SUSTAINABLE SCM: 2013 SURVEY REVISION & VALIDATION

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ABSTRACT

Sustainable supply chain management (SCM) focuses on identifying the existing processes across the supply chain currently and identifying opportunities for improvement to be compatible with 21st century needs. It involves eliminating waste, using environmental friendly processes and products, working smart to minimize use of hazardous materials, recycling of products and encouragement of good governance practices throughout the life cycle of goods and services. One way to identify opportunities for improvement (OFIs) is to survey the SCM. This was done in 2012 for Arizona’s Aerospace & Defense supply chain (SC). The goal of the current 2013 project is to revise the previous survey and complete a Pilot Survey prior to a full SC survey. The questions in the revised survey were found to be clear, and an acceptable response rate could be achieved in approximately three weeks allotted time. Most participants completed the survey in 20 minutes or less, which was within goal.

Keywords: Sustainability, Supply Chain Management, Survey Development, Next Generation Manufacturing

INTRODUCTION

In 1950s & 1960s US manufacturers focused on mass production techniques as their principal cost reduction and productivity improvement strategies. In 1980s & 1990s intense global competition led US manufacturers to adopt supply chain management (SCM) techniques to control flow of products and services from raw material manufacturers, component and intermediate manufacturers, final product manufacturers, wholesalers, distributors and retailers. Today SCM controls a complicated network of interconnected businesses involved in the provision of products and services. SCM includes design, planning, execution, control, and monitoring of supply chain (SC) activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally (Lambert, 2008). The purpose of SCM is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement throughout the SC.

The term sustainability refers to the integration of social, environmental, and economic responsibilities. Sustainability is a business priority today, affecting an organization’s supply chain and logistics networks, and is frequently quantified by comparison with social, ethical,
cultural, and health ratings (SECH). In addition, many US companies are beginning to rapidly adopt the concepts of sustainability. Approximately 68 percent of the Global 250 firms generated a separate annual sustainability report as early as 2004, which considered environmental, social, and economic issues in contrast to the primary emphasis on environmental reporting in 1999. In addition, 80 percent of these reports discuss supply chain-related issues (KPMG, 2005).

Sustainable supply chain management is defined by Stefan et al. (2008) as the management of material and information flows as well as cooperation among companies along the supply chain, while suggesting goals from all four dimensions of sustainable development, i.e. economic, environmental, social, and stakeholder requirements. One of the key objectives of Sustainable Supply Chain Management is superior process improvement. This process improvement aims to record annual productivity and quality gains that exceed the competition through a companywide commitment to continuous improvement (see also, Superior Processes at Industrial Equipment Manufacturers, MPI Report). The presence of sophisticated measurement systems for review of processes can provide a reliable indicator of an organization’s willingness and ability to continuously improve, as well as important input for accomplishing Next Generation Manufacturing (NGM) strategies. NGM strategies help an organization meet customer needs at a faster pace than the competition. Best practices in manufacturing include the capability to produce high-quality, lower cost goods, and continuously improve the processes that enable efficient production.

**LITERATURE REVIEW**

In today’s global economy, largely because of high-tech manufacturing, business competition is no longer just between companies, but now includes their supply chains (Friedman, 2005). It is critical to create a supply chain to achieve lower costs, and companies can often save millions of dollars by expanding their supply chain overseas (Barry, 2004).

In most of the previous research from 1990’s to 2000’s on supply chain management and sustainability, there has been little or no attention to interrelationships among environment, diversity, human rights, and safety, linked to sustainability (Carter & Easton, 2011). Recent research by Pagell and Wu (2007) found that the best companies had alignment between all three aspects of sustainability, incorporated this sustainability focus into their daily conversations, and included sustainability in their value systems. Several researchers (eg. Schwartz, 1994, p. 21) have examined how management’s personal values have influenced organizations. Supply chain management can mean different things to different people. For some it is the process of controlling inventory or the processes of the procurement function. For others it is simply the processes involved in the logistics or distribution functions. Sustainable supply chain management is defined by Stefan et al. (2008) as the management of material and information flows as well as cooperation among companies along the supply chain, while suggesting goals from all four dimensions of sustainable development, i.e. economic, environmental, social, and stakeholder requirements. Sustainability has its own history and definition, ranging from an intergenerational philosophical point of view to a multi-dimensional and multi-scale term for business management. The intergenerational philosophy focuses on making sure that future
generations are not negatively impacted by decisions we make today (Stefan et al, 2008). The multi-dimensional view includes topics related to the “trip-bottom-line” (TBL) of balancing economic, environmental and social dimensions of sustainability (Stefan et al, 2008). It has recently been suggested that “at the intersection of social, environmental, and economic performance, there are activities that organizations can engage which not only positively affect the natural environment and society, but also result in long-term economic benefits and competitive advantage for the firm” (Carter & Rogers, 2008, p 364). For the TBL to be successful, it must integrate the physical and financial activities of the corporation (Stefan et al, 2008).

