LEVERAGING SOCIAL MEDIA FOR SUPPLY CHAIN COMPETITIVE INTELLIGENCE: AN EXPLORATORY STUDY

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ABSTRACT

The social media has become one of the premier resources to harvest supply chain competitive intelligence and in turn drive supply chain performance improvement. Like in marketing, supply chain is not immune from social media's influence. Indeed, social media is the latest sources of data for firms to acquire supply chain competitive intelligence. However, in spite of this revolutionary trend, there is little or no empirical research on the impact of social media on supply chain competitive intelligence. The present research fills the gap by investigating the role of social media in acquiring supply chain competitive intelligence to enhance supply chain performance.

Key Words: Social Media, Supply Chain, Competitive Intelligence, AHP

INTRODUCTION

In today's social media universe where consumers exert more power and influence, organizations have no choice but to embrace it or perish. Like in marketing, supply chain is not immune from social media's impact. The advent of social media has made the global marketplace more than ever competitive. Social media can be valuable tools for gaining supply chain competitive intelligence. The importance of social media in supply chain management is receiving attention in the popular press and blogs. Much of that attention is coming from the practitioner community. However, one of the challenges confronting supply chain managers and C-level executives is how to employ social media data to gain supply chain intelligence for the purposes of enhancing competitive business knowledge and better decision making. Thus, in today's global marketplace, to remain responsive and competitive will require investing in SMCs. SMCs are lynchpin between suppliers, manufacturers, distributors/wholesalers, retailers, and consumers. SMCs can improve visibility in supply chains by providing accurate and immediate (real-time) information on rapid development of new product and delivery. With this new media, C-level executives can afford to make real-time decisions in response to market changes.

SMCs have become quintessential part of society, marketing and human resources. However, their adoption in logistics and supply chain and supply chain competitive intelligence are still in their infancy. Casemore (2012) claims that a few firms have integrated social media channels into their logistics and supply chains, even though there seem to be a number of good reasons to use them. Arguably, although they are "…more important for some industrial sectors than others, … in the era of Big Data, all sectors are going to find themselves involved with social media in one way or another. Social media provides access to too much significant data for companies to ignore it" (DeAngelis, n. d). Case (2012) indicates that the early adopters of social media platforms such as Home Depot and Teva Pharmaceuticals have benefited from improved

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communications and built valuable knowledge repository. SMCs indeed will significantly improve communication and collaboration within and across supply chains.

Will social media technologies play an important role in enabling companies to acquire supply chain competitive intelligence? Which of the social media technologies have or will play a key role in gaining supply chain competitive intelligence? Arguably, social media possesses a great potential to become a major tool for firms gain supply chain competitive intelligence. Indeed, a number of firms of all sizes are currently leveraging social media to gain strategic competitive position in an increasingly changing global marketplace. It is noteworthy that social media technology is here to stay and will significantly change the contour of old business model. For firms to maximize their business opportunities and competitive advantages, it behooves them to be engaged in this revolutionary trend (Sun, 2011).

This research used Saaty's (1980) analytic hierarchy process (AHP) to explore impact of social media on supply chain intelligence in which the goal to achieve has multiple and conflicting criteria. Supply chain intelligence factors to improve are both qualitative and quantitative in nature, and selecting the alternative social media platforms is equally conflicting. As a multi-criteria decision making process, the AHP enables decision makers or a group of decision makers to set priorities and deliver the best decision when both quantitative and qualitative aspects of a decision must be considered. The AHP encompasses three basic functions, including structuring complexity, measuring on a ratio scale, and synthesizing. It is a powerful operational research methodology useful in structuring complex multi-criterion problems or decisions in many fields such as supply chain management, marketing, engineering, education, and economics. Furthermore, the AHP advantages includes its reliance on easily derived expert opinion data, ability to reconcile differences (inconsistencies) in expert judgments and perceptions, and the existence of Expert Choice Software that implements the AHP (Calantone et al. 1989).

This paper is motivated by the following research objectives, including to understand the impact of social media on supply chain by analyzing data collected from supply chain managers, C-level executives, and consultants; from supply chain intelligence perspective, the purpose is to develop effective social media applications to help supply chain managers make use of real-time actionable intelligence. Therefore, the purpose of this research is to explore (1) the role of social media in acquiring supply chain intelligence. In the next section, we review the literature on the social media technology use in logistics and supply chain management, business and marketing/competitive intelligence, supply chain competitive intelligence, social media and supply chain intelligence. In Section 3, we present the research methodology and data analysis. In Section 4, we discussed the results. Section 5 provides the managerial implications. Finally, Section 6 presents the conclusions.

LITERATURE REVIEW

In this section, we review the literature on competitive intelligence, supply chain intelligence, social media in logistics and supply chain management, role of in gaining supply chain competitive intelligence. Thus, the literature review provides the theoretical background for this research.

