environment in operation management and supply chain. The results indicates that research in GSCM can be categorized into two things, which are GSCM framework and performance measurement (Ninlawan et.al, 2011). Some research about GSCM framework discuss how to improve the collaborative relationship between producers and suppliers, advise exploration the gap between the framework and reality, managerial decision making or developing current system, comparing system alternatives, and designing a new system to determine decision variables to produce high performance (Zhu and Sarkis, 2004). Moreover, wastes and emission caused by supply chain has become the main source of serious environment problems. According to literature research, it is shown that some prior papers found the positive impacts by applying GSCM on logistics. For example, Large & Thomsen (2011) indicated that the level of green supply chain had direct impact to performance of environment.

Keywords: Green supply chain, environment, logistics

1. INTRODUCTION

In the last few years Green supply chain management (GSCM) has emerged as an innovation environment that integrates environmental management into the supply chain. Bloemhof-ruward, et al. (1995) argues that wastes and emissions caused by supply chain has become a major source of environmental problems at this time. most organizations consider GSCM their business as responsibility for environmental sustainability. They realize that the benefits of adopting green business technology systems they will impact significantly on their supply chain, from supplier to end customer.

The latest research of the GSCM can be separated into two ways: a framework for performance measurement, and GSCM.

Some of the proposed framework how to increase it collaboration relationships between manufacturers and suppliers, to explore the gap between order and now the country is taking managerial decisions or develop a common procedure in order to achieve and maintain a green supply chain [1]

This paper aims to explore the literature discussing the GSCM and try to determine the new direction of development of GSCM. The research is focused on the application of the GSCM in both developed and developing countries involving research related to sustainable social and environmental supply chain management operations. This paper also discusses the implementation of GSCM and its implications in manufacturing Indonesia.

2. LITERATURE REVIEW

2.1 Green supply chain management

Green supply chain management has emerged as an important organizational performance to reduce the risk to the environment. Choosing a suitable supplier is a strategic decision for production and logistics management at many companies to eliminate the impact on supply chain management [2]

The main purpose of the GSCM is to identify the benefits, costs and risks associated with environmental performance [3]. A typical starting point in considering the inclusion of supply chains is by implementing ISO 14001, which recommends the inclusion policies to ensure suppliers know the practice environment and obligations [4]

Green supply chain is the process of incorporating environmental criteria or issues into the Organization's purchasing decisions and long-term relationships with suppliers. There are three approaches to, among others, GSCM: environmental regulations, strategy, and logistics. In addition, the concept of Green productivity (GP) showed that for any sustainable development strategy must have a focus on quality, the environment, and the benefits that form the focus of the triple GP [2]

When talking about green initiatives, one should not think in the company, but in the supply chain. This need arises from the fact that the competition is no longer taking place between companies but between supply chains. To maintain and enhance the competitiveness of the supply chain, so their initiatives, "green thinking" or "lean" must be adopted by the whole supply chain and coordinated by the level of integration companies determine the environmental performance, as more supply chain integration leads to better environmental performance [5]

The U.S. Environmental Protection Agency (2000) provides four basic steps to implement Green supply chain as shown like: First step on Green Procurement, the second step in the production of Green manufacturing, Green's third step distribution, and Reverse Logistics. For more details we refer to figure 1, and a brief

explanation of each step for the realization of the basic steps of green supply chain management.

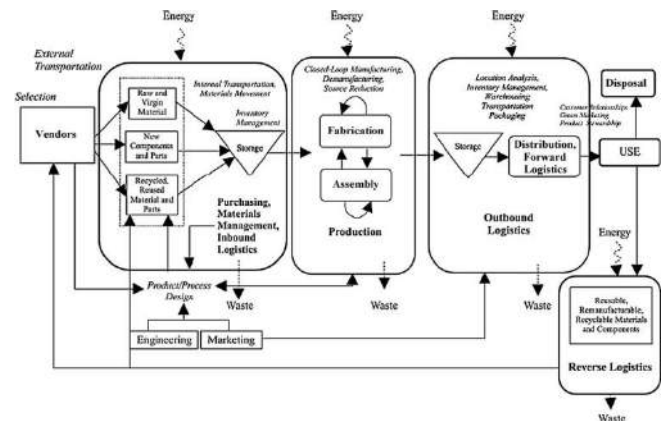


Figure 1. Basic steps to implement Green supply chain

a. Green Procurement

Green Procurement is defined as the purchase of environmentally friendly products that consists of the involvement in the activities of which include the reduce, reuse (recycling) of material in the process of the purchase. In addition there is a procurement solution for business related to the environment and economically conservative, as well as the concept of acquiring a wide range of products and services that minimize environmental impacts. [6]

