Purchasing and supply management sustainability: Drivers and barriers
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Abstract
While sustainability has garnered a great deal of attention in the popular press, it is not well defined, and little is known about the actual drivers and barriers to adopting environmentally sustainable practices within organizations. This is particularly true with regard to implementation in the purchasing and supply management (P/SM) function. This study reviews the sustainability literature and defines supply management sustainability (SSM) and its components. Additionally, a multi-method approach was utilized consisting of an extensive review of the sustainability literature, a multi-stage Delphi analysis with a panel of twenty-one P/SM executives, and interviews with nineteen additional P/SM executives. The purpose of this study was to identify the drivers and barriers currently facing P/SM sustainability implementation efforts. The results indicated that top management initiatives and government regulations currently drive P/SM sustainability efforts while investments in sustainability and economic uncertainty are a hindrance to these programs.

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1. Introduction

This research identifies the drivers and barriers to supply management’s implementation of sustainable purchasing practices. The research is based on a Delphi analysis of 21 leading supply management executives from national to multinational companies headquartered in the United States. A review of the research uncovered significant discrepancies in the definitions of sustainability and a significant lack of understanding of the drivers and barriers in Purchasing/Supply Management (P/SM) sustainability efforts. After conducting a thorough review of the general and supply management sustainability literature, we have developed a definition of sustainable supply management (SSM).

The lack of clarity in the literature and void in standards for sustainability was found in a previous study of CEOs (Berns et al., 2009) to hamper implementation efforts. In P/SM, Walker et al. (2008) identified a list of drivers and barriers in their work with seven U.K. based firms. We extend both of these works by identifying and analyzing a more comprehensive list of the drivers and barriers of sustainability in supply management. Tests were then conducted on a group of senior level purchasers using a Delphi approach.

The results of the Delphi study indicate that such confusion and lack of consensus extends to supply managers who view sustainability somewhat differently. Top management initiatives and compliance to government regulations appear to be the key drivers to supply management sustainability efforts. Conversely, barriers to sustainability are not extensively discussed in the literature but were found to include supplier and buyer investments in sustainability along with economic uncertainty. This research paper begins with a historical review of the sustainability literature then specifically reviews the literature which applies to the supply chain and supply management. Next, we provide a definition of sustainable supply management (SSM) to fill a gap in the literature and provide future researchers with a foundation for their work. Following this is a description of the research purpose, description of the research sample, the Delphi analysis and results, and implications for managers.

2. Literature review

Over the past few years, global organizations have recognized sustainability as an increasingly important strategic goal (Closs et al., 2011). Linton et al. (2007) propose that sustainability as an integrative concept is following the same trajectory as global warming by both the public and private sectors. The magnitude of this concept is shown by the global interest in sustainability as evidenced by the European Union (EU) which is a highly influential proponent of sustainability (Linton et al., 2007). They further state that if the EU’s earlier influence in the area of quality...
management and the global adoption of ISO 9001 certification is any indication, the EU emphasis on sustainability is likely to be a strong harbinger of actions by others. The UK organizations, Business in the Environment and Chartered Institute of Purchasing and Supply (1997), developed guidelines for tackling environmental issues in the supply chain early in the 21st Century (Preuss, 2001).

2.1. Evolving views on sustainability

The last twenty years have seen growing pressure on businesses to pay attention to the environmental and resource consequences of their products and processes (Kleindorfer et al., 2005). Starik and Marcus (2000) state two common explanations of the emergence and study of “greening organizations” are: (1) this development was the evolving outcome of the environmental and social movements that received considerable attention in the 1960s and 1970s; and (2) the perception that organizational entities have or could have significant impacts on their respective ecosystems became widely held, providing various motivations for organizational change. One aspect of these overall themes is green supply chain management issues and how organizations can maximize the potential of their suppliers to adopt green supply chain management practices (Walker et al., 2008).

Table 1 highlights the key themes in the sustainability literature. Environmental compliance was considered a “fringe” issue in the 1960s and 1970s and elicited little discussion at executive levels (Walton et al., 1998). In the late 1960s, with environmental protection gaining prominence in the political arena, producers of commodities focused on the externalities connected to their products by national and local governments with regulative approaches (Vermeulen and Seuring, 2009).

The period from 1970 to 1985 saw the beginning of the integration of environmental concerns and business and marketing strategies. The beginning of a strategic and coherent approach to handling environmental concerns can be traced to this stage (Menon and Menon, 1997). During the 1980s, research was conducted on the various aspects of organizational greening (Starik and Marcus, 2000). In this time period, several leading edge firms started to change their corporate positions from ignoring or even resisting environmental pressures to trying to embrace, incorporate, and even profit from them (Schot and Fisher, 1993; Winn, 1995; Starik and Marcus, 2000). In the late 1980s evidence indicates that businesses began internalizing the concept of sustainability into their own value sets (Vermeulen and Seuring, 2009; Sharma et al., 2010).

Beginning in the 1990s, the sustainability focus shifted to “green marketing” to gain or maintain a competitive advantage (Stone and Wakefield, 2001). One popular approach used in the 1990s was the argument that environmental sustainability could contribute to economic profitability as well as to competitive advantages (Porter and van der Linde, 1995; Schmidheiny, 1992; Wald, 2006; Lash and Wellington, 2007; Sharma et al., 2010). In the 21st Century, overall sustainability issues moved into the supply chain. Researchers began to probe: consideration of product life cycle during material selection; impact of green purchasing on a firm’s supplier selection; waste management; packaging; and regulatory compliance (Kaiser et al., 2001; Zhu and Geng, 2001; Theyel, 2001; Min and Galle, 2001; Sarkis, 2001).

