

Green Supply Chain Initiatives in Malaysia: A Conceptual Critical Success Factors Framework

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Submitted: Sep 9, 2013; **Accepted:** Nov 7, 2013; **Published:** Nov 12, 2013

Abstract: The purpose of this study are to discover the critical success factors (CSF) for green supply chain management (GSCM) initiatives and to generate a conceptual framework that will be applied to Malaysia logistics companies. CSFs are the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for an organization. The method applied in this theoretical study covers comprehensive literature reviews from previous academic works and the literatures were derived from electronic databases. The keywords for this review are green supply chain management, supply chain management and critical success factors, to name a few. Four CSFs were proposed and a theoretical framework was constructed. This literature review will be a platform for more academic or industry research work. Plus it will act as a guideline for future studies on GSCM and add in more value to the existing academic research done on CSFs. Additionally, the study discussed future directions and addressed then countered limitations.

Key words:Green Supply Chain Management • Supply Chain Management • Critical Success Factors
• Literature Review • Malaysia

INTRODUCTION

Green supply chain initiatives is classified into five categories, eco-friendly design for the environment, green purchasing, supplier environmental collaboration, customer environmental collaboration and reverse logistics [1]. In Malaysia, organization both local and international, such as Panasonic Malaysia, General Electric Malaysia, Malaysia Green Tech Corporation and Toyota Malaysia [2], have placed numerous green initiatives. In addition, GreenTech Malaysia, an agency under the Ministry of Energy, Green Technology and Water, classify green businesses into nine sectors (energy, water, waste management, transportation, building, manufacturing, information communication technology (ICT), agriculture and forestry). Focusing on transportation, it is a service based industry which is in the same group as logistics and supply chain business. Green supply chain management (GSCM) has emerge as a strategy for leading companies and a source of competitive advantage [3,4]. Besides,

GSCM practices ensures enhanced environmental performance, minimize waste and achieve cost saving benefits [5].

Hence, the study on GSCM is significant with the current volatile logistics and supply chain sector plus with the ever demanding consumers, the need for GSCM through designing environmentally friendly products and taking back products and packaging, business organizations can generate benefits to the environment, in the form of reduced waste and better resource utilization [1]. Therefore, the objectives of this study are to uncover the critical success factors for GSCM using literature survey and to develop conceptual framework that will be applied to Malaysia logistics companies. This paper is divided into five parts, beginning with the first part on general introduction followed by the second part on series of literature reviews. The third part will explain the methodology and subsequently, the fourth part addresses the findings based on selected literatures. The final part concludes the findings, limitation and future research study are drawn.

Critical Success Factors (CSF): Critical Success Factors (CSFs) is a mechanism for defining a chief executive officer’s information need, was first introduced by John Rockart [6]. CSFs is define as “the limited number of areas in which results, if they are satisfactory, will insure successful competitive performance for the individual, department or organization” [7]. Moreover, for businesses to flourish, they are several key areas where “things must go right” and if results in these areas are not adequate, the organization’s efforts for the period will be less than desired. Besides that, CSFs is described as the few key areas of activities in which favourable results are absolutely necessary for a particular manager to reach his goals [8]. Apart from that, CSFs is a mechanism used for planning and identifying goals in an organization [9], assisting managers in improving performance, better communication and defining a manager’s information needs [10].

The concept of CSFs have been applied in various fields and functions. Studies of CSFs can be found in the field of knowledge management [11], human resource outsourcing [12], internet marketing [13], new product development [14], tourism industry [15], environmental management [16], small-medium enterprise (SME) [17], public sector organization [18] and higher education [19]. This signifies that the concept of CSFs is widely recognize in research and scholarly activities.

Supply Chain Management CSFs: The definition of supply chain management (SCM) by Cooper *et al.* [20], described SCM as the integration of business process from end-user through original suppliers that provides products, services and information that add value for customers. In addition, Chen and Paulraj [21] suggest the

critical elements in SCM are strategic purchasing, supply management, supply network coordination and logistics integration. The incorporation of CSFs and SCM is noticeable in many studies and is summarize in Table 1. Among the studies of SCM critical success factors include humanitarian aid supply chain [22], outsourcing logistics functions [23], agile SCM [24], web-based SCM [25], third-party logistics (3PL) [26], reverse supply chain [27] and logistics SMEs [28]. Judging from the mentioned literatures, it is an indication that CSFs are commonly used in SCM studies and is fit for green supply chain management studies as well.

Green Supply Chain Management (GSCM): According to Hervaniet *al.* [29], green supply chain management (GSCM) definition is derived from SCM definition itself, adding “green” components to SCM involves addressing the influence and relationship of SCM to the natural environment. Hervaniet *al.* [29] further describe GSCM as the combination of green purchasing, green material management, green distribution and green reverse logistics. Efforts in GSCM involve reducing packaging and waste, assessing supplier based on environmental performance, developing more eco-friendly products and reducing carbon emission associated with the transport of goods [30]. Furthermore, there are increasing interest in GSCM among researchers and practitioners is mainly because of the escalating deterioration of the environment for instance diminishing raw material resources, overflowing waste sites and increasing level of pollution [31]. The author further express that it is not just about being environmentally friendly but it is also about good business and higher profits.

Table 1: Summary of CSFs Studies in SCM

Authors (year)	Focus/Scope	Critical Success Factors (CSFs)
Mothilal <i>et al.</i> [26]	Third-party Logistics (3PL)	breadth of services; industry focus; relationship with 3PLS; investment in information system; skilled logistics professionals; and supply chain integration
Pettit and Beresford [22]	Humanitarian Aid Supply Chain	strategic planning; resource management; transport planning; capacity planning; information management; technology utilization; human resource management; continuous improvement; supplier relations; and supply chain strategy
Hong <i>et al.</i> [27]	Reverse Supply Chain	ease of use; costs; service quality; perceived usefulness; and channel relationship
Ngai <i>et al.</i> [25]	Web-based Supply Chain	communication; top management commitment; training and education; data security; and hardware and software reliability
Gunasekaran and Ngai [28]	Logistics Small-Medium Enterprises (SMEs)	Strategic planning; inventory management; transportation planning; capacity planning; and information management
Power <i>et al.</i> [24]	Agile Supply Chain	participative management (human resource management); computer-based technology; resource management (inventory management); continuous improvement; supplier relationship; just-in-time methodology; and technology utilization
Razzaque and Sheng [23]	Outsourcing Logistics Functions	communication; supplier relationship; customer relationship; setting standards and monitoring performance; knowledge on payback period; and human factors

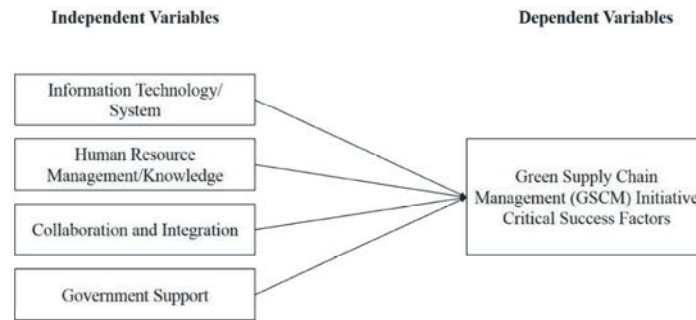


Fig. 1: GSCM Critical Success Factors Conceptual Framework

For a successful GSCM implementation, as suggested by [32], the drivers are:

- Certification of suppliers' environmental management system;
- Environmental collaboration with suppliers;
- Collaboration between product designers and supplier to reduce and eliminate product environmental impacts;
- Government regulation and legislation;
- Green design;
- ISO 14001 certification;
- Integrating quality environmental management into planning and operation process;
- Reducing energy consumption;
- Reusing and recycling materials and packaging;
- Environmental collaboration with customers; and
- Reverse logistics

Moreover, Hu and Hsu [33] proposed 20 CSFs for GSCM, most importantly, top management support, compliance statement, product testing report, green purchasing, environmental auditing for suppliers, establishing environmental for purchasing items and supplier evaluation and selection. Kim and Rhee [34] stated that collaboration with partners, mutual trust, green business understanding, planning and implementation, standardization and integration, activation of supporting and strategic use of information technology as the CSFs for GSCM.

Therefore, combining the CSFs of conventional SCM and GSCM, this study concludes that information technology, human resource management/knowledge, collaboration and integration and government support are the CSFs for GSCM initiatives. Figure 1 illustrate the relationship and conceptual framework.

MATERIALS AND METHODS

This study applies literature survey methodology as a literature review is essential as to ensure that no important variable, that has in the past been found repeatedly to have an impact on the problem, is ignored [35]. Besides, a literature review helps to identify the conceptual content of the field and guide towards theory development [36]. Additionally, this literature review focuses on books, journal articles and working paper. The journal articles are obtained from online databases such as Emerald, Taylor & Francis, Science Direct and EBSCOhost. Google Scholar is also used to assist the authors in finding relevant literature as the coverage of Google Scholar is impressively broad and includes the most important scholarly publishers' archive [37]. Keywords for this literature survey include green supply chain management, supply chain management and critical success factors. The collected literatures are then classified and evaluated to match the relevancy with the keywords.

