



Evaluating green supplier development programs at a telecommunications systems provider

Xiaoyong Fu^a, Qinghua Zhu^a, Joseph Sarkis^{b,*}

^a School of Management, Dalian University of Technology, Dalian, Liaoning Province 116024, PR China

^b Graduate School of Management, Clark University, 950 Main Street, Worcester, MA 01610-1477, USA

ARTICLE INFO

Article history:

Received 5 May 2010

Accepted 30 August 2011

Available online 8 September 2011

Keywords:

Environmental

Supply chain management

Supplier development

Grey numbers

DEMATEL

ABSTRACT

Green supplier development has become necessary as organizations increasingly compete on environmental supply chain capabilities. However, formal modeling tools to aid managers in evaluating green supplier development programs (GSDPs) are virtually non-existent. This paper introduces a formal structured managerial approach for organizations to help evaluate the influence relationships amongst GSDPs. Utilizing GSDP categorizations we acquire multi-functional managerial inputs within a telecommunication systems provider to evaluate the GSDPs. The managerial inputs are evaluated using a formalized grey-based DEMATEL methodology. Managerial and research implications of the proposed study and application, limitations and future research directions are also detailed.

© 2011 Elsevier B.V. All rights reserved.

1. Introduction

The green supply management literature has focused on aiding existing suppliers improve their environmental performance by 'requiring' these suppliers to acquire certifications or introduce green practices. Alternatively, some companies green their supply chains through selection of existing green suppliers. Not all suppliers are in the position to effectively, on their own, improve their environmental or sustainability performance. Also not all suppliers are initially green. Similar to organizations aiding their suppliers to improve upon business and competitive performance, such as costs, quality and delivery, organizations may also aid their suppliers' green development.

A critical aspect of green supply chain management literature that has been under-researched has been this issue of supplier development (Seuring and Müller, 2008a). Interestingly, even though significant research has been initiated and completed on green supply chain management (Srivastava, 2007; Seuring and Müller, 2008b; Ilgin and Gupta, 2010; Sarkis et al., 2011), investigation into green supplier development programs (GSDPs) is virtually non-existent.

The development or application of formal tools and models has been very limited in general supplier development programs (Bai and Sarkis, 2010a). Some formal models that have been developed consider the further development of suppliers through, for example, adjusting supplier practices in response to requests for

proposals (Narasimhan et al., 2008b). Formal decision and management models are recommended by the literature to help in supplier improvement and management (Krause et al., 1998; McGovern and Hicks, 2006). Formal tools and models for environmental supplier development to aid companies manage environmental performance of suppliers are even more limited.

Formal modeling tools for organizations to green their supply chains need to help them determine how they should develop and implement their GSDPs. That is, some GSDPs will be more valuable or foundational (influencing development of other supplier development programs). In recognition of this fact, we introduce a formal methodology to investigate the importance of organizational GSDPs and how they relate to each other. To help develop these relationships we introduce a novel grey-based Decision-Making Trial and Evaluation Laboratory (DEMATEL) approach to structure the program management environment.

One important purpose of this formal modeling approach is to aid organizations prioritize their investments in GSDPs while also identifying critical relationships amongst them. Prioritization and relationship identification of GSDPs potentially helps organizations to free up resources and enhance their organizational returns by focusing on the most important programs that set the foundation and relationships to other environmental programs and goals. This formal modeling methodology is valuable for planning, design, implementation or maintenance of GSDPs in organizations.

The formal modeling approach introduced in this paper, using a grey-based DEMATEL approach, incorporates a number of stages resulting in a relationship diagram amongst various GSDPs on prominence and cause/effect axes, a prominence–casual

* Corresponding author.

E-mail address: jsarkis@clarku.edu (J. Sarkis).

relationship diagram. The technique involves the identification of GSDPs, understanding their interrelationship utilizing “grey” data input from management, transforming the grey data into crisp data, completing a series of DEMATEL steps, and eventually arriving at a final prominence–causal relationship diagram with associated analysis.

The goal of this paper is to introduce and explicate how grey-based DEMATEL can be a valuable managerial tool to evaluate GSDPs and their relationships to each other and importance for the organization. The paper begins with a short discussion and review of GSDPs and some previous work on evaluating the relationships of these programs. In addition, some background on related tools for analysis of GSDPs that do exist will help us identify what gaps occur in the literature. We then generally introduce the basic concepts associated with grey-based DEMATEL. In the following section we apply the technique to a real-world situation that provides managerial insights and implications for the methodology and its results. The results are presented with some discussion analyzing the results and implications of the technique with feedback from management. We finally conclude the paper with some limitations and future research directions in this emergent field and topic.