2.2. Sustainability—a lack of consensus

Although global organizations have recognized sustainability as an increasingly important strategic goal, there are many definitions, focuses and business activities associated with sustainability. Berns et al.'s (2009) research found that there is not a single established definition for sustainability. Linton et al. (2007) define sustainability as “using resources to meet the needs of the present without compromising the ability of future generations to meet their own needs.” This is the definition put forth previously by the World Commission on Environment and Development (WCED, 1987). Savitz and Weber (2006) suggest that a sustainable company is one that creates profit for its shareholders while protecting the environment and improving the lives of those with whom it interacts.

Sustainability in the supply chain has taken a number of different labels in the literature including green supply chain (Bowen et al., 2006), socially responsible purchasing (Carter and Jennings, 2002; Carter, 2004a, 2004b), or closed loop supply chain (Seitz and Peattie, 2004; Guide and Van Wassenhove, 2009; Krause et al., 2009). Other concepts used in the literature such as corporate social responsibility have similar definitions. A classic definition of CSR is “the firm’s consideration of, and response to, issues beyond the narrow economic, technical, and

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<thead>
<tr>
<th>Time frame</th>
<th>Major theme(s)</th>
<th>Key references</th>
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<tbody>
<tr>
<td>1960s</td>
<td>Compliance with government regulation</td>
<td>Vermeulen and Seuring (2009)</td>
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<td></td>
<td>Initial actions to integrate sustainability into business</td>
<td>Walton et al. (1998)</td>
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<td>1970s</td>
<td>Change of corporate position to embrace sustainability</td>
<td>Costanza et al. (1995)</td>
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<td>Focus on environmental and resource consequences of products and processes</td>
<td>Gladwin et al. (1995)</td>
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<td>Incorporating sustainability to provide a competitive advantage</td>
<td>Hawken (1993)</td>
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<td>1980s</td>
<td>Promotion of sustainability and the realization of the value of sustainability as a strategic goal and in the supply chain</td>
<td>Menon and Menon (1997)</td>
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legal requirements of the firm” (Davis, 1973; Salam, 2008). Carroll (1991) maintains that the responsibilities of a business go beyond a base level of economic responsibility, to include legal, ethical, and discretionary responsibilities (Salam, 2008). Matten and Moon, 2008 state that corporations have recently begun to adopt the language and practice of CSR, particularly in Europe, but also in Africa, Australia, South America, and Southeast Asia.

Overall there is lack of consensus in the definition of sustainability. Despite these confusions in defining sustainability, Berns et al. (2009) found that businesses were unified in their view that sustainability will be a major force that will need to be addressed. Further, they felt that it will have a determining impact on the way that businesses think, act, manage, and compete. Fig. 1 illustrates the broad landscape comprising the sustainability literature and provides a map for the discussion which follows.

2.3. SCM sustainability

Supply chain management has traditionally been viewed as primarily operational, with a major focus on reducing cost. Over the past ten years, this perspective has broadened substantially as firms realize that they require effective supply management strategies to enhance competitiveness. In a financial world that seeks increased return on investments, effective supply chain management can help deliver increased revenue, lowered costs, reduced assets, and improved sustainability (Linton et al., 2007; Closs et al., 2011).

Salam (2008) discusses socially responsible supply management activities, or PSR, and how they affect costs. Carter and Jennings (2002) identify key drivers and facilitators of PSR as a people oriented culture, top management leadership, employee initiatives, and customer pressures. Although the dimensions of PSR appear to mirror those of CSR, many of the specific activities appear to be unique to purchasing/supply chain management.

Srivastava (2007) defined Green SCM 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.” This term is gaining popularity as firms realize that customers and other stakeholders do not always distinguish between a single company and its partners in the supply chain (Rao and Holt, 2005; Kovacs, 2008; Large and Thomsen, 2011).

According to sustainability, the British organization credited with coining the vision of the triple bottom line over a decade ago, “The triple bottom line (TBL) focuses corporations not just on the economic value they add, but also on the environmental and social value they add—and destroy” (Elkington, 1998). Foerstl et al. (2010) further supports the definition of sustainability as the pursuit of the tripartite of economic, environmental, and social performance.

2.4. Defining sustainable supply management (SSM)

While there are several definitions of sustainability, none have specifically addressed supply management sustainability. Incorporating and extending these various definitions, we define “sustainable supply management” (SSM) as the extent to which supply management incorporates environmental, social, and economic value into the selection, evaluation and management of its supply base.

Historically, supply managers have focused almost exclusively on the economic value when evaluating and selecting suppliers (Monczka et al., 2009). However, this started to change early in the 21st century as researchers posited that there was value in considering environmental and social considerations (Handfield et al., 2002; Carter, 2004a, 2004b). Closs et al. (2011) argue that sustainability is an important value consideration across the entire supply chain. Thus, the SSM definition recognizes and incorporates the broader value considerations needed to evaluate and select suppliers. SSM practices provide a wider lens that recognize the need to consider environmental and social values in addition to economic ones that will help the organization achieve its overall goals in a profitable and sustainable manner. If SSM is to be incorporated into the fabric of the organization, then it must be prompted by certain organizational forces that we term as drivers.

3. Drivers of sustainability

In our research we were unable to find a comprehensive list of sustainability drivers. As a result, one of the objectives of this research was to identify the drivers of P/SM sustainability efforts. We also attempt to show how these drivers are associated with different corporate initiatives. Previous research identified motives for corporate ‘greening’ such as regulatory compliance, competitive advantage, stakeholder pressures, ethical concerns, events and top management initiative (Bansal and Roth, 2000; Dillon and Fisher, 1992; Lampe et al., 1991; Lawrence and Morell, 1995; Vredenburg and Westley, 1993; Winn, 1995).

Sroufe (2003) identifies growing environmental regulations, government pressures, international certification standards such as the International Organization for Standardization, (ISO) 14000, changing customer demands, and managers recognizing pollution as waste (Kleiner, 1991; Porter and Van Der Linde, 1995) as reasons why firms must now develop environmental policies for their manufacturing plants and supply chain partners while being consistent with new regulations (Rondinelli and Vastag, 1996).

