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Green Supply Chain Management: Strategy to Gain Competitive Advantage

Meythi[1] Riki Martusa[2*]

1. Accounting Profesional School Department, Maranatha Christian University, Indonesian;

2. Master of Accounting, Maranatha Christian University, Indonesian;

*Email address of corresponding author: theofilus2001@yahoo.com

Abstract

Green Supply Chain Management (GSCM) has become a potentially valuable way of securing competitive advantage and improving organizational performance. With increasing competition in today's global market, the firms have to look to the modern strategic manners, in order to gain sustainable organization and competitive advantage. GSCM as a new innovative managerial tool can be used as a strategic weapon to gain competitiveness and to promote the firms environmental and financial performance simultaneously (Hajikhani et al., 2012). GSCM as a strategy to gain competitive advantage means the orienting empirical study shows that there is a substantial interest amongst the companies to take action to decrease their environmental impact. The goal of adding value to the business and reducing costs in all parts of the production system is identified as key drivers in order to increase competitiveness. The companies agree that the common manufacturing objectives such as cost, quality, delivery and flexibility will not be enough in order to stay competitive when external stakeholders require an increased focus on sustainability. Hence, a need for investigating how environmental sustainability can be integrated to create a competitive production system has been identified. The perspective then changes from greening as a burden to greening as a potential source of competitive advantage. According to Simpson and Samson (2008) there are 4 (four) strategies to gain competitive advantage in the use of GSCM: (1) Risk-based Strategies, (2) Efficiency-based Strategies, (3) Innovation-based Strategies, and (4) Closed-loop Strategies.

Keywords: Green supply chain management (GSCM), competitive advantage, risk-based strategies, efficiency-based strategies, innovation-based strategies, and closed-loop strategies.

1. Introduction

GSCM has its roots in both environment management and Supply Chain Management (SCM) literature. Adding the 'green' component to SCM involves addressing the influence and relationships between SCM and the natural environment. Similar to the concept of SCM, the boundary of GSCM is dependent on the goal of the investigator (Srivastava, 2007). As in any emerging research area, the early literature focuses on the necessity and importance of GSCM, defines the meaning and scope of various terms and suggests approaches to explore the area further. Fundamentals of greening as a competitive initiative are explained by Porter & Linde (1995). Their basic reasoning is that investments in greening can be resource saving, waste eliminating and productivity improving. Three approaches in GSCM, namely reactive, proactive and value-seeking, are suggested (Hoek, 1999). In the reactive approach, companies commit minimal resources to environmental management, start labelling products that are recyclable and use 'end of pipeline' initiatives to lower the environmental impact of production. In the proactive approach, they start to pre-empt new environmental laws by realizing a modest resource commitment to initiate the recycling of products and designing green products. In the value-seeking approach, companies integrate environmental activities such as green purchasing and ISO implementation as strategic initiatives into their business strategy (Srivastava, 2007).

According to Hajikhani et al. (2012) several studies on GSCM have determined a broad range of factors, persuading companies to develop environmental management initiatives and practices to its supply chain. It can be motivated by firm's stakeholders requests, persuaded by firm's want to have full compliance with environmental regulations, or even promoted by the firm's internal strategic motivations, which is related to the opportunity to gain the competitive advantage in the market. According to review on the previous studies, the determining factors of GSCM adoption can be classified between: (1) External factors mostly related to stakeholders pressures and environmental regulation, which named as relational motives arise from the aspiration of a organization part, to become legitimized and to advance the existing relationship among the company's different stakeholders; (2) Internal factors linked to a set of business-led strategic motives.

Along with the rapid change in global manufacturing scenario, environmental and social issues are becoming more important in managing any business (Amemba, 2013). GSCM is an approach to improve performance of the process and products according to the requirements of the environmental regulations (Hsu & Hu, 2010). The rise in greenhouse emissions and pollution of the environments by firms has precipitated the need for organizations to realign their supply chain operations with a view of conserving the scarce resources. GSCM is defined as "Green Purchasing + Green Manufacturing/Materials Management + Green Distribution/Marketing + Reverse Logistics". The idea is to eliminate or minimize waste (energy, emissions, chemical/hazardous, and solid wastes) along supply chain (Hervani et al., 2005). According to Amemba (2013) in the case of a single organization, the creation of 'green' supply chain makes it a significant competitive advantage in decreasing the costs (to create new markets for businesses), more organic and better cooperation with the suppliers. Moreover, at the national level, green supply chains can help to change the market's orientation to become more 'green', together with the creation of incentives for small and medium-sized enterprises to implement right practices to improve environmental protection.

There are different motivators for companies to switch to 'green' in their supply chain (Fortes, 2009). Although some of the motivators are quite unclear, Wu & Dunn (1995) suggests that some organisations are simply doing this because it is the right thing to do for the environment. Perhaps some are more radical to environmental change, but others may not. Studies, however, have shown that profitability and cost reduction are some of the main motivators for businesses to become 'green' in the supply chain (Srivastava, 2007). Johnson (1998) argues that reverse logistics were motivated primarily by economic factors and not concerns about protecting the eco-system. Tibben-Lembke (2002) suggest that reverse logistics can only bring about profitability, reduction of waste, and advertising. Zhu & Sarkis (2004) took this idea further and argued that most of the 186 participants in their study all agreed that GSCM practices are only about win-win relationships on environmental and economic performance.

The purpose of this paper, however, is to discuss some of these issues and provide an overview of the academic perspective of the GSCM literature. This paper will then discuss GSCM as a strategy to gain competitive advantage. At the end, the paper closes with conclusions.

2. Literature Review

2.1 Green Supply Chain Management

GSCM is a kind of sustainable strategic development for enterprises in today's competitive workplace, which has emerged as a new innovative approach, to achieve both financial and environmental benefits simultaneously, by reducing environmental risk and impact (Hoek, 1999). Srivastava (2007) defined GSCM as incorporating environmental thoughts into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the customer moreover, the end-of-life cycle. With the more environmental concern during the past years the issue of environmental toxic waste incidental to industrial growth should be addressed together with supply chain management as the most important part in production chain, therefore contributing to initiatives of GSCM (Sheu & Chou, 2005). The main flow is as the following figure 1:

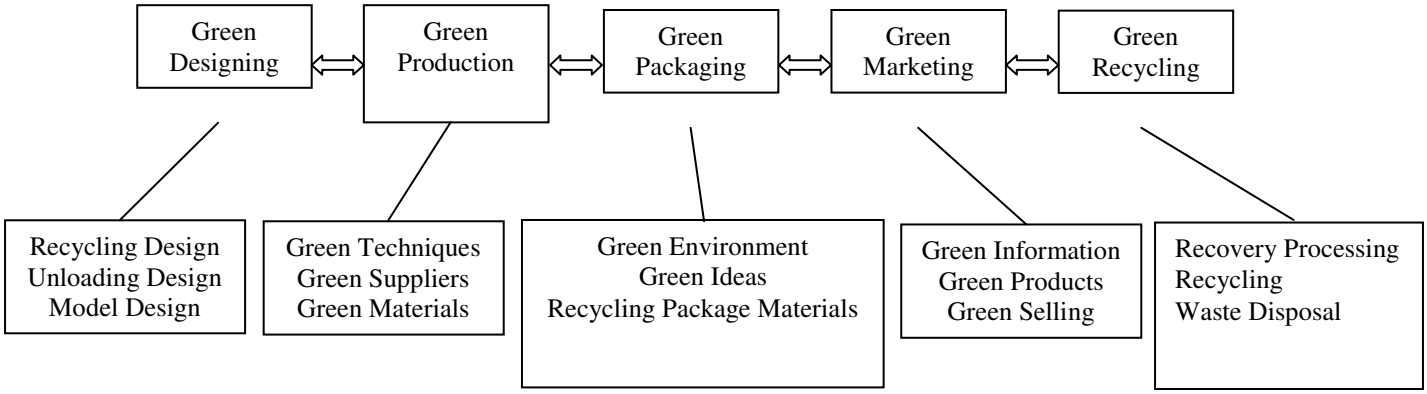

Figure 1. The flow of Green Supply Chain Management (Baojuan, 2009)

Porter & Linde (1995) concluded that companies' response to competitive business environment and regulation forces, by expanding strategies to increase productivity of resources, making them possible to improve their industrial and environmental performance at the same time. In this way firms want to be sustainable by acquiring

a sustainable supply chain (Sustainable Supply Chain Management). The sustainable firms display characteristic environmental behaviors on their supply chain, such as, pollution control, recycling or reverse logistics. Moreover they would be responsible for environmental accountability of their suppliers. Thus it needs to combine environmental liabilities to economic concern in order to help the future firm's sustainability by the means of delivering economic, social and environmental benefits simultaneously.

According to Hervani et al. (2005) it is not surprising that GSCM finds its definition in supply chain management. Adding the 'green' component to supply chain management involves addressing the influence and relationships of supply chain management to the natural environment. Motivated by an environmentally-conscious mindset, it can also stem from a competitiveness motive within organizations. GSCM is defined as "Green Purchasing + Green Manufacturing/Materials Management + Green Distribution/Marketing + Reverse Logistics".

Figure 2 shows this GSCM equation graphically, where reverse logistics "closes the loop" of a typical forward supply chain and includes reuse, remanufacturing, and/or recycling of materials into new materials or other products with value in the marketplace. The idea is to eliminate or minimize waste (energy, emissions, chemical/hazardous, and solid wastes). This figure is representative of a single organization's internal supply chain, its major operational elements and the linkage to external organizations. A number of environmentally conscious practices are evident throughout the supply chain ranging from green design (marketing and engineering), green procurement practices (e.g. certifying suppliers, purchasing environmentally sound materials/products), total quality environmental management (internal performance measurement, pollution prevention), environmentally friendly packaging and transportation, to the various product end-of-life practices defined by the "Re's" of reduction, reuse, remanufacturing, recycling. Expanding this figure, a number of organizational relationships could be found at various stages of this model, including customers and their chains, as well as suppliers and their chains, forming webs of relationships (Hervani et al., 2005).

2.2 Green Supply Chain Management as a Strategy to Gain Competitive Advantage

According to Simpson and Samson (2008) there are 4 (four) strategies to gain competitive advantage in the use of GSCM:

1. Risk-based Strategies

   The simplest strategy of GSCM with regard to inter-organizational investment resource development is one of risk minimization. Firms adopting this strategy are proposed to do so in response ostensibly to stakeholder requirements. Such a strategy is ideal for the organization that retains minimal internal environmental management resources or has only recently begun to consider the introduction of a supply chain greening program. It is based on minimal inter-organizational engagement. Such efforts might involve the inclusion of basic clauses in purchasing contracts for suppliers to meet all relevant regulatory requirements. Most frequently used with this approach is the cascading of an established international standard such as ISO 14001 (King et al., 2005). The use of an existing performance standard, an approach used initially by the Ford Motor Company with its suppliers and now more frequently by other organizations for their supply chains, offers: (a) established environmental performance benefits (Melnyk et al., 2003), (b) third party or arms-length management of performance, and (c) a system recognized globally by other organizations. This third aspect improves the efficacy of uptake by suppliers because the system is recognized by the market and other industry members, reducing the ambiguity of desired performance levels and minimizing the need for customer involvement. From the perspective of competitive advantage, however, the benefits are limited because of the ease of implementation, a lack of uniqueness, and a growing use by other supply chains. A similar approach to basic certification schemes is the use of broad statements within purchasing guidance or principles to include 'supplier activities' among the organization's environmental responsibilities. Such systems based on risk minimization only and managed in a climate of low relational investment only guarantee supply chain compliance with local or national regulations. The end result being that risk can be minimized and reputation enhancement is possible, but no additional innovation or complementary economic benefits are likely.

2. Efficiency-based Strategies

   A more complex and developing strategy in recent years has been the 'eco-efficiency' or 'lean and green' approach to GSCM. This type of strategy derives environmental performance benefits for the supply chain beyond mere regulatory compliance through the requirement for suppliers to meet operations based efficiency targets. Much of the environmental performance benefit arises from specific manufacturing practices that have been found to provide secondary environmental performance benefits. The point of

departure for the efficiency based strategy from the risk based strategy is the availability of dual economic and environmental performance benefits to the supply chain and the requirement for higher levels of engagement between customers and suppliers. The efficiency based strategy ties environmental performance to operational processes in the supply chain, and this strategy allows the extension of performance requirements into the supply chain that maximize economic performance and provide secondary environmental performance benefits through waste and resource use reductions. It requires more comprehensive and supply chain specific performance specifications than the simpler risk based strategy. It also requires a higher level of involvement between supply chain partners arising from the use of more complex inter-firm performance requirements. Using this strategy to facilitate greater efficiency in the supply chain does not require the development of co-specialized resources specific to environmental performance. The necessity for collaboration on efficiency, however, provides a facilitating role for context-specific, complex problems such as waste reduction and recycling (Klassen & Vachon, 2003). The strategy can provide a cost-reduction advantage to the supply chain and readily fits with pre-existing organizational goals of optimization. But the efficiency based supply chain strategy does not allow for more knowledge intensive environmental management activities such as product design, material substitution, or innovation. Product recalls because of a poor choice of low cost but hazardous materials represent the inherent risk in focusing only on efficiency in the supply chain. The efficiency-based strategy is considered technically weak but more socially complex than the risk based strategy.

3. Innovation-based Strategies

The innovation based GSCM strategy is distinct from the efficiency based approach because of its use of a supply chain environmental performance strategy that is more environmentally specific. Organizations are increasingly aware of the potential for narrow purchasing policies to in-source components or services from suppliers that may be legally non-compliant with environmental regulations or who themselves procure goods in an environmentally irresponsible way (Bowen et al., 2001). Some organizations have begun to guarantee more comprehensive product life cycle considerations for consumers of their products. Once a supply chain begins to consider specialized processes, technologies, or complex performance standards for suppliers such as chemical avoidance, the level of knowledge exchange and relational investment begins to change. Moving from an efficiency based GSCM strategy to a greater level of innovation or integration of environmental performance in supply chain and product design requires specialized environmental resources (Lenox & King, 2004). Keeping up to date with environmental legislation changes and training suppliers in environmentally relevant process changes requires more dedicated environmental resources, specialized personnel, and design. The development of such resources provides the conditions for an organization to shift from an efficiency based to an innovation based GSCM strategy. For products, the resources developed could be used to incorporate innovative environmental planning into specific product designs, characteristics, functionality, or life cycle related activities (e.g., service, repair, and recycling). At the process level they could be deployed to develop environmentally robust methods and systems for the production, distribution, and use of products.

4. Closed-loop Strategies

According to Kocabasoglou et al. (2007) closed-loop strategies are a more recent type of GSCM strategy and represent the most complex and collaborative form of this type of activity. Often referred to in its simplest form as 'reverse logistics', closing the loop involves the capture and recovery of materials for either re-manufacture (high-value) or recycling (low value). These materials can arise during production, as returned goods, post-use, and at end-of life. The closed-loop strategy ties or integrates environmental performance to the whole supply chain. Very few examples of coordinated recycling or closed-loop activity in the supply chain currently exist however. Prominent examples include Kodak's return and re-manufacture of its disposable cameras, Hewlett Packard's retrieval of used printer cartridges, and BMW's end-of-life vehicle requirements for suppliers (Guide & Wassenhove, 2002). The motivation for a closed-loop strategy remains low for basic reasons of poor and distributed control over the reverse supply chain, lack of available infrastructure, and the inability of supply chains to believe that such activity is economically viable. Designing and successfully using a closed-loop strategy presents one of the most complex endeavours for a single organization to undertake within its supply chain (Richey et al., 2005). In its simplest form, 'closing the loop' may involve product take-back and reverse logistics implemented only in the retail portion of the supply chain. In more complex 'closed-loop' systems, used or obsolete products and waste are taken back by the producer and remanufactured or recycled rather than being disposed of to landfill. The closed-loop strategy, however, represents an approach that seamlessly integrates issues of economic, operational, and

environmental performance. Organizations considering implementation of a closed loop supply chain require high levels of control over the capture and return of used materials. Goods need to be managed for quality considerations and aggregation of collection and sorting activities allows for the creation of economies of scale. Such a high level of integration, coordination across partners, and socially complex knowledge requires years of development effort. Socially complex, collaborative relationships provide the basic foundation for a closed-loop supply chain strategy.

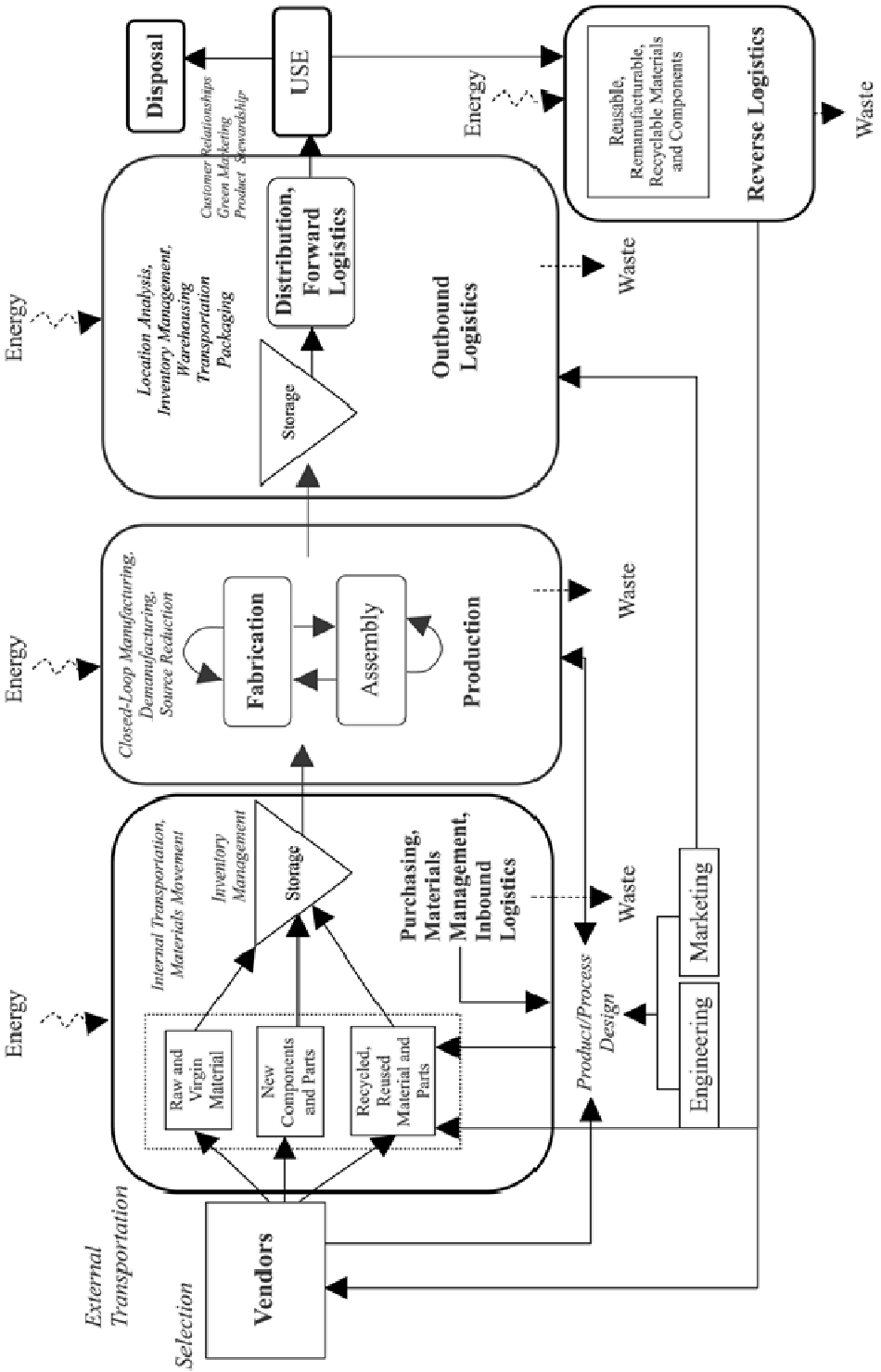

Figure 2. Graph of the GSCM (Hervani et al., 2005)

3. Conclusions

Business organizations today face a more complex and competitive environment than ever before (Porter & Stern, 2001). As trade barriers crumble and less developed countries enter the competitive marketplace, firms now confront a greater number of competitors able to introduce new products and services faster and cheaper than ever before (Garten, 1998). The ever expanding capabilities of information technology with the concomitant reduction in investment costs allow capital and information to flow almost instantly throughout many parts of the world. Furthermore, as consumers have become more discriminating and demanding (Ellinger et al., 1997), product life cycles have been shortened, forcing firms to contract time to commercialization (Lovelace et al., 2001) and provide higher levels of customer service and customized products. Consequently, most industries and firms have entered into a 'hyper competitive' marketplace characterized by an increase in competition, uncertainty, and complexity (Merrifield, 2000).

GSCM is a newer concept rather than SCM. A few literature reviews are found on GSCM. Accordingly GSCM defines as, adding "greening phase" to the supply chain activities, in all parts which leads to a more "integrated" and "co-operative" supply chain that finally produces better competitive advantages (Rao, 2002). As stated previously, GSCM requires ecological and social aspects of business practices at the same time. Basics of greening as a "competitive initiatives" are described in detail by Porter & Linde (1995). They argued that, resource saving, waste eliminating, and productivity improving can be the basic reasons for green initiatives and all the three parts can promote the firms competitiveness. Accordingly "greening" can lower the ecological impacts of business and also increases efficiency, creates the potential source of competitive advantages in an innovative manner. According to Simpson and Samson (2008) there are 4 (four) strategies to gain competitive advantage in the use of GSCM: (1) Risk-based Strategies, (2) Efficiency-based Strategies, (3) Innovation-based Strategies, and (4) Closed-loop Strategies.

Today, "green" as a competitive means is a widely recognized phenomenon. It is generally accepted that a company's contribution to environmentally sustainable development is dependent on an integration of environmental requirements into industrial products and processes (Porter & Linde, 1995). However, the result of the review and orienting empirical study indicates that even though much research has been conducted within the area, questions are still remaining. Many companies include sustainability in their business strategy, but the link between strategy and daily operations is often weak. One important challenge identified is the fact that environmental responsibility is often separated from production and operations management leading to constraints regarding environmental awareness within the organization. Hence, we argue that keeping environmental work separated from operations may lead to sub-optimization and overlooked opportunities for continuous improvements.

GSCM can reduce the ecological impact of industrial activity without sacrificing quality, cost, reliability, performance or energy utilization efficiency. It involves a paradigm shift, going from end-of-pipe control to meet environmental regulations to the situation of not only minimizing ecological damage, but also leading to overall economic profit. The area throws various challenges to practitioners, academicians, and researchers. Research in GSCM to date may be considered compartmentalized into content areas drawn from operations strategy. The primary areas of emphasis have been quality, operations strategy, supply-chain management, product and process technologies, which are collectively beginning to contribute to a more systematic knowledge base. It is reasonable to expect that these research areas will continue to hold the greatest promise for advance in the short term. However, more integrative contributions are needed in the longer term, including intra and inter-firm diffusion of best practices, green technology transfer and environmental performance measurement. One of the biggest challenges facing the field of GSCM is extending the historical 'common wisdom' about managing operations. Much research, management education and many practical applications have focused on buffering the operations function from external influences, including the natural environment, in order to improve efficiencies, reduce cost and increase quality. When the natural environment is considered, it is typically recognized or modelled as an external constraint, requiring operations to work within prescribed limits. Once this basic assumption is relaxed, a fundamental question arises about how to pursue research on green issues in operations: should this be considered a separate research stream with its own strategic framework or should green issues be integrated into existing operations management research frameworks and areas? While the complexity of green issues might favour the former approach, the greatest contributions can be achieved by pursuing opportunities within a more integrative framework (Srivastava, 2007). Finally, the preparation of GSCM didn't only based on interdependence relationship between business strategy and society but the integrated relationship between the both. Thus perceiving social responsibility as building shared value rather than as damage control or as a PR (Public relation) campaign will require dramatically different thinking in

business (Porter & Kramer, 2006). Porter & Kramer (2006) said that we are convinved, however, that CSR will become increasingly important to competitive success.

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