

Challenges in implementing Green Supply Chain Management in SMEs: A case study of a South Korean company

Abstract: This paper aims to examine the ways small and medium-sized enterprises make use of green supply chain management. This study employs qualitative methods to examine green supply chain management (GSCM) with a case study. Approaches used include in-depth interviews and document analysis. This paper has identified a gap in the existing business and management research literature regarding small and medium-sized enterprise (SME) use of green supply chain management and has attempted to fill this gap. The research conducted finds that tactical and structural change can result in more environmentally friendly practices in SMEs. As confirmed by case study, the structural change necessary for instituting green supply chain management involves a range of factors including innovation competency, cost savings, managerial arrangement, human resources, and competitive advantage. However, it has also become evident that additional research is necessary to fully determine the ways management practice can impact SME sustainability.

1 Introduction

Environmental management is a critical strategic area to maximise a firm's performance, and its importance is increasing steadily (Zhu and Sarkis, 2006). As a result of the implementation of Environmental Management Systems (EMS) for businesses, an increase in the use of EMS tools has been noted. Apart from internal environmental improvement, it is often the case that organisations are employing EMS guidelines past the boundaries of their factories and they can be seen in their supply chain networks (Sarkis, 2003). Effects on the environment can be seen throughout a number of points in a product's life cycle from start to finish, including material sourcing and selection, manufacturing processes, reuse, product delivery, and disposal (Ojo et al., 2012). Green supply chain management (GSCM), together with other connected standards, has turned into a crucial area for firms to create new profit and market advantages through a drop in environmental hazards and increased efficiency (Sarkis, 1995).

Nevertheless, there are certain parties that view this topic differently, as it is in contrast with the idea that environmental and social integration are mutually exclusive to financial gain. This disparity is particularly notable when comparing the views of business academics and practice. It suggested that there is an inherent clash between protecting the environment and economic prosperity. The idea is based on the notion that the increasing need for organisations to protect the environment will cause a rise in their expenses, thus providing fewer resources to boost productivity and causing a drop in market competitiveness (Palmer et al., 1995). A McKinsey survey (2008) reported that the vast majority (4 out of every 5) of 2192 executives contacted believed that there would be an environmental problem of some kind (most likely climate change related, in their view) in the next five years in the regions where their firms work. Environmentally proactive firms attempt to structure these guidelines and even encourage stricter rulings, which could cause difficulty for their less environmentally conscious rivals. Moreover, 81% of the executives contacted that states and businesses must be active in combating climate change, as this is seen as a societal trend with the highest chance of impacting shareholder value in the next 5 years, together with other environmental and social concerns. Lee, K. H. (2009) stated an important question for executives with regards to corporate environmental management system or green supply chain management is how to implement environmental decision making into their business practices, with profitable outcomes. However, it should be noted that business and management research into GSCM is severely lacking when it comes to small and medium-sized enterprises (SMEs). The organisational management paper by Sharma, S. (2000) requested that researchers give importance to environmental problems when conducting organisational studies. In the area of strategic management, Noci and Verganti (1999) noted that mainstream literature was focused on the examination of larger firms, and did not look into SMEs' features. Hitchens et al. (2004) stated that the issue is noticeable for SMEs, as they are further hindered by limited information and funding for green management practices. As a result, it is necessary to comprehend the reasons behind SMEs employing green supply chain management in their operations, and how they can best go about this task.

2. Environmental Management

An environmental management system (EMS) allows companies to conduct their business services and activities whilst minimising damage to the environment through a specific group of processes, values and management techniques (Feldman et al., 1997). To support companies achieving the desired sustainable development, the International Standardisation Organisation (ISO) created the list of standards known as the ISO 14001. Ofori (2000) explains that, under ISO 14001, EMS represents one element within the total management system of a company. The EMS entails considerations such as the monitoring and evaluation of firms' environmental policies, the implementation and achievement of such policies, developmental resources and procedures, business practices, operational procedures, corporate duties, planning, and organisational structure. The ISO 14001 is structured based on the 'plan-do-check-review' ideology and includes five cyclic stages of development and betterment. Ritchie and Hayes (1998) outline the various advantages of ISO 14001 as follows: environmental protection; cost reduction; improved market entry opportunities; proven regulatory compliance; more environmentally-friendly performance; higher levels of customer satisfaction; stronger trust between consumers and the company; promotion of fair competition, influencing global trade; more knowledgeable and engaged employees; improved brand image; a better and more credible reputation for the firm.