The findings in the procurement activities of producers in Thai are presented as follows:

- supplier Selection: (1) purchase the material or part of the "Green partner" which meet the standards of environmental quality green partner audit process and pass the following regulations for the environment-related substances (2) consider suppliers who obtain ISO 14000, OHSAS 18000 and/or directives RoHS (3) choose suppliers that control harmful substances in the list of company standard and get green
- certificate of achievement in the process of procuring the 3Rs: (1) reuse of recycled-paper or on the container (plastic bag/box) (2) orders via email (paperless)

b. Green manufacturing

Green manufacturing is defined as a production process that uses the input with a

relatively low environmental impact, which is very efficient and produces little or no waste or pollution. Green Manufacturing can lead to raw material cost is lower, the efficiency of production, reducing the cost advantage of safety and the environment, and enhancing the corporate image [7]. The findings in the green manufacturing production activities can be presented as follows:

c. Green distribution

Green distribution consisting of green packaging and logistics. Packaging characteristics such as size, shape, and material have an impact on distribution because they affect the transport characteristics of the product. Better packaging along with the original pattern loading, can reduce the use of materials, increasing the use of space in the warehouse and in the trailer, and reduces the amount of handling required [8]. The findings in the activities of green distribution in Thai can be presented as follows:

- Green Packaging (1) save the packaging (2) the use of "green" packaging material (3) work closely with vendors to standardize packaging (4) minimize the use of materials and time to unload (5) pushing himself and adopt the method of packaging (6) promoting recycling and reuse programs
- green logistic transportation: (1) provide directly to users of the site (2) the use of alternative fuel vehicles (3) distribute the products together, from on in batches (4) minor change to move the capital

d. Reverse Logistics

Reverse Logistics is the process of taking the product from the end consumer for the purposes of capturing value or proper disposal [9]. Activities include collection, a combined inspection / sorting / selection, the process of returning / live recovery, redistribution and disposal. The findings in reverse logistics by stakeholders are presented:

- Waste collector put together a computer from EOL community, private organizations/public, and then check the used computer store, pick and sort initially to get used to the dismantling of the recycling plant. The drawback is

obvious database about the number and the given value at this stage.

- Demolition recycling plants collect used computers and the 50% of mills

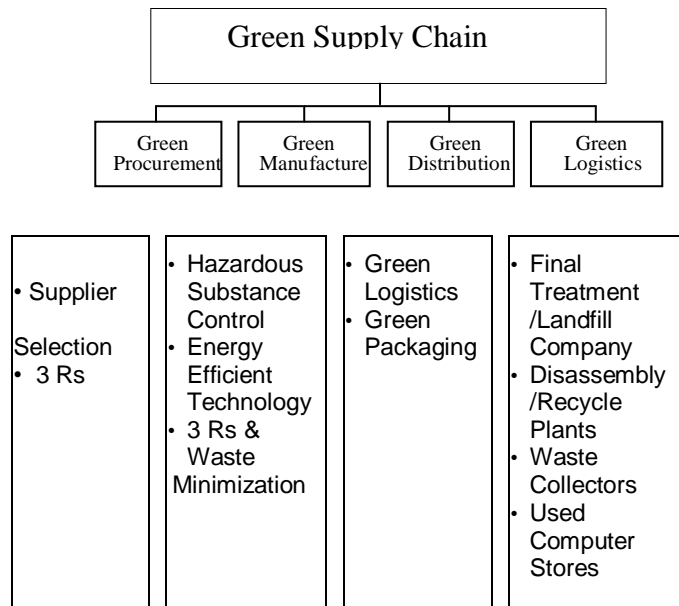


Figure 2. Activities in green supply chain of electronics industry

3. GREEN SUPPLY CHAIN IN ELECTRONIC INDUSTRY IN DONESIA

The electronics industry plays an important role for Indonesia's economic growth ranked at the top. In 2013, the export value of electronics products was \$28.2 billion dollars that 60% is the computer, the lights are part of them. In recent years some of the obstacles facing Electronics podusen as an inflexible pieces in production costs, labor need skills, technological change, exchange rate, and the impact of high competitiveness, environmental laws, and directives as well as. Reverse view of theelectronic supply chain will also challenge with incremental limbah end-of-life (EOL) products such as computers, lights and home appliances.