The following sections identify the most commonly cited drivers of sustainability.

3.1. Involvement of top management

Members of top management are instrumental in encouraging firms to evaluate their role in society and are responsible for the firms’ environmental management leadership (Anderson and
Bateman, 2000; Lawrence and Morell, 1995; Winn, 1995). They are also a strong internal political force that can foster corporate environmentalism (Banerjee et al., 2003). Bansal and Roth (2000) state that top management team members (Anderson and Bateman, 2000; Lawrence and Morell, 1995; Winn, 1995) and company values (Buckholz, 1991) are instrumental in encouraging these firms to evaluate their role in society.

Banerjee et al. (2003) identified four antecedents to corporate environmentalism: public concern; regulatory forces; competitive advantage; and top management commitment. They found that corporate environmentalism is related to all four antecedents and that industry type moderates several of those relationships. The influences of regulatory forces, public concern and competitive advantage were all significantly mediated by top management commitment and moderated by industry type.

3.2. Government regulation

Previous research by Lampe et al. (1991), Lawrence and Morell (1995), Post (1994) and Vredenburg and Westley (1993) showed the importance of legislation as a driver for corporate ecological responsiveness has been widely recognized (Bansal and Roth, 2000). Escalating penalties, fines, and legal costs have punctuated responsiveness has been widely recognized (Bansal and Roth, 2000). Furthermore, firms can avoid expensive capital reits by keeping ahead of legislation (Lampe et al., 1991). According to Rondinelli and Vastag (1996) firms may be reacting to an increasingly difficult regulatory environment or responding to market pressure in adopting environmental management practices (Montabon et al., 2007). Preuss (2001) found the motivation for environmental initiatives in manufacturing companies to date, centers around compliance with legislation and cost or quality considerations. Berns et al. (2008) research found that government legislation is the sustainability-related issue with the greatest impact on businesses.

3.3. Financial benefits

Studies have concluded that corporate social responsibility does pay off financially. Waddock and Graves (1997) concluded that corporate social performance and profitability are significantly and positively related. Bansal and Roth (2000) examined why companies go green and refined a model that explained corporate ecological responsiveness. They identified three motivations: competitiveness (potential for ecological responsiveness to improve long-term profitability); legitimization; and ecological responsibility that induce corporate ecological responsiveness. They found that organizational self-interest, including elements of both competitiveness and legitimacy, was needed to fuel the movement toward eco-responsibility.

Given the public and political pressure on firms to turn green, Stone and Wakefield (2001) studied the orientation of firms toward environmental issues and their subsequent business performance. Their findings suggest that firms that are responsive to eco-oriented issues perform better in the marketplace.

Economic opportunities drive corporate ecological responsiveness. By intensifying production processes, companies can reduce their environmental impact while simultaneously lowering the costs of inputs and waste disposal (Cordano, 1993; Lampe et al., 1991; Porter and Van Der Linde, 1995).

Pullman et al. (2009) found that current sustainability programs indirectly help the economic bottom line of the company. The ISO 14001 system may help prevent expensive environmental non-conformances, but often has a company go above and beyond the legal requirements of applicable regulatory agencies. Ganesan et al. (2009) state that social responsibility perceptions affect the images of brands and firms, the propensity of consumers to buy specific brands and patronize certain retailers, and the financial performance of firms (Luo and Bhattacharya, 2006).

3.4. Competitive advantage

An increasing number of firms are engaging in “green marketing” to gain or maintain a competitive advantage. Previous research found that excellence in protecting the environment created opportunities to achieve competitive advantage (Starik and Marcus, 2000). Walton et al. (1998) reviewed integrating environmental management with the day to day processes of the organization and concluded that purchasing and supply chain managers can have a major impact on the ability of a company to establish and maintain a competitive advantage through environmentally-friendly practices (EFP).

Orsato (2006) states that “managers need to identify circumstances that favor the generation of both public and corporate benefits of sustainability initiatives.” He further presents a framework to categorize types of competitive environmental strategies that can be utilized by managers to optimize the economic return on environmental investments and transform these investments into sources of competitive advantage. Orsato (2006) identifies four types of environmental strategies that are based on the structure of the industry in which the firm operates, the position within that industry, the types of markets the company serves, and its capabilities. They include eco-efficiency, beyond compliance leadership, eco-branding, and environmental cost leadership.

The four types of environmental strategies can be used as a basis from which they can prioritize environmental investments.

3.5. ISO certification

Handfield et al. (2002) found that the movement towards greater environmental responsibility is a result of several recent developments including the introduction of the ISO 14000 certification standard and the escalating emphasis on waste reduction from external or governmental agencies. They further state that the need to be environmentally friendly is beginning to influence decision making in product design, process design, manufacturing practices and purchasing.

Montabon et al. (2007) found evidence in both extant literature and anecdotal experiences of firms suggests that environmental management practices are becoming increasingly popular due to the release of voluntary and international environmental standards. Since the release of the ISO 14001 standard there has been additional pressure on some industry supply chains to address environmental performance through the use of environmental management systems (Zuckerman, 2000; Gordon, 2001). In addition to ISO 14001, firms wishing to sell in the European Union must comply with WEEE and RoHS rules that are laid down at the European level and then re-implemented at each country level (taken from http://www.buyusa.gov/europeanunion/weee.html accessed 7-23-2011). WEEE is an acronym for “Waste Electrical and Electronic Equipment” and its purpose is to prevent the buildup of electrical and electronic waste by encouraging reuse, recycling and other forms of waste reduction. RoHS is an abbreviation for “Restriction of Hazardous Substances” and restricts the use of certain hazardous substances such as lead in electronic equipment.

3.6. Customer demand

During the 1960s and 1970s the emphasis was mostly toward political solutions, environmental and social ills (Wells, 1990). However, in the 1990s, the focus was on consumer purchase
behavior. Roberts (1996) found that ecologically conscious consumers of the 1990s differ from their predecessors. The individual consumer’s belief that they can help solve environmental problems was found to be the best predictor of ecologically conscious consumer behavior.

Stakeholders have played a key role in increasing corporate responsiveness with regards to ecology. Customers, local communities, environmental interest groups and even the natural environment itself encourage companies to consider ecological impacts in their decision making (Berry and Rondinelli, 1998; Buckholz, 1991; Lawrence and Morell, 1995; Starik, 1995). Berns et al. (2009) found that consumer concerns about sustainability were a significant impact on the businesses in their study. Additionally, consumer concerns were viewed as a more critical force in sustainability in companies outside the U.S. and Europe.

4. Barriers

While there are forces driving firms to sustainability, on the opposite side, there are factors that hinder a firm’s effort to adopt sustainable practices which we discuss below. These factors are: (1) lack of consensus at the CEO level; (2) costs of sustainability and economic conditions; (3) lack of sustainability standards and appropriate regulations; and (4) misalignment of short term and long term strategic goals.

4.1. Lack of consensus at the CEO level

Berns et al. (2009) found a lack of clarity regarding sustainability and what it means to an organization amongst business leaders. Companies do not have a common definition or language for discussing sustainability, some define it more narrowly, whereas others define it more broadly, while still others do not have a corporate definition. Additionally, the reward for efforts are too loosely defined and not collectively understood within the organization. Often there is not an understanding of how to measure progress once actions are undertaken.

Sharma (2000) found that in the Canadian oil and gas industry, environmental strategies were associated with managerial interpretations of environmental issues as either threats or opportunities. The extent to which some of these firms went further in incorporating environmental concerns into decision making was heavily dependent on the degree to which their managers perceived these issues as opportunities and not threats.

4.2. Costs of sustainability and economic conditions

Many companies are convinced that the more environmentally friendly they become, the more the effort will erode their competitiveness. They believe it will add to costs and will not deliver immediate financial benefits (Nidumolu et al., 2009).

On a short term basis, going green can be an expensive undertaking. A company that decides to initiate a green revolution will have to front the cost for a wide array of upgrades from more energy efficient machines to recycled printer paper. There are a variety of other related expenses when considering green changes, specifically to manufacturing processes. Green materials tend to be more expensive and raise the product’s overall cost (Koplin et al., 2006).

Hoffman (2008) found that while three quarters of logistics contracts included environmental impact targets, only 46% provided for the cost of compliance. They further predicted that shippers will continue to require green initiatives, but also continue to transfer the cost to service providers.

Berns et al. (2009) provide a good indication that sustainability has staying power. Less than one fourth of their survey respondents indicated that they had pulled back on their commitment to sustainability during the downturn.

4.3. Lack of sustainability standards and appropriate regulations

Koplin et al. (2006) states that globalization allows working with numerous suppliers to get raw materials and preliminary products, and each first tier supplier often depends on a multi-level supply chain for their own production. Such a structure makes it difficult for a company to handle the whole supplier network and thus increases the complexity of purchasing. They further state that the global nature of today’s business environment requires large supply chains to adequately serve different markets on various continents. Each continent has different acceptable standards of sustainability, as do the varying countries that comprise it. Gaining cooperation from such companies could be difficult and not all suppliers will agree to the restrictions placed upon them, hence limiting supply options (Koplin et al., 2006). The various regions of the world face their own unique challenges to building and sustaining a global supply chain because of different environmental circumstances in various locations. Also, it is difficult to monitor these companies to ensure they are complying with set standards (Koplin et al., 2006).

Compliance is complicated as environmental regulations vary by country, by state or region, and even by city (Nidumolu et al., 2009). Banerjee et al. (2003) indicate that environmental regulations get top management’s attention. Additionally, top management’s direct involvement in environmental issues is more prevalent in firms that perceive regulations as a major threat or whose customers come from the environmentally-friendly segment.

4.4. Misalignment of short term and long-term strategic goals

Berns et al. (2009) found a lack of understanding among business leaders as to what sustainability means to a company. Reasons for this include: (1) managers lack a common fact base about the full suite of drivers and issues that are relevant to their companies and industries; (2) companies do not share a common definition of language for driving sustainability as a definition can vary from narrow to broad, to none at all; and (3) the goal of efforts is often defined very loosely and not collectively understood within the organization. Additionally, there is often no understanding of how to measure progress once actions are undertaken.

Their research found that a majority of businesses did not have a strong business case for sustainability. This was attributed to: (1) difficulty in forecasting and planning beyond the one-to-five year time horizon that is typical of most investment frameworks; (2) difficulty in gauging the system-wide effects of sustainability investments; and (3) planning amid high uncertainty including regulation and customer preferences.

5. Research propositions

As previously shown in Fig. 1, sustainability is a very broad and evolving issue. There is a lack of consensus on what sustainability means. This becomes problematic when translating it into corporate programs. Likewise, supply chain sustainability efforts run a gamut from closed loop supply chains, to purchasing social responsibility, to green purchasing. Part of our contribution was to take the various definitions and develop a specific definition of supply management sustainability (SSM) based on the disparate literature.
The SSM definition adds to the literature, but does not address the progression or stages of SSM in organizations. Friedman and Herman (1998), proposed a “Ladder of Sustainability,” and indicate that steps exist in helping organizations to achieve sustainability. The bottom rung of the ladder starts with the organization’s products and services. Issues include whether nontoxic, renewable materials and sustainable manufacturing practices are used. The next rung involves analyzing the sustainability of company processes. This is followed by the alignment of the business model with sustainable practices, i.e., does the business model focus on goals other than economic value? Once the business model is realigned, the entire company focuses on sustainability. This extends to the company’s brand identity. Now the firm extends its efforts up the supply chain to its suppliers. Finally, at the top rung the company takes an advocacy role for sustainability. What is important is not the actual rungs on the ladder, but how far up the ladder an organization must have progressed to enable SSM. This would indicate that a firm needs to have advanced practices to be at the top of the ladder and enable SSM.

Other researchers have classified three approaches in Green Supply Chains, namely reactive, proactive and value-seeking (van Hoek, 1999). Given this lack of consensus, there is a need in the literature to uncover the drivers and barriers to SSM to reach the levels necessary to fully implement SSM.

The intent of this research was to uncover both the drivers and barriers to SSM sustainability efforts. Berns et al. (2009) did this with CEOs and were not able to find consensus on sustainability practices. Further, it was more difficult to make a value creating business case for CEOs and were not able to find consensus on sustainability practices. This is followed by the alignment of the business model with sustainable practices, i.e., does the business model focus on goals other than economic value? Once the business model is realigned, the entire company focuses on sustainability. This extends to the company’s brand identity. Now the firm extends its efforts up the supply chain to its suppliers. Finally, at the top rung the company takes an advocacy role for sustainability. What is important is not the actual rungs on the ladder, but how far up the ladder an organization must have progressed to enable SSM. This would indicate that a firm needs to have advanced practices to be at the top of the ladder and enable SSM.

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P1: From the perspective of CPOs and supply managers, the importance of drivers of sustainable supply management (SSM) will differ across organizations.

Top management is responsible for directing sustainability efforts (Anderson and Bateman, 2000). The P/SM function is increasingly becoming more strategic in its focus (Monczka et al., 2009). CEOs and CPOs should be closely aligned in their pursuit and attainment of organizational goals and objectives. In an examination of the strategy-making process, Hart (1992) highlights that many researchers have “advocated the importance of top management vision and the nurturing of strong corporate values in the strategy process” (Conger and Kanungo, 1988; Kotter, 1988; Pascale, 1985; Peters, 1987; Weick, 1987). Still, no strategic vision can take hold without the “commitment and involvement of organizational members,” therefore, highlighting an integrative process, led by top management (Hart, 1992).

Hence, the following proposition is made:

P2: Sustainable supply management (SSM) efforts will follow top management strategic initiatives.

We have discussed the barriers to sustainability adoption in the literature review. One of the most influential factors that affect organizational plans is economic conditions. Our definition of SSM is based on economic, social and environmental components. It has been previously found that among CEOs, economic conditions did not affect sustainability efforts (Berns et al., 2009). Such economic conditions include times of economic prosperity as well as recession conditions. Therefore, we propose that:

P3: Sustainable supply management (SSM) efforts should not be affected by the economic environment.

6. Research methodology

6.1. Research sample

This research utilizes the Delphi method to explore the drivers and barriers of sustainability in P/SM across a diverse sample of firms. Twenty-one high-level supply managers in U.S. based national and multinational firms comprised the Delphi sample. Additionally, comments on sustainability practices were obtained from another nineteen organizations and used to enrich the discussion of the results from the Delphi panel. These nineteen participants were P/SM executives interviewed at industry conferences. Their input was used to provide an improved understanding of sustainability practices and P/SM. The additional firms were interviewed at the end of Phase III of the Delphi to provide an additional check on the validity of the research instrument. Their feedback served to qualitatively enhance the Delphi results. Table 2 lists the primary business of the forty organizations in

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<th>Total sample (40 organizations)</th>
<th>Delphi sample (21 organizations)</th>
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<tr>
<td><strong>Primary business</strong></td>
<td><strong>Manufacturing</strong></td>
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<tr>
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<td>Consumer products (2)</td>
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<td>Pharmaceutical (5)</td>
<td>X</td>
</tr>
<tr>
<td>Railroads</td>
<td>X</td>
</tr>
<tr>
<td>Renewable energy manufacturing</td>
<td>X</td>
</tr>
<tr>
<td>Retail (2)</td>
<td>X</td>
</tr>
<tr>
<td>Technology manufacturing (6)</td>
<td>X</td>
</tr>
<tr>
<td>Technology services</td>
<td>X</td>
</tr>
<tr>
<td>Transport aerospace</td>
<td>X</td>
</tr>
</tbody>
</table>

( )=number of firms in that category.
alphabetical order and a subset list of the twenty-one Delphi participants.

All forty companies were private sector organizations and were larger firms with annual sales revenue over a billion dollars. The universities were also private. They were not directly supported by government funding, but received most of their revenue from student tuition and endowments. Since P/SM sustainability efforts are applicable in all organizational settings, a diverse sample should strengthen the research. Taking this into consideration, the Delphi study included manufacturers, service providers, retailers and universities.

The supply managers selected for the Delphi panel were chosen because of their commitment to sustainability, their extensive experience in supply management and their high-level position within the organization. As a group, the companies were committed to sustainability with over one half of the supply management executives employed by companies ranked in Newsweek’s “Green Rankings 2010” report and/or were members of CorporateRegister.com, a membership-based website devoted to the reporting and sharing of corporate responsibility and sustainability information. Additionally, as senior managers within their respective organizations, each respondent possessed the specific knowledge of their organization’s strategy with regards to sustainability and also played a role in shaping that strategy. Therefore, the experts in this study were able to evaluate the drivers and barriers to sustainability within the P/SM function.

Phase I of the Delphi study was initiated in January of 2009 and Phase III was completed during August of 2009. To preserve the confidentiality and independent responses required of the Delphi process, all communication was conducted by individual email to each respondent’s business email address.

6.2. Benefits of the Delphi method

The primary method of analysis used in this study was the Delphi method. The Delphi technique is characterized “as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem” (Linstone and Turoff, 1975).