2.1 Supply chain management

Bachok et al. (2004) define the supply chain as a group of processes that facilitates the transference of knowledge, money, information and tangible products and services between supplier companies and end-users. Mentzer et al., (2001), however, explain that supply chain management has various definitions and no overall consensus amongst those who have attempted to define the term. Some propose that the term supply chain management (SCM) refers to a process that businesses use to associate suppliers to the company and the company to consumers, with the process being strategic in nature. Others have defined SCM not as a strategic element but as an art form that, when mastered, offers value to companies (Billington, 1999). Ofori (2000) explains that the benefit of SCM is that it provides the company with insight when forming business strategies and allows firms to identify opportunities and threats in the supply chain.

2.2 Green supply chain management

Today's companies are beginning to become much more aware of their duties towards the environment. Therefore, environmental management has started to emerge as a core strategic component of organisational performance. Zhu and Sarkis (2006) explain that the product lifecycle entails various stages at which the environment can be damaged, whether this is the collection of raw materials to create the product, the manufacturing process behind the product, or the discarding or recycling of the product. Sarkis (1995) points out that, for this reason, companies have begun to focus heavily on increasing their productivity and decreasing the damage they cause to the environment through green supply chain management (GSCM) in order to obtain stronger competitive advantages and profits. Rao (2005) adds that ISO 14000 (and the equivalent European Union's EMAS) have promoted the role of GSCM for some time. As Zhu and Sarkis (2004) explain, because GSCM entails somewhat modern research and practice areas (i.e. supply chain management and corporate environmental management), there is no absolute agreement on how to define it. Over the last two decades, various proposals have been made in solution to the lack of global definition for GSCM:

Green et al. (1996) define GSCM as follows:

"The way in which innovation in supply chain management and industrial purchasing may be considered in the context of the environment"

“The term ‘supply chain’ describes the network of suppliers, distributors and consumers. It also includes transportation between the supplier and the consumer, as well as the final consumer... the environmental effects of the researching developing, manufacturing, storing, transporting, and using a product, as well as disposing of the product waste, must be considered” (Messelbeck and Whaley, 1999, p. 42)

There are various explanations what is the GSCM activities and why organisations should consider to engage in the activities.

2.3 Green supply chain management in SMEs and its motivating factors

GSCM research explores the impacts, motivators, practices and definitions involved in GSCM. GSCM practices are heavily based on monitoring (collecting and interpreting supplier information, putting supplier evaluation criteria into place, and assessing suppliers’ environmental performance as well as the environmental performance of products) and collaboration (joint research with suppliers, information-sharing on environmental management, and supplier training incentives). Amongst the researcher who have examined these issues is Hall (2000) explain that GSCM practices often start as a result of regulatory requirements or consumer/stakeholder demands.

According to Bowen et al. (2001), Theyel (2001) and Lippman (1999), firms then implement these practices through greater supplier compliance, senior management input, supply chain management capabilities, the use of multifunctional teams, and so on, making the best use of assets held both within the company and by other companies.

Rao and Holt (2005) and Zhu and Sarkis (2004) have attempted to explore the ways in which GSCM practice and companies’ financial and environmental performance are linked, often emphasising the companies rather than the suppliers. At the point of writing this research paper, the engagement of small-to-medium suppliers in large enterprises’ GSCM schemes has rarely, been covered.

Some researcher, such as Hall (2000), have explored the specific factors that impact the environmental management practices of SMEs (e.g. lack of funding, lack of technological assets, lack of human resources, fewer demands from stakeholders and less recognition of environmental problems). Other, such as Luken and Stares (2005), have presented case studies to explore environmental support schemes in relation to SMEs. In these studies, it is proposed that SMEs are more likely to focus on bettering their environmental performance when they are able to obtain support from relevant figureheads and leaders, or when they are under pressure from the supply chain.

One study was more extensive and emphasised SMEs’ implementation of clean technologies (Hitchens, 2003). The research that has been conducted on the environmental management practices of SMEs focuses, at least somewhat, on the motivations behind SMEs’ adoption of environmental management strategies. In summary, these factors include the desire to enhance their environmental performance, pressure/assistance from external stakeholders, and regulatory requirements. This being said, the existing studies pay little attention to the supply chain. Consequently, the existing body of literature fails to examine the ways in which green supply chain schemes are impacted by SME suppliers. Furthermore, very little research papers discuss or test the factors that can motivate suppliers to become more involved in the green supply chain.

2.4 South Korean Green Supply Chain (GSC) programs

In the past, Korea was characterised by a determined drive towards achieving national economic growth, with environmental issues only entering Korea’s social consciousness over the last 20 years. Consequently, as Yol and Rhee (2006) point out, this enabled a 500-fold increase to occur in the Korean economy for a period of some 30 years.

Environmental concerns were first raised in 1991 after the infamous phenol leakage incident, along with other serious events that caused damage to the environment. Furthermore, the Korean government began to focus on the supply chain’s environmental impacts as a consequence of EU regulation (e.g. the Restriction of Hazardous Substances and Waste Electrical and Electronic Equipment Directives). Soon, Korean businesses began to follow suit (Lee K. H., 2007). Foreign markets are hugely influential on the Korean economy, with many Korean businesses maintaining a competitive

advantage as a direct result of their suppliers. For example, one report states that of all cars manufactured in Korea, around two-thirds were exported. Furthermore, it is reported that Korean businesses spend an average of 59% of their revenue on purchasing (Lee K. H., 2008).

Consequently, the supply chain became the target of a newly-introduced environmental management policy introduced by the Korean government, with SME suppliers becoming a major focus of the policy. This policy resulted in a national GSC scheme that began in 2003, which was initially designed to support SME suppliers in achieving better environmental performance. The government initiative was founded upon the North American Supplier Partnership for the Environment's set of standards and emphasised partnerships between leading large-size companies and the suppliers of these enterprises. Here, supply chain management is implemented as a key strategy to facilitate information-sharing between large purchasing companies and SME suppliers. The initiative is known as the GSC program. The GSC program is funded by participating firms and the government in South Korea. The GSC initiative serves to offer all participating suppliers the opportunity to engage in extensive environmental support schemes, which offers benefits in the form of environmental data profiling, mass balance management, hazardous material analysis, and green procurement and management support from partnerships with leading experts and purchasing companies (Lee, S. Y., 2008). However, most of the SMEs still do not have the necessary background information, expertise, skills, and economic or human resources to implement the necessary alterations in their firm (Lee, S. Y., 2008). Furthermore, it is often the case that their practices are concentrated on a specific aspect of the production process or the product itself that the SMEs want to change. As a result, SMEs usually have a restricted view of future innovation possibilities, and usually approach green problems (Nawrocka, 2008).

After the EU parliament approved the proposed guidelines for Waste Electrical and Electronic Equipment (WEEE), Restriction of Hazardous Substances (RoHS), a number of Multinational Corporation (MNC) firms in consumer products industry (such as Apple, Samsung, LG, Sharp, Lenovo, Sandisk, and Nokia) have implemented "green" standards in their SCM. End manufacturers use their buying power to convince suppliers to uphold a greater standard of environmental performance. Under the RoHS-compliance program, a number of larger firms request that their suppliers verify parts and components compliances in order to ensure compliance of the final products (Cusack and Perrett, 2006). The majority of the suppliers along the supply chain are SMEs, and 4 out of every 5 global enterprises are categorised as SMEs (i.e. having less than 250 employees) (Moore and Manring, 2009).

Considering that more than 80% of enterprises in the world are technically small and medium size, there is, even more, reason to be concerned about the creation of a business case for the sustainability of SMEs and to encourage SME investments in sustainable business operations. When accounting for the stringent environmental requirements currently in place (and those in the future), SME business operations must be inspected in order to ascertain and solve environmental management and sustainability issues. To best comprehend the unique situation of implementing GSCM in SMEs, the strategic backgrounds of organisational structure, innovation capability and human resources, cost saving for GSCM are taken into account to provide additional clarity (Lee, K. H., 2009). The four strategic backgrounds will be explained with the chosen case study in next chapter.

3 Methodology

This paper utilizes literature review and qualitative research to achieve its research objectives. The inductive approach resulted in a set of raw data that connected the research objectives to the data.

Once condensed data was derived from the literature review, the authors turned to qualitative research to further the study. Qualitative research formulates hypotheses using a variety of contextual inputs. In this instance, the authors used secondary sources – such as the internet, literature, and articles – to inform the theory and objectives of this study.

There is a wealth of research concerning GSCM and sustainability, but there is a lack of research that specifically applies that information to practical decisions made by SMEs. This study attempts to fill that gap in research through descriptive and explorative means. The case study section of this research collected data through primary interviews and meetings supplemented by secondary data gleaned from company literature and presentations. In this way, both primary and secondary data methods were utilized in this study.

3.1 Case study: PEMTECH

PEMTHCH (Corp.) is a company that has been established in 1993, with capital of ₩ 615,370,000 (£ 352,296), sales figure of ₩ 28,851,890,000 (£ 16,397,300) in 2014, with employment of 134 staffs, and it is a company that has been selected by the small business administration in South Korea (SBA), as outstanding small business. (see the table 1) PEMTHCH's main industry of business is manufacturing of constructional materials, also operating refrigerant storage warehousing, red-clay housing business. This research facility is progressing with various research developments, related to red-clay housing business, such as architectural design, boiler design, quality control of constructional materials along with research on function improvement, the system of selling products, and system of transportation. Operating in variety of different fields of business,

PEMTHCH's main business is civil engineering, and it is construction specialising business that builds PEM retaining wall which is protection measure for cut-slope from the field of slope stability. The main customers for the PEMTECH involve Samsung C&T, Hyundai Heavy Industries Co Ltd, public enterprises (Korean Rail Network Authority, Korea Land & Housing Corporation, Korean-Water, etc) and many regional construction management administrations.

4. GSCM's Challenges in PEMTECH and Construction industry

PEMTECH's P.C. panel manufacturing production process entails the use of steel reinforcement, concrete, and cement as raw materials, with cement being comprised of various components including lime, silica and alumina and being one of the simpler materials used in construction. According to Occupational Safety and Health Administration (2008), cement production uses a high amount of energy and cement production contributes as much as 10% of the global Co2 emission total and is the world's third-largest generator of CO2 (after transport and energy production).

Moreover, the PEMTECH's construction process leads to various types of waste issues, which can generally be categorised as direct waste or indirect waste. According to EPA (2002), indirect waste stems from low-quality workmanship, production waste, tailored specifications/dimensions and the nature of the materials. Direct waste, on the other hand, stems from trial-and-error, the inefficiency of the production plant, incorrect specification, inappropriate usage, vandalism, theft, spillages, cutting, storage, delivery, and transport.

According to Envirowise (2005), two key incentives for improving the construction industry's resource efficiency are said to be: i) the need for construction companies to show contractors and clients that they are in continuous development of sustainable construction processes; and ii) the increasing expense involved construction products and waste disposal. Ministry of Environment in South Korea (2013) reports that the cost of waste disposal and construction products are being increased further by the following factors: i) a £3-per-tonne annual rise in landfill tax, which was predicted to be £27 per-tonne or more by 2018; ii) an increase in the cost of waste disposal due to stricter regulations and less space in landfills; and iii) the aggregates levy and other taxies and levies impacting primary materials. Therefore, waste management and reusing processes are the critical issues for GSCM at PEMTECH.

5. Findings and Discussion

This paper has explored the implementation of GSCM amongst Korean SMEs within the construction industry from a variety of angles, including the exploration of GSC practices and activities in order to assess the development and success in this area. Amongst the core considerations behind SMEs' proactive or reactive adoption of GSCM is the driving forces behind the adoption of this corporate management style. The motivational factors to implement GSC practices can be the most important issues to comprehend the cause of SMEs move toward GSCM.