RESULTS AND DISCUSSION

Information System/Technology: According to Alshawi [38], information system have been seen as more than resources that support various business processes. Gunasekaran and Ngai [28] suggest that proper use of information system will result into accurate information, better utilization of resources, measuring performance and controlling operation. Kim and Rhee [34] listed information technology as one of the CSFs for GSCM. The author further states that intensive information sharing and technology, integration of information resources, standardize database, linking networks for supply chain member and applying technology base for instance RFID, POS and EDI are critical for success in

GSCM. Hu and Hsu [33] and Hsu and Hu [39] argues that information system is the one of the factor for an effective GSCM.

Human Resource Management/Knowledge: Ho *et al.* [40] stressed that a company’s human resource support is essential since it is important for supply chain managers to possess the right supply chain skills, as it enhances the potential to be successful [41]. One of the CSFs suggested by [33] is the involvement of manpower in GSCM. However, organizations are very aware of the importance of GSCM but few have really implemented it due to lack of knowledge [34]. Apart from that, the lack of understanding of how to incorporate green into buying is a barrier to GSCM [30]. Furthermore, Hervani *et al.* [29] made a compelling argument that knowledge are keys to environmental innovation and availability of experts can be an important resources for GSCM. Meanwhile, Kim and Rhee [34] suggest that understanding of SCM is a CSF for successful GSCM. To overcome the lack of knowledge and understanding of GSCM, Hu and Hsu [33] suggest that various education and training in green issues need to be launched for promoting the environmental awareness for both employees and suppliers.

Collaboration and Integration: Holweg *et al.* [42] describe collaboration in supply chain have a common goal as well as to create transparent and visible demand pattern that paces the entire supply chain. Collaboration with suppliers on green product designs, holding awareness seminars, helping suppliers establish their own environmental program are some of the effort in GSCM practices [43]. Collaborative efforts in GSCM can be in the form of information sharing, integration of information resources and using standardized database [34]. Moreover, the collaboration between product designers and supplier are the drivers to reduce and eliminate product environmental impacts [32]. According to Barratt [44], trust, mutuality, information exchange and

openness and communication are elements of collaboration. Thus, for GSCM to be successful, supply chain partners will have to trust each other by exchanging information, transparent or honest with clear communication that will be mutually beneficial for all.

Government Support: Governments’ or public agencies’ policies and regulations can be a barrier or an enabler for GSCM [30]. Plus, the successful management of GSCM is also influenced by government regulation [29]. For instance in China, the China government’s support varies from imposing taxes to environmental regulations to pressure companies to adopt GSCM practices [45]. Furthermore, efforts can be seen from the South Korean government when the nation launched a new policy on expanding environmental management through the entire supply chain, called the ‘Green Supply Chain Management Business’ [34]. Besides, government support is essential for promoting logistics services [46] and government can also accelerate the GSCM growth by developing key logistics infrastructure [47].

The summary of CSFs for GSCM is summarized in Table 2. There are four CSFs namely information system, human resource management/knowledge, collaboration and integration and government support. Several limitation need to be highlighted for this conceptual study. Firstly, the nature of CSFs method has been cited for three weaknesses [6], in terms of implementation issues, validity and applicability. However, this is stressed by [21] that different organization may have different CSFs. Secondly, this study lack empirical evidence. Therefore, future study should focus on quantifying, ranking and checking the relevancy of the proposed CSFs. Furthermore, this study appraise the knowledge and field of CSFs and contribute more to the existing knowledge of GSCM and SCM as a whole. Finally, it is with hope that in the future, this study can be quantify and applied to green logistics service providers in Malaysia, to seek the acceptance, drivers and barriers of adopting GSCM.

Table 2: CSFs for GSCM

Critical Success Factors	Selected Reference
Information System/Technology	Alshawi [38]; Gunasekaran and Ngai [28]; Kim and Rhee [34]; Hu and Hsu [33]; Hsu and Hu [39]
Human Resource Management/Knowledge	Ho <i>et al.</i> [40]; Myers <i>et al.</i> [41]; Hu and Hsu [33]; Kim and Rhee [34]; Walker <i>et al.</i> [30]; Hervaniet <i>al.</i> [29]
Collaboration and Integration	Holweg <i>et al.</i> [42]; Rao, [43]; Kim and Rhee [34]; Diabat and Govindan [32]; Barratt [44]
Government Support	Walker <i>et al.</i> [30]; Hervaniet <i>al.</i> [29]; Zhu <i>et al.</i> [45]; Kim and Rhee [34]; Peng and Vellenga [46]; Goh and Pinaikul [47]

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