This study discusses the framework green supply chain in electronic indutry indonesia. Supply chain indonesian green activities can be seen in Figure 3. as follows:

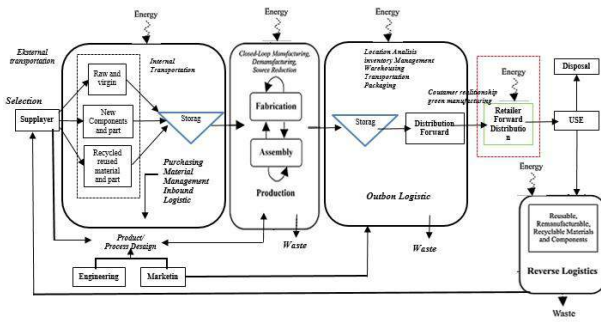


Figure 3 : Framework green activities Supply chain Indonesian

3.1 Inbound

It can be seen from inbound aspects point of view that the adoption of green supply chain management can provide some advantages for companies, ranging from cost reduction to integrating suppliers in a participative decision-making process in environmental innovation involving the supplier. Most of the inbound refers to a strategy of green procurement which was adopted to improve the company's concern for the environment. In green procurement include reduction of waste activities – activities, replacement of material that are more environmentally friendly, and manage the waste of raw materials.

There are six factors that can be used to adopt the green supply chain management in the inbound.

1. Convene a seminar for suppliers and contractors about environmental awareness.
2. Guide the supplier to prepare program environmental.
3. Invite all suppliers in the same industry to share knowledge and issues.
4. Provide information on suppliers to hit the profits from production and clean technology.
5. Emphasize the supplier to take action based on the environment.
6. Selecting suppliers according to criteria based on the environment.

3.2 Production or internal supply chain

In this phase, there are a number of concepts that can be encountered, such as cleaner production, design for environment, lean production and remanufacturing. Lean production or manufacturing is the most important part in the production phase in the

reduction of impact on the environment, because with the lean so companies can improve the environmental performance of the company through pereduksian general waste and minimize hazardous waste. Production phase is the most critical phase, which ensure that the product or service that is produced by the company is environment-friendly products; avoid pollution in the production process; the application of cleaner production; closed loop manufacturing deployment to the maximum, so that waste produced will be processed and recycled back into the production phase; reuse and recycling of raw materials is maximized; reduced use of raw materials; the products that can be recycled is increasing; the production process is optimized so that the production of waste both hazardous and non-hazardous can be minimized; redesigns products so that the influence of the environment can be minimized. In this phase there are eight variables that can be used for green supply chain in the production process of Rao and Holt (2005):

1. Environment-friendly raw materials.
2. Replacement of the raw materials the influence on the environment is still questionable.
3. Enter the criteria-based environment in consideration.
4. Consider the design of the environment.
5. The optimization process for the reduction of waste and emissions.
6. The use of cleaner technologies so that it can save energy, water and waste.
7. Recycling of raw material internally when the production process is conducted.
8. Apply the principles of total quality management (TQM).

3.3 Outbound

On the outbound phase of the green supply chain, green marketing, eco-friendly packaging, and distribution of environmentally friendly, it is a great initiative that may be able to improve environmental performance and supply chain of the company. Components – components that are found in the green supply chain used for identifying packaging, waste processing and shipment, marketingnya,

green strategies and components – the component involving variables:

1. Eco-friendly waste management.
2. An increase in packaging based environment.
3. Taking back of packaging.
4. Eco-labeling.
5. The withdrawal of the company's products that have been damaged.
6. Provide information that the product and the production process is environmentally friendly.
7. The use of environmentally friendly transport.

Green supply chain which is used by Loma Negra (2008) – stated that green supply chain in developed countries generally are not much different from the existing draft framework of the dielectronic Indonesia. The only different is on the additional activity in outbound logistics which are significant influential to the continuity of the flow of goods to the consumption-end.

4. CONCLUSION

From the exploration of prior works of GSCM, it can conclude that there is evident from the literature indicate that the GSCM very effectively applied in developed and developing countries. Although a few studies in the literature are discussed regarding implementation of the GSCM including drivers, practice, and performance from around the world, but it is still a little bit of research about the implementation and adoption of GSCM developing countries, one of them in Indonesia. Based on the results of the literature review indicates that in Indonesia still needed a deeper understanding of the application and implementation of the GSCM and also the level of awareness organization on environmental problems caused by their business operations.

From the results of the literature review is demonstrating that the framework of the GSCM is absolutely essential is applied in indonesia. Considering Indonesia belongs to developing countries in the manufacturing sector (24) from various studies also showed very significant contributions of GSCM.

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