This paper has revealed that PEMTECH's adoption of ISO 14001 stemmed from the need to meet a number of demands arising outside of the company environment. As part of this, the company began to examine its competitive strengths in the market, regulatory issues, absence of waste management processes and production process. As shown in table 2, the company essentially decided to move towards greener management due to demand from the public and the need to adhere to environmental legislation. As a consequence of increasingly strict environmental regulations, PEMTECH implemented a strict standard for emissions.

Table 1: Drivers for implementing the GSCM at PEMTECH

| Internal Drivers | External Drivers |
|--|---|
| Reducing environmental costs | Complying with stringent government environmental regulations |
| Solving the recycling, reusing problem in P.C. panel process | Responding proactively for customers' green expectation |
| Saving the cost from the reusable machineries and materials. | Increasing the green public image. |

As supported by Perez-Sanchez et al. (2003), an analysis of smaller firms revealed that these two factors (public pressure and environmental regulations) are the primarily motivators behind companies' adoption of environmental management strategies. Of course, all companies strive to adhere to fundamental environmental legislation. However, as Azzone et al. (1997) point out, SMEs encounter greater impacts from environmental regulations due to their possession of fewer resources than large companies. Thus, since SMEs often lack adequate funds, and because the adoption of environmental technologies is complicated, this tends to mean that SMEs face greater challenges in this regard.

It is argued that SMEs' lower level of experience and technological complexity leave them in a weaker position than large companies (Lee, K. H., 2008, 2009). All companies must deal with various legal, managerial, technological and political issues when facing legislation. Since numerous norms exist, this results in a more complicated process, which brings additional challenges in dealing with the interaction of managerial processes, manufacturing processes, environmental technologies and regulators. This indicates that companies must enact a greater number of activities the more they are subject to restrictions from environmental legislation. Thus, SMEs might meet requirements by changing their organisational procedures and increase efficiency by selecting the most appropriate environmental technologies.

6. Recommendations & Conclusion

The ability of companies to remain competitive in the market will greatly depend on sustainability factors in the future. Thus, it is essential that I gain greater insight into the relationship between GSCM and competitive advantage in order to ascertain whether businesses stand to gain from investing in sustainability and environmental management. As Del Brio and Junquera (2003) point out, business and management research must immediately begin to focus more on the competitive impacts of environmental regulations for SMEs, especially since very few studies have explored the relationship between environmental management, GSCM and SME performance.

Whilst it can be argued that there are no valid reasons for avoiding the adoption of GSCM, companies continue to pose numerous reasons for their hesitance. Essentially, companies must consider whether or not they are prepared to contribute in a positive way by committing to navigate the difficulties that arise in making these necessary changes. It is clear that there is a strong case for companies to become implementing GSC activities successfully and that they stand to gain competitive advantages from doing so. However, unless managers are driven by appropriate motivators, it is unlikely that every SME will take steps to improve its environmental performance in any tangible way. Environmental legislation has been highlighted in this research study as a crucial motivator, but the extent to which it can motivate SMEs to become greener depends on the nature of what is required by the company in order to adhere to regulatory requirements. Additionally, the research findings suggest that companies can transform various aspects of management practice to increase their environmental performance. Specifically, this can be achieved if SMEs focus on competitive advantage, cost savings, human resource development, innovation, learning and the GSCM's activities (Green production, Green purchasing, Green logistic, Reuse)

The research findings obtained in this study have successfully shed light on the options available to SMEs when making changes to their organisational strategies in order to adopt GSCM practices. Further exploration of the topic is highly

encouraged, particularly in the context of other industries and a broader variety of enterprises in order to overcome some of the limitations present in the current study. Additionally, in exploring the difference between reactivity and proactivity in organisational strategy, it could be greatly useful for future studies to apply quantitative methods to a single industry. It could also be useful for other researchers to explore ways to assess GSCM implementation through the establishment of dedicated strategies and guidelines. Being able to evaluate the level of adoption within a company through the use of cultivation indicators would be greatly beneficial, as would the ability to evaluate a company's immersion in GSCM.

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