Corporations represent over half of the world’s largest economies, as stated by Henriques & Richardson (2004) and sales of the top 200 corporations equate to at least one quarter of the world’s economic activity. If the current accounting practices of an organization only focus on economic bottom line, then the TBL benefits will not accrue, as concluded by Smith & Sharicz (2011).

The TBL approach to environmental cost accounting is to identify where a company is in terms of its environmental impacts, to determine appropriate sustainability targets or standards to aim for, and to work out the most cost-effective way for the company to close that sustainability gap (Henriques & Richardson, 2004).

There are challenges to implement sustainability. First, it is true that some companies have begun to exhaust the easy, low-hanging fruit and “are now into the harder, longer term investment commitments in which conventional and environmental criteria are not necessarily in harmony” (Gray, 1994, p. 47). However, projects will likely become increasingly viable as energy costs continue to rise, pressures from consumer groups increase due to greater transparency along supply chains, and firms begin to take a more holistic view of the costs and benefits associated with social and environmental projects.

Kosbe, et al. (2012) investigated how companies in the Aerospace & Defense industry handle their supply chain, with the main focus being on obeying the laws. Many companies in the Aerospace & Defense industry seem to have a higher focus on human rights versus sustainability & the environment, but much of the enforcement and guidelines are not well defined or accessible to outsiders. According to Kosbe, et al (2012), most companies in the Aerospace & Defense category do not seem to have any training programs available to suppliers. Many of the companies did seem to have internal training programs for a number of different subjects, but Human Rights did not seem to be one of them. Some companies have online training programs available internally (Kosbe, Pannell, & Williams, 2012).

In regards to human rights violations studied by Kosbe, et al. (2012) the industry did not appear to have any recent major violations. The majority of lawsuits concerning the Aerospace & Defense (A&D) industry had to do with labor disputes, mainly union labor disputes. OSHA did fine Honeywell for a labor dispute where it got rid of union labor and replaced the union workers with temporary workers, which reportedly resulted in an explosion from the newly-hired workers not being experienced and trained well enough to safely handle Uranium.
The majority of A&D companies studied by Kosbe, et al (2012) did not mention environmental sustainability in their code of conduct. The main thing referenced in terms of the environment was to follow the laws, but not much more, and when it came to penalties for suppliers for not being sustainable, it appeared that as long as the suppliers followed the laws, the majority of A&D companies would still do business with them.

The effort organizations expend to manage their supply chains, is often for managing their supply base through supplier development; managing their internal operations through lean, six sigma, etc.; and/or managing their distribution channels through practices such as collaborative planning. These strategies typically result in improvements in the swiftness, and reduction in variability of material flow within and across organizational boundaries. As such, efficient supply chain management is means attention to only swift and even flow of materials to the firm. Organizations typically improve the flow of materials in supply chains through a set of organizational routines developed by assembling organizational and inter-organizational resources to reliably perform critical activities.

In order to utilize the framework of SSCM, managers generally identify environmental and social initiatives that can have the greatest economic impact. Likewise, value chain analysis typically includes inbound and outbound logistics, packaging use and disposal, warehouse safety, transportation impacts, emissions and safety, energy use, hazardous materials, worker safety, human rights, after-sales service, and logistics issues. Fully understanding their value chains can enable managers to identify social and environmental initiatives with the greatest strategic value (Porter & Kramer, 2006).

Ramos and Steger (2000) studied employees of environmentally proactive European companies and found that those companies with strong written environmental policies and supportive supervisory environmental behaviors led to increased eco-initiatives from employees. Several authors have evaluated the characteristics and structures of socially sustainable organizations. Historically, these organizations tended to be smaller, highly responsive entities, that would allocate power to individuals and local communities to help create their environmental agendas (Hoffman, 1997; Korten, 1996).

According to Griffiths and Petrick (2001), three alternative organizational structures best align with sustainability values: a network organization, a virtual organization, and communities of practice. A network organization is created by a number of interconnected units with a flat hierarchy, usually working collectively to obtain economies of scale and scope. Typically, a virtual organization forms to solve or address important issues and disbands once these issues have been resolved. Communities of practice form around areas of interest, expertise, or project orientation (Brown & Duguid, 1991). It is recommended that future studies address these issues and structures in Arizona’s A&D industry.
METHODOLOGY

The current research project uses suggestions from prior research and a pilot study method to investigate areas for improvement in the previous Arizona NGM supply chain management survey (Humble, Waissi, Chang, 2012) at Arizona State University (ASU). The prior survey was based on the national NGM survey report (NGM, 2009). A problem of very low response rate in the prior survey research indicated an opportunity for improvement was to shorten, update, test, and validate the questions. Therefore, the goal of the present project was to create a revised survey instrument. The 2013 Survey is shortened and focused on issues uncovered in the prior NGM Survey. Using a revised survey instrument, responses were collected from volunteers for the present 2013 pilot, which includes fewer questions, but still covers all the NGM areas:

- Demographics
- Leadership
- Customer Satisfaction and Innovation
- Work Force Strategies
- Supply Chain Management
- Lean Process Improvement
- Sustainability and Green Focus
- Global Engagement

The following steps were involved in this project:

- Update previous ASU supply chain survey as needed.
- Send surveys to volunteers.
- Compile, graph and evaluate selected pilot survey data from selected NGM areas.
- Provide conclusions and recommendations for further update of the survey instrument.

The pilot survey was conducted during October-November 2012, data analysis was completed in December, 2012, and the report prepared in 1Q2013. A total of 40 people were sent surveys. These volunteers were not part of the Arizona A&D supply chain. The survey results were collected using SurveyMonkey and analyzed using MS Excel. It was assumed that participants would answer the survey voluntarily and honestly, and were allowed to complete the online survey at their own pace through internet access without further assistance. The time it took each participant to complete the survey was automatically tracked and recorded. Because the participants were volunteers from the university rather than from local A&D companies, their responses were not assumed to represent actual NGM characteristics. The goal was to ensure the survey questions were understandable and that the responses could be accurately recorded and graphed by SurveyMonkey.

DATA ANALYSIS

A total of 40 electronic copies of the questionnaire were distributed via SurveyMonkey, and 19 responses were collected by the end of the allotted pilot survey time period. The overall response rate for the survey was about 47.5%. Selected key areas of the survey responses are analyzed for
this pilot study because the primary goal was to determine if the questions were clear and if an acceptable response rate could be achieved in three weeks allotted time. The survey responses have been successfully analyzed to illustrate how actual survey responses can be analyzed directly from the SurveyMonkey charts. Complete results are available upon request from the primary author (Prof. Jane Humble, jane.humble@asu.edu).

About 52.2% of the pilot study respondents were in upper level management roles such as president, Chairman of the board, Chief Financial Officer, Director and Manager. 4.3% of respondents were chairman of the board; 8.7% of the respondents were chief executive officer; 0% of the respondents were chief financial officer; 8.7% of the respondents were director; 30.4% were managers. 47.8% of the respondents reported to be “others”. It was reported that 56.5% of the surveyed respondents’ companies were privately owned, 30.4% of the surveyed respondents’ companies were public owned, and 13% of the respondents’ companies were Non-profit organizations.

The pilot survey successfully presented 74 questions in all eight sections of the A&D supply chain survey. A total of 19 respondents out of 40 completed the entire survey and an additional 4 respondents completed only 10 to 20 questions. There were no reports that the questions were difficult to understand or answer. However, there were some comments that the survey was still too long, and that the research team should perhaps consider shortening it to increase response rate. The next chapter presents conclusions and recommendations based on research results.

RECOMMENDATIONS BASED ON SURVEY RESPONSES

The purpose of this project was to update the 2011-12 Arizona A&D supply chain survey instrument and use the updated instrument to conduct a pilot survey, analyze pilot survey results, further refine the Arizona A&D survey questionnaire as needed based on pilot survey results, and to provide recommendations and suggestions for future study. The following summary of findings are based on the 2012-13 research results:

1. The survey response rate was less than 50% for the 74 questions.
2. The survey questions were easy to understand, and participants suggested only minor changes to 4 questions.
3. Most participants completed the survey in 20 minutes or less.
4. SurveyMonkey graphs of results (shown in Appendix A – available upon request to the author) were all clear and easy to understand

Recommendations

It is desired to further increase the survey response rate because the response rate for the Pilot survey was less than 50%. To increase the response rate, the following are recommendations for conducting the next survey:
1. Most of the respondents mentioned the survey was long and had too many questions. In order to overcome this problem, we need to consider further reducing the number of questions in the survey.
2. Providing $5 coupon or other monetary incentive to the respondents who complete the survey within a particular period of time, which might increase response rate.
3. Giving the respondents a choice of $5 coupons of Amazon or Starbucks card should be considered.
4. Providing a thank you note for each response received, so that the relationship is maintained for future.
5. Respondents could be sent reminders weekly if the survey is not completed. This helps encourage the respondents to reply within a specific timeframe.
6. For future surveys, it is important to be sure that we have the latest up to date addresses for the intended respondents. Some of the respondents from previous surveys might have moved on to other companies.
7. Need to also add new and delete old company details from the previous survey database.
8. Consider inviting some of the respondents for on-campus Workshops and/or Seminars to encourage knowledge transfer between companies and the University.
9. Conduct a get together for the organizations that are in the same line of business, so that knowledge sharing happens between companies of the same industry.
10. Continue to use SurveyMonkey and its charts for future projects.

Summary

Most of the respondents mentioned the survey was long and had too many questions. In order to overcome this, we need to consider further reducing the number of questions in the survey. In addition, we might provide $5 coupons or other incentives to the respondents who complete the survey in the designated period of time. In addition, it is suggested that we could invite some of the respondents for on-campus seminars, so that knowledge transfer begins between SMEs and the ASU research team. Implementing all of these suggestions should be considered due to the importance of encouraging a high response rate to more accurately reflect the characteristics of Arizona’s Aerospace and Defense Supply Chain.
SELECTED REFERENCES


KPMG (2005), *KPMG International Survey of Corporate Responsibility Reporting 2005*, University of Amsterdam, Amsterdam.