Linstone and Turoff (1975) indicate that the Delphi approach is used primarily when one of the following properties exist: (1) the problem does not lend itself to precise analytical techniques, but can benefit from subjective judgments on a collective basis; (2) the problem does not lend itself to precise analytical techniques, but can benefit from subjective judgments on a collective basis; (3) the problem does not lend itself to precise analytical techniques, but can benefit from subjective judgments on a collective basis; (4) the problem does not lend itself to precise analytical techniques, but can benefit from subjective judgments on a collective basis; (5) the efficiency of face-to-face meetings can be increased by a supplemental group communication process; (6) the efficiency of face-to-face meetings can be increased by a supplemental group communication process; (7) the heterogeneity of the participants must be preserved to assure validity of the results, i.e., avoidance of domination by quantity or by strength of personality (“bandwagon effect”).

Existing research indicates there is no formula for determining a proper number of Delphi study participants. Ten to fifteen participants are adequate for Delphi studies with homogenous groups (Linstone and Turoff, 1975). While under certain other circumstances, as few as four participants may perform well (Brockhoff, 1975; Delbecq et al., 1975). Thus it can be concluded that the twenty-one participants in this group are more than adequate.

The Delphi methodology is appropriate for this research for several reasons. First, the Delphi method allows for opinions to be gathered and attempts to reach consensus among a group of experts regarding sustainability in P/SM. Second, it is the first attempt to systematically measure the SSM drivers and barriers across a broad sample of organizations. Finally, insights gained by the Delphi study can be used as a platform to facilitate future research as well as increase understanding of SSM practices.

6.3. Three-phased approach to measuring P/SM sustainability

This study followed the three overarching phases of data collection in a Delphi study: (1) discovering the issues; (2) determining the most important issues; and (3) ranking the issues (Schmidt, 1997). Fig. 2 summarizes the process that is described in detail below.

This research focused on the drivers and barriers that P/SM managers encounter in implementing sustainability. As previously mentioned, a literature review was performed to uncover an initial set of drivers and barriers to sustainability. Next, supply chain and purchasing experts from three different organizations were asked to submit their sustainability issues. All three experts had work experience in the area of supply management sustainability. They were employed at large organizations, two in the private sector and one in the public sector.

This process provided a comparison to the literature and the addition of critical issues facing P/SM managers. Finally, it provided face validity to the Delphi instrument. At these face to face meetings, the experts were asked to describe each issue in detail. This helped to mitigate potential misinterpretation by the researchers if respondents provided the same issue, but used different terms. Finally, all responses were consolidated into a single list and issues having the same definitions were deleted (Schmidt, 1997; Schmidt et al., 2001).

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The second phase of the Delphi process involved sending the final list generated from the pre-Delphi activity to the twenty-one person expert panel. The intent of this was to further pare down the list of drivers and barriers to sustainability so that they could be appropriately ranked (Schmidt, 1997). The Delphi panel was sent a randomly ordered, consolidated list generated from the first phase of the study and asked to rank the issues in terms of their overall importance. Normally, the ranking is limited to the top 10% or top twenty issues (whichever is fewer) in order to reveal the most critical ones. According to Schmidt (1997), limiting the number of issues ranked by each respondent forces a result to emerge. The initial list of 17 drivers and 16 barriers was reduced to a final ten drivers and barriers.

The third phase of the Delphi involved ranking the consolidated lists for both drivers and barriers to sustainability that were developed and refined during the first and second phases. The study participants were asked to avoid assigning the same rank to issues that they believe are of equal importance (Schmidt, 1997). Tied rankings were, however, compensated for by computing Kendall’s Coefficient of Concordance (W), a commonly used statistic for evaluating consensus, for significance. If Kendall’s W fails to show consensus amongst the panel experts, the respondents can be told, for example, “There was no agreement among the panel members on the relative ranking of these items in the previous round” (Schmidt, 1997). As Schmidt (1997) indicates, however, the statistical significance of W is not a sufficient criterion to stop the progress of the survey. Even very small values of Kendall’s W may be significant. Therefore, researchers must consider the value of W as an indication of the strength of consensus. The third phase was repeated until no change in the rankings occurred.

7. Delphi study results

7.1. Delphi method phase I and phase II

In Phase I the researchers had an a-priori list of drivers and barriers from the literature review and these were used as a “preliminary list.” Face to face meetings were conducted with the three executives to collaborate on the creation of each list. Following these meetings, 17 drivers and 16 barriers were agreed upon for P/SM in striving to implement sustainable practices. The results of the first phase, which served as the basis for Delphi respondents to further pare down and rank, are provided in Table 3.

Following the creation of the drivers and barriers to sustainable practices, the Delphi process moved on to the second phase. During Phase II, the 21 P/SM managers were asked to further pare down the lists generated during Phase I, by ranking the top ten drivers and barriers. Respondents were asked to provide their rationale for each driver and barrier that they suggested be dropped from the instrument.

Respondents provided significant feedback on Phase II. The results indicated that several factors from both lists needed to be dropped, revised or added. In total, six drivers were dropped, one new one was added, one item was reworded to make it more specific to P/SM, and two separate drivers were combined into one. The rationale provided by the respondents for dropping each item was summarized in the following discussion. “Public relations is the main driver” was dropped due to the belief that, in P/SM, there were more pressing drivers.

“Generates revenue growth” was dropped due to the agreement among respondents indicating that acquiring green goods/services from their suppliers were not directly linked to revenue growth in their organizations. There are several issues in the popular press on how green IT systems result in energy savings through the construction of environmentally sustainable data centers and warehouses (Babcock, 2009). However, the item “Green IT systems integration practices” appears to be more of an IT department issue than a P/SM issue. “Purchasing initiated our green initiatives” was dropped since the respondents felt their initiatives supported sustainable strategies, but did not necessarily initiate them. “Reusing/recycling resources” is encouraged in all sustainability efforts. These P/SM managers felt it to be too broad to be incorporated and not necessarily a top ten driver.

“End customers driving green efforts making it a requirement or a strong recommendation” was an item that respondents suggested be reworded more specifically to reflect how it applies to P/SM. Respondents felt that this often came from marketing

![Table 3 SSM drivers and barriers-Delphi panel.](image-url)
and was restated to read “Required by a customer’s contract solicitation on RFP or RFQ.” The final item suggested for addition to the list was that “Offering sustainable product/service solutions is considered a legitimate competitive differentiator.” This reflects the view that these P/SM executives feel their sustainability efforts can lead to a competitive advantage and is a proactive driver for sustainability as opposed to the previously mentioned and mostly reactive driver of responding to sustainability due to a customer request.

Finally, “ISO 14000 compliance dictates our efforts” and “Compliance with international standards such as European standards, WEEE and RoHS” were combined, as panel experts felt “Compliance with international standards such as European standards was a proactive driver for sustainability as opposed to the previously mentioned and mostly reactive driver of responding to sustainability due to a customer request.”

Six barriers hindering SSM adoption were dropped. The suggestion to remove “Perceived lack of technology to drive environmental sustainability” was deemed appropriate because, as one respondent stated, “Our competition is not operating with environmentally responsible practices.” It was removed due to the belief that at an operational level, many of the respondents’ competitors were utilizing green practices.

“Drop in energy/commodity prices reduces green priorities” was dropped due to the belief that regardless of commodity price levels, P/SM sustainability efforts will move forward. “Difficulty in changing user preferences to green products/services,” “Customer demand is not sufficient to drive green strategies,” and “Challenges in changing user behaviors and comfort levels” also went against the majority of experts. There were two major reasons given for dropping these items. Some respondents believed these were beyond the traditional measurements in P/SM and were really more marketing issues. Still, other P/SM executives, mostly in consumer products, retailing and universities believed that user preferences were evolving more towards green products/services and that customers are becoming more accepting and demanding of green alternatives. Following the removal of all driver and barrier items that were deemed unnecessary to respondents, the study proceeded to Phase III.

7.2. Delphi method phase III

In the third and final phase of the Delphi process, respondents were asked to rank order the remaining drivers and barriers of sustainability (ten each) from 1–10 (1 being the “most important”). Two rounds were conducted during this phase of the study with a goal of obtaining consensus between the respondents. The strength of consensus amongst respondents was measured using Kendall’s W. The closer the coefficient of concordance (Kendall’s W) is to 1, (perfect consensus) the stronger the consensus among study participants.

The results of both rounds of rankings for Phase III indicated generally weak levels of consensus for both drivers and barriers. As can be seen in Table 4, .39 was the highest consensus obtained in either the drivers or barriers. Interestingly, the highest levels of consensus were found on the ranking of barriers during the first round. Efforts to strengthen levels of consensus in the second round resulted in lower levels of agreement. These results agree with Berns et al. (2009) who found that CEOs pursued a variety of sustainability strategies and were stymied by a lack of standards to drive their sustainability initiatives.

<table>
<thead>
<tr>
<th></th>
<th>Drivers</th>
<th>Barriers</th>
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<tbody>
<tr>
<td>Round 1</td>
<td>0.33</td>
<td>0.39</td>
</tr>
<tr>
<td>Round 2</td>
<td>0.22</td>
<td>0.20</td>
</tr>
</tbody>
</table>

8. Discussion of the Delphi study results and interviews

Qualitative insights for this study were obtained through a careful assessment of the open-ended comments provided by the twenty-one Delphi participants and the nineteen other P/SM executives that were interviewed separately. The qualitative analysis of the nineteen respondents supplemented reasoning for the results generated from the Delphi panel.

8.1. SSM drivers

The P/SM panel was very insistent on sticking to their rankings of drivers and barriers even after being shown the ranking from the previous phases. Repeated runs of the Delphi did not change their views. This lack of consensus provides support for Proposition 1 showing that the drivers of SSM will differ across organizations.

Quantitative analysis of the mean rankings from the Delphi panel provided important information on the key themes driving and limiting sustainability within organizations. First, according to the P/SM executives, the most important driver of sustainability was top management initiatives, thus providing support for Proposition 2. The results of this study clearly indicate that SSM requires the vision and support of top management. This is in agreement with Bansal and Roth (2000). They found that the philosophy of top management was instrumental in establishing the role of the firm in society.

One respondent stated that top management support was “Critical to support any corporate strategic initiatives.”

Second, sustainability efforts are currently driven by compliance to government regulations. This indicated that current SSM efforts are compliance oriented. Certainly, this finding would indicate that SSM adoptions of social and environmental concerns are those promulgated by regulatory bodies. This is supported by Berns et al. (2009) that found government regulation has the greatest impact on sustainable efforts by businesses. A respondent from a large multinational automotive firm and one from a heavy equipment manufacturer had almost identical quotes stating, “Most of the changes are driven by government regulations."

Alternatively the lowest rated drivers are ISO 14000 and government incentives. This could be directly attributed to the variety of panel participants’ business orientation. Not all manufacturing firms sold in Europe, and the service sector firms were not directly affected by either the EC standards (ROHS and WEEE) or had not yet implemented ISO 14000. Also, it would appear these executives felt that while they complied fully with government regulations, there was a lack of positive incentive to drive SSM efforts.

Mid-level drivers focused on using sustainability to drive competitive advantage and reduce total costs. This was well summarized by one respondent.

“Top management is driven by cost, compliance and customer demand. Our senior leaders must see these priorities reflected in any initiatives they champion.”

Reducing both the organization and supply chain’s carbon footprint is becoming a concern to P/SM executives as indicated by one respondent (Fig. 3).