2. Green supply chain management and development programs

Green supply chain management has seen significant development in the past two decades ranging from initial practical sense-making and conceptual developments to more rigorous theoretically driven empirical and analytical studies (Seuring and Müller, 2008b). Green supply chain management is the integration of natural environmental concerns into supply chain management (Sarkis, 2006). There are many activities and factors that may be incorporated into this organizational practice. Examples include selecting green suppliers, incorporating supplier input into greening organizational practices, expanding the environmental life cycle analysis of products into supplier processes, helping develop and implement environmental management systems into suppliers’ organizational structure, and many such practices (Sarkis, 2006).

It has been argued that the greening of supply chains is critical as organizations encounter both competitive and environmental influences (Zhu and Sarkis, 2004; Rao and Holt, 2005). Given the breadth of possible activities and functions within green supply chain management, the necessary organizational resources for the development of these programs may not exist. This resource barrier is especially profound for smaller and medium sized enterprises. In fact, many times these programs are relegated to the ‘nice-to-have’ organizational decisions rather than the ‘must-haves’. The involvement and support of larger and more resource rich supply chain partners for supplier development can be crucial to a successful green supplier management program when resource poor partners exist. Research has shown that just because there are external pressures to become greener suppliers may not respond to these external pressures. It has been found that internal resources and capabilities are also needed and play an important role for implementation of greening programs by organizations (Sarkis et al., 2010). Building these capabilities, without additional infusion of resources, whether they are soft (knowledge) or hard (technology, finances), for smaller suppliers is improbable. Top management support needs to be in place for these green supply chain management initiatives to be pursued (Zhu et al., 2008), if a business case is to be made. Getting top management support is easier with collaborative GSDP type

programs where resources of the customer are shared with the supplier and vice versa.

Given this situation, supplier development for green supply chains has been and continues to be an important dimension for the diffusion of green supply chain management practices. Even though significant formal modeling effort has focused on aspects of green supplier management (e.g. Sarkis, 2003; Piplani et al., 2008; Lee et al., 2009; Bai and Sarkis, 2010b), the research in green supply chain management has not focused on GSDP activities, much less their existence or prevalence.

Categorizations of general supplier development programs can be quite broad for organizations. The literature has relatively extensively studied general supplier development programs (e.g. Krause and Ellram, 1997; Krause et al., 1998; Lee and Humphreys, 2007; Narasimhan et al., 2008a; Wagner and Krause, 2008). Different categorizations from empirical studies have been developed through these many studies. Utilizing these general supplier development programs categorizations, GSDPs may be grouped into at least three categories including: Green Knowledge Transfer and Communication; Investment and Resource Transfer; Management and Organizational Practices (Bai and Sarkis, 2010a) and are shown in Table 1.

Some of the activities within these categorizations are oriented toward ‘monitoring and control’ (e.g. auditing) while other supplier development activities have been defined as collaborative (joint product design) (Vachon and Klassen, 2008). Very practical and direct examples can be focused on the dyadic and partner relationship or internal to the supplier environmentally focused operational activities with suppliers such as:

- programs to reduce or eliminate materials used in manufacturing processes or products;
- programs focused on the environmental compliance status and practices of supplier operations;
- joint development of new materials, processes or other solutions to environmental issues (Sarkis, 2003; Simpson et al., 2007).

The number of GSDPs in an organization can be extensive and continues to grow. Understanding the roles and relationships amongst these programs can provide management with additional informed insight into how to manage them. Sometimes there are foundational GSDPs such as supplier auditing programs that may set the stage for helping suppliers improve their systems. These supplier environmental auditing programs may complementarily support other GSDPs such as providing training for environmental improvement or knowledge sharing in weak areas. But a foundational program does not necessarily make it the most important supplier development program for an organization, if this supplier development program has already been established and in operation. Thus, the relationships and relative importance of supplier development programs may vary depending on the organization that is managing these programs. This example is a nuanced managerial issue that we seek to address in this paper with a methodology that can help organizations consider their idiosyncratic situations.

We know of no specific formal planning model to help address these types of GSDP management issues focusing on the relationship of various practices to each other. To help fill this gap and contribute to the body of knowledge we introduce a technique in this paper that integrates the grey scale measures and DEMATEL to help managers plan, manage, and maintain their GSDPs. A practical outcome of such a technique is a prioritization for determining where and when resources should be targeted for specific GSDPs.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات