

Green Supply Chain Management and Environment Performance in Malaysian Healthcare Industry

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Abstract: Green Supply Chain (GSC) is increasingly implement in the healthcare industry. The purpose of this paper are to identify the Green Supply Chain Management (GSCM) and Environment Performance (EP) measures for Malaysian Healthcare Industry and to develop relationship model between GSCM and EP for Malaysian Healthcare Industry. A structural relationship model using Structural Equation Modeling (SEM) has been proposed. Based on the proposed conceptual model and reviewed, research hypotheses are being developed. The research concludes with suggest future research work.

Keywords: Green Supply Chain, Green Supply Chain Management, Environment Performance, Healthcare Industry, Malaysia.

1. INTRODUCTION

Over the past 15 years, supply chain management and healthy environment has attracted great interest among practitioners or researchers. By using this approach in the care provider environment, an organization will tend to become more integrated. According to [1], the integration between supply chain strategy combined with green technology becomes much easier especially in improving supply chain performance. Manufacturing information among supply chain influence the behavior and performance and make decisions in a better direction for the healthcare industry environment.

National Key Economic Areas (NKEAs) under the 10th Malaysia Plan (2011-2015) has outlined an activity that is identified as the healthcare industry. The healthcare industry in Malaysia has grown rapidly and steadily since the early 90's until now. For many years in the Healthcare industry, Malaysia has been continuously vigilant about their healthcare system. [2]; [3]; [4]; [5]; [6]; [7]. According to [8], activities that operate in Malaysia through healthcare has undergone a radical transformation. Malaysia needs to review our healthcare business strategy whether to adopt a healthcare system driven by markets such as Singapore or resorting to a single-payer National Health System (NHS). This is because today's healthcare industry continues to face excessively increased costs, reduced profitability, administrative inefficiency, and steep regulatory compliance. Green Supply Chain (GSC) has become an important strategy in order to compete globally in the service industry. Since

1980, supply chain has been concerned to almost all organization. Priority is now more focused on issues for many companies, not just a profit, venture capital, or the government, but also engage healthy manner within their company [9], [10], [11]. According [12], a source familiar to define 'green' is from the report of the World Commission on Environment and Development 1987. It states that sustainable development as development that meets present needs without compromising the ability of future generations to meet their own needs. A complex system of interacting as a sustainable healthcare can be defined as an approach to recovery manage and optimize human health and the environment, and competitive in economic and social development, [13].

Seeing the current global market scenario, [14] mention that competitive advantage and environmental sustainability is believed to co-exist. [15], [16] shows that companies need to undertake a paradigm shift of their environmental responsibilities. Therefore in order to gain a competitive advantage to meet environmental responsibilities, the organization realized that they can not work in isolation. To ensure a healthy environment in the supply of a resource, not only on the walls of the company, but across the entire supply chain. These companies are often subject to environmental liabilities from their suppliers should urgently to integrate environmental initiatives, to ensure a healthy environment [17]. In addition, environmental issues have grown out of their organizations by entering their supply chain partners [18]; [19]. It is supported by [20] stating such organizations realize that industrial ecosystem can only be maintained

through the green supply chain management. In addition, according to [21], although there is not a new concept gained widespread recognition in the Asian region.

In this study, GSCM have five domain categories in this study that are namely; Green Manufacturing (GM), Reverse Logistic (RL), Ecodesign for Environment (ECD), Green Purchasing (GP) and Green Design (GD). Furthermore, this paper also focused towards Environment Performance (EP). There are three elements of EP: (1) Operational Performance (OP), (2) Economic Performance (EcP), and (3) Innovation Performance (IP). The purposes of this study are:

- To identify the GSCM and EP measures for Malaysian healthcare industry.
- To review the impact of GSCM and EP in Malaysian healthcare industry.
- To develop research model of the GSCM and EP in Malaysian healthcare industry.

In the next section, these papers review the literature on GSCM and EP measures as well as the relationship between GSCM and EP, and impact of GSCM and EP. This section are more focus on methodology and develop instrument. As a conclusion for this section are to discuss the future agendas for research and practice.

2. LITERATURE REVIEW

2.1. Green Supply Chain Management (GSCM)

Supply Chain Management (SCM) is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer and to customer [MIRA1]; [AQMAR1]. Different definitions of Green Supply Chain (GSC) exist in the literature. Some studies defined the GSC as closed-loop supply where designed and managed to explicitly consider the reverse and forward supply chain activities over the entire life cycle of the product [6]. Some have called it as a Sustainable Supply Chain (SSC) [12] and [13], environmental supply chain, and ethical supply chain [6]. It has also been described as a socially responsible supply chain [14]. The whole idea of a green supply chain is to manage the product after its useful life while helping the environment.

GSCM is integrating environment thinking into SCM, including product design, material sourcing and selection, manufacturing process, delivery of the final product to the consumer, and end-of-life management of the product after its useful life. GSCM also is a concerted effort across the enterprise and is more than simply implementing some ecological practices, but rather a coherent approach for improving environmental and organizational performance of all levels of management [15]. GSCM also integrated environmental considerations into SCM including product and service design, procurement, manufacturing processes, distribution, and end-of-life management of the product to achieve sustainable competitive advantage [16].

The summary of research the others definition of GSCM based on previous studies are listed in Table 1 as below

Table 1. Definition of GSCM

Source	Definitions
[16]	Defined as 'integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life'.
[17]	Greening the supply chains management seek to balance marketing performance with environmental issues.
[18]	Involve finance flow, logistics flow, information flow, integration, relationships, and environment management, promoting efficiency and synergy between partners, facilitates environment performance, minimal waste and cost savings.

The different processes and activities are encompassed in GSCM have been discussed GSCM can therefore be defined by the following below.

2.1.1 Green Manufacturing (GM)

Green manufacturing is a combination of a set of manufacturing processes to reduce the use of resources , it is not hazardous waste and generate little or no contamination [19]. According to [20], GM is to provide an environment free of pollution to consumers, employees and the community. GM is not an option but a necessity for the well-being and survival in today's competitive environment [21]. Furthermore, according [19] GM aims to reduce the burden on the environment and can lead to lower costs of raw materials, production efficiency , reduced environmental spending , and better public image by using appropriate materials and environmental technology around innovative. GM aims to 3Rs (reduce, reuse, recovery) the ecological burden by using appropriate materials and technologies, and remanufacturing industrial refers to the process where the product is obsolete restored to like-new condition [19].

2.1.2 Reverse logistics (RL)

Other practices that have been discussed, Reverse Logistics activities as wrong way on one-way streets because most of the delivery of the product to flow in one direction [22]. Next, [23] defines a narrow scope by stating that RL can be a redistribution of materials / products among the scope of the supply chain. Activities that can be included as reverse logistics or green logistics includes the remanufacturing, modifications, recycling, landfill, packaging, returns processing, and salvation.

Reverse logistics focuses primarily on the process of retrieving used products from the point of consumption to the point of origin to be reusing , recycling, and remanufacturing [24]. It represents the transformation of the products used in the product can be reused. Other means RL is the return or take back the product and materials from the point of consumption to forward supply chain for the purpose of recycling, reuse, remanufacture, repair, cleaning, or safe disposal of all products and materials [23] : [25]. According to [23], RL most found in the literature of which is as

follows:

- Reuse is the process of collecting used products from the field, and distribute or sell them used. Therefore, even if the final product is reduced from the original value, no additional processing is required.
- Remanufacturing is the process of collecting used products or components from the field, assess the situation, and replace worn, broken, or worn parts with new or refurbished parts. In this case, the identity and function of the original product is preserved.
- Recycling is the process of collecting used products, open them (when necessary), separating them into categories of such materials (eg plastic type, glass, etc.), and process them into the recycle product, components and or materials. In this case, the identity and function of the original material is lost.

2.1.3 Eco-Design (ECD)

It is about taking into account systematically issues related to environmental safety and health over the product life cycle with a potential to be reused or recycled at end-of-life [13]. According to [15], ECD is defined as the product and packaging design-conscious environment in order to reduce the negative environmental impact of products and packaging throughout life and promote positive environmental practices such as recycling and reusing products and packaging.

ECD also include consideration of certain elements in product design, including the reduction or elimination of hazardous goods, reuse, recycling, remanufacturing, and efficiency of resources (materials and energy) during the use of products [26].

ECD includes designing products for reduced consumption of both materials and energy, designing products that enable the reuse, recycling and recovery of materials and components, parts, and products designed to prevent or reduce the use of hazardous substances and dangerous process. By incorporating green issues in the development of new products, green design is increasingly regarded as a systematic method for companies to reduce the environmental impact of their products and processes at the same time reduce the cost and increase the product [27].

2.1.4 Green Purchasing (GP)

Green Purchasing is defined as an environmentally-conscious purchasing activity that ensuring purchased materials and products meet the environmental goals set by the company and purchase [28]. Green purchasing by [29] was defined as the practice of an environmentally-conscious purchasing that aims to ensure items purchased meet the environmental objectives of the firm such as reducing or eliminating hazardous goods, encourage recycling and reduce waste of resources and reclaimed materials purchased. According to [30], the measurement for green purchasing is developed based on seven basic elements such as the proposed purchase of green: product content requirements, certification providers, product content labeling or disclosure, compliance audit of the supplier, EMSs, product content restrictions, and a questionnaire on suppliers.

2.1.5 Green Distribution (GD)

Green distribution is defined as the integration of environmental issues into the activities consisting of green

packaging, green transport and logistics [31]. According to [32], the packaging features such as size, shape, and materials affect the distribution because they affect the transport characteristics of the product, better packaging and order patterns, then it can reduce material consumption, increase the use of space in the warehouse and in the trailer, and reduce the amount of handling required.

2.2 Environment Performance (EP)

Environment performance related to the ability of manufacturing plants to reduce air emissions, waste effluents, and solid waste and the ability to reduce the use of hazardous materials and toxic [33]; [32]; [34]; [paper Nor]; [paper IJAT].

2.2.1 Operational Performance (OP)

Operating performance is related to the ability of the plant to produce more efficiently and deliver products to customers [33]; [35]; [CHECK]. According to [36], refers to operating performance aspects that can be measured from the results of the organization, such as reliability, production alternate cycle time, and inventory. OP turn affects business performance measures such as market share and customer satisfaction.

2.2.2 Economic Performance (EcP)

Economic performance relates to associated with the plant's ability to reduce the costs associated with purchased materials, energy consumption, waste treatment, waste discharge, and fines for environmental accidents [33]; [37]; [34]. In addition, it can also be an assessment of the success of the organization in areas related assets, liability and overall market strength beyond to ensure their company remains on track financially [33].

2.2.3 Innovation Performance (IP)

The performance of innovation may be defined as a composite construct that arrangement or combination of material [38]. Additionally, it is based on various performance indicators related to, for example, for new patents, new product announcements, new projects, new processes, and new organizational arrangements. IP also defined the steps of green practices in developing new ideas and behaviors to produce and process and at the same time can contribute to the reduction of environmental load [32], [34], [39]. Thus, a combination of IP overall organizational performance gains from reform and improvement effort is made to consider various aspects of firm innovation, the process, product, and organizational structure, [40]; [SU] [AFNI].

3. Research Methodology

To understand the relationship of each GSCM on EP in Malaysian healthcare industry, the following hypotheses were set up to be tested. According to literature review above, these hypotheses will be stated based on a numbering system from H1 [41]. This style of hypothesis statement is chosen due to the nature of answering hypotheses using structural equation modeling methods.

H₁: There is a positive and direct significant relationship between GSCM implementation and EP in Malaysian

healthcare industry

4. METHODOLOGY

In this study, sampling methods are using structured questionnaire. The population of this study comprised in Malaysian healthcare industry. Questionnaires will distribute to respondents from Malaysian Hospital. To analyze the data, two statistical techniques were adopted. Structural equation modeling (SEM) technique was utilized to perform the required statistical analysis of the data from the survey. Exploratory factor analysis, reliability analysis and confirmatory factor analysis to test for construct validity, reliability, and measurement loading was performed. Having analyzed the measurement model, the structural model was then tested and confirmed. The statistical Package for the Social Sciences (SPSS) version 21 was used to analyze the preliminary data and provide descriptive analyses about thesis sample such as means, standard deviations, and frequencies. SEM using AMOS 6.0 will use to test the measurement model. etc.).

5. A Proposed Research Model

Based on the literature review, many previous studies were explored about GSCM and EP. The research aims at analyzing of the relationship between GSCM and EP for Malaysian automotive industries. This model is called proposed research model as presented in Figure 1.

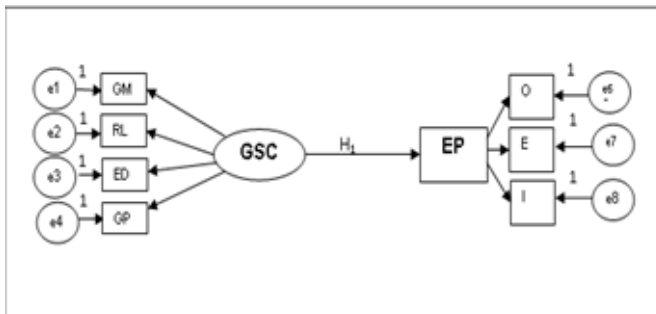


Figure 1: Proposed Model of The Study.

* GSCM=Green Supply Chain Management, EP=Environment Performance, GM =Green Manufacturing, RL=Reverse Logistic, ECD=Ecodesign for Environment, GP=Green Purchasing, GD=Green Design, OP=Operational Performance, EcP= Economic Performance, IP=Innovation Performance.

6. Conclusion and Future Research

In Malaysia, healthcare is an essential component in service industries is growing rapidly due to the increasing demand of medicine. Therefore, it is important for healthcare to find ways to improve environment performance to deliver quality service to patients. As the literature review has shown GSCM in influencing the environment performance. Furthermore, the concept model has been postulated that connects comprehensive GSCM (GM, RL, ED, GP, GD) as possible determinants for effective environment performance. The purpose of this study was to determine the factors of a GSCM. These review to conclude that the GSCM has a

positive relationship between environment performance in the Malaysian healthcare industry. On the future agenda, empirical research will conduct to examine the study hypotheses. The review previous study on this topic will be assist the way in which managers and next researcher to investigate and impliment GSCM in Malaysian healthcare.

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