“We have started tracking our carbon footprint and found that collectively our suppliers create a much higher footprint than we do alone. Reducing the entire supply footprint will become more important.”
8.2. SSM barriers

The top two barriers to SSM were the high initial buyer and supplier investment costs of adopting sustainable practices and economic uncertainty due to recessionary times. Costs on both the buyer and supplier side were very uncertain and viewed as a barrier, particularly in a tenuous economic environment when firms are seeking to do more with less. This is in agreement with the findings of Nidumolu et al. (2009) that firms believe sustainability will add to costs and will not deliver immediate financial benefits. As two respondents, one in the transportation business and another in the services sector, stated

"Costs for implementing 'green' are not at all clear." and
"It is difficult to clearly identify the financial returns (ROI) from the required capital investments to support 'green' (initiatives)."

One respondent in the manufacturing sector highlighted the impact of the current recession by stating

"The economic climate dictates caution with regard to capital investments required to support green transformation."

This indicates that firms tend to reorder their priorities in SSM practice by stressing the importance of the economic as opposed to the environmental or social value. The focus in a recession shifts to costs. Meanwhile, another P/SM executive from a large U.S. based grocer is similarly focused on costs for both buyer and supplier while trying to establish green practices and processes within the organization. This firm was trying to maintain a balanced focus on SSM, despite uncertain economic times.

"We are finding creative ways to reduce investment costs required to maintain our green initiatives."

Overall, these findings do not support Proposition 3 which indicated that SSM is not affected by economic conditions.

The lack of sustainability standards left respondents guessing at the direction of government policy on sustainability. One large pharmaceutical manufacturer’s P/SM director ranked the “Lack of U.S. or global environmental sustainability standards” as their second highest barrier to sustainable business practices. They followed up by stating that it is

“Difficult to gauge the direction that the Obama administration and EPA will take regarding mandating new ‘green’ policies with the recession.”

9. Managerial implications and conclusions

This research provides supply managers with a definition of SSM to assist in guiding and implementing their programs. Further, this study has demonstrated that a diverse sample of manufacturing and service organizations rank the top drivers and barriers to sustainable business practices somewhat differently. Our findings are applied to P/SM executives and generally support past research showing that there is no consensus in sustainable practices from the CEO level.

Given the current findings, we would state that SSM is not as well developed in this sample as both the general sustainability literature and the limited sustainable P/SM literature would indicate. While the literature has stated sustainability provides value in social and environmental realms, the reality is that the economic side currently drives SSM in practice. This is evidenced by the top two drivers being government compliance and a lack of economic incentive to be more proactive. Further, the top barrier was the high initial buyer and supplier investment costs associated with adapting SSM. Thus, this study extends Walker et al. (2008) study and proposes that the status of SSM programs are driven by government regulations and top management initiatives, but are constrained by cost issues and economic uncertainty.

Sustainability programs in P/SM are compliance driven and require top management support. The consensus from this Delphi study on drivers and barriers is limited, indicating a great deal of divergent thought across different organizations. There is support that this Delphi study of P/SM executives accurately portrays the status of sustainability in organizations today. A recent study of CEOs by Berns et al. (2009) found difficulties in obtaining a
consensus on sustainability strategies. Thus, while the overall results are mixed, what is clear is that P/SM executives must look toward their particular company’s CEO strategies. CEO initiatives regarding sustainability were the number one driver of P/SM sustainability efforts, clearly indicating that top managers are driving sustainability strategies. Second, P/SM executives must keep up to date with government regulations on sustainability and be in full compliance with these regulations. Conversely, our study indicated that it may be wise for government policy makers to reconsider their sustainability initiatives since they appear to be currently insufficient to motivate P/SM executives to increase sustainability efforts.

In overcoming barriers to sustainable efforts, it is important to minimize both buyer and supplier investments in sustainability, especially in tougher economic times. Many P/SM executives in this sample were uncertain about making the necessary investments by themselves in their suppliers to advance SSM. Making such investments was particularly uncertain in the tough economic climate. These findings are different from those at the “CEO levels” who must maintain a ‘public posture’ that economic conditions do not affect sustainability efforts. However, these same CEOs look to supply management for cost reductions during economic downturns. This creates a mixed signal between short and long term goals which was evident in this research.

The results of this study are supportive of the sustainability literature which describes the multiple sides of sustainability with no real consensus as to what sustainability means. We have clarified this by providing a definition for SSM. However, implementing this definition is challenging as a lack of consensus among companies hinders these efforts. The only real anchor they have is government regulations and a much weaker perception that sustainable practices can lead to competitive advantage and perhaps lower costs. The current compliance shift to government standards becomes the “de-facto” standard for SSM efforts. Below these compliance issues are feelings that sustainability can promote a competitive advantage and lower costs, but it appears P/SM executives are currently divided on how much it actually can create this advantage.

On the positive side, based on comments from 40 P/SM executives, SSM is here to stay. This research has shown that currently SSM is company specific and will continue to evolve as more standards are developed. Finally, the P/SM function can make substantial contributions to supporting their organizations sustainable strategies.

Overall, the results of this study demonstrated that P/SM executives do follow and support their CEO’s in implementing sustainable practices. They also realize the need to comply with government regulations. Their uncertainty comes into play with truly understanding the costs and paybacks associated with implementing sustainable practices. There is certainly a mixed message sent to P/SM regarding the short term need to uncover price savings versus the long term additional costs and unknown benefits of sustainable practices. It appears getting a grasp of these tradeoffs to build a business case for overall lowest total cost is a large challenge for P/SM executives. However, the cons of not engaging in sustainable practices could be the loss of a longer term competitive advantage. Thus SSM will continue to be on both the CEO and the P/SM agenda, but the methods and techniques will vary across companies. A challenge for future researchers is to use this data to launch efforts at finding other variables that may strengthen the key drivers and overcome the barriers.

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