Competitive Intelligence

Haags (2006) contends that competitive intelligence is both a process and a product. Competitive intelligence is regarded a process because of the set of legal and ethical methods that an organization deploys to harness information that enable them to strategically attain international success. Conversely, competitive intelligence as a product is an information system used to analyze data associated with competitors' activities gathered from the public and private sources (i.e., business intelligence). The outcome of the analysis is knowledge building associated with the current and future behavior of competitors, suppliers, customers, technologies, acquisitions, markets, products and services, and the general business environment. Competitive intelligence entails the process of gathering market information and using the same to develop strategic planning (Teo & Choo, 2001; Vedder et al, 1999). In agreement, Bao et al (2008) point out that actionable information derived competitive intelligence can aid a firm in its strategy planning formulation required to gain competitive position in the marketplace. Because of social media technology "…a vast amount of public data has become available…, which allows companies with limited resources (or end-users in large companies, who wish to find answers quickly) an opportunity to acquire some CI information directly from free online sources" (Zhang et al, 2011). Indeed, competitive intelligence is a means of procuring information to study competitors and anticipate their actions in order to gain a competitive position in the marketplace (West, 2001; Gordon, 1989). Competitive intelligence has become an internationally recognized and practiced discipline (Teo and Choo, 2001). Competitive intelligence is neither marketing research nor business scanning (Teo and Choo, 2001, Gilad and Gilad, 1998). Ettore (1995) contend that competitive intelligence is all about knowing the competition's game plan and staying a step ahead of the competition by gathering actionable information about competitors and using it to execute short and long term strategic planning. Social media represents the latest resources for data and actionable competitive intelligence. Social media-internet based as a competitive intelligence resource, Graef (1997) asserts that it is an important source of information and an inexpensive ways to share information with decision makers. Teo and Choo (2001) point out that marketing and sales leverage the internet to gain knowledge of customer taste and preferences via interactive web 2.0 sites and agents. According to Teo and Choo (2001), "online sales reveal information that facilitates continuous forecast of sales, resulting in competitive advantages in terms of better production planning and less inventory stockpiles." Collection of data from sources such as blogs, corporate publications, websites, newspaper articles, patent filings, specialized databases, and information at trade shows (El Haddadi et al, 2011) when analyzed can yield actionable intelligence for organizations.

Supply Chain (Competitive) Intelligence

Social media is the new source of supply chain intelligence. Leveraging social media can help firms acquire supply chain intelligence through their real-time interactions with suppliers, manufacturers, distributors, retailers and customers. Haydock (2003) contend that "supply chain practitioners consider that the intelligence required to efficiently source, make, store, ship, and ultimately sell and deliver the product or service to a customer is an area of opportunity not well-leveraged in most companies." Social media is the new information ecology will transform the manner that firms mine, collect, produce and transmit competitive intelligence. The significant

growth of social media channels and their role in human resources, public relations, marketing, pharmaceutical industry and hospital management is noteworthy. Recently, however, leveraging social media channels to harvest supply chain intelligence and in turn improve supply chain performance (e.g., supply chain relationships, supply chain coordination and collaboration, supply chain visibility) has attracted considerable discourse in both practitioner and academic press. Supply chain intelligence involves the process of mining supply chain data internally and externally from their operation environment and transforming the acquired data into actionable information. Competitive intelligence can help a firm to succeed in a dynamic business environment by supply chain managers to use actionable information to make real-time decision. Batori (2010) attests that effective supply chain relies on competitive intelligence systems to nimbly anticipate, react, respond and adapt to changing business conditions. "Supply chain intelligence is a new initiative that provides the capability to extract, sense, and analyze information about a supply chain. It enhances an executive's ability to reason through business outcomes and prescribes the best course of action for focusing an organization on the highest impact activities" (Haydock, 2003).

In addition, Haydock (2003) notes that Supply chain intelligence helps firms to understand the entire supply chain from the customer's perspective and reveals both threats and opportunities to reduce costs and stimulate revenue growth. For supply chain operations efficiency and effectiveness, Andreeascu (2009) states that competitive intelligence can play a role in supporting data visibility associated with inventory levels and evaluation of customer service levels necessary to identify likely problems. "Addressing this type of information challenge requires business intelligence methods and techniques that look across multiple business dimensions and "mine" the data for its informational content – turning information into insight and, in the case of a supply chain, finding opportunities where costs can be taken out and top-line revenue can be added" (Haydock, 2003). In order to develop a more meaningful relationship with a customer, it is imperative to gather data across the supply chain about the stimulus and response behavior of customers, segmentation of those customers into clusters of behavior and then treating those customers most efficiently relative to their ability to return profit (Haydock, 2003). "Executives today are faced with a tough economy, increased competition, fickle consumers and a shrinking product lifecycle, requiring smarter, more strategic decisions along the supply chain" (Haydock, 2003). Handfield (2008) describes supply chain intelligence as the convergence of data collection, analysis, actionable information, dissemination and response in both the upstream and downstream supply chains. By leveraging actionable information, firms can afford to build knowledge with respect to supplier relationship management, customer relationship management, performance management, supplier quality management, risk management, and continuous improvement (Handfield, 2008).

Social Media Technology in Logistics and Supply Chain Management

In today's social media universe, firms can leverage social media technology-based intelligence to disseminate actionable information necessary for C-level executives to build and manage collaboration among supply chain stakeholders. The confluence of factors has made supply chain improvements imperative (Haydock, 2003). 1) To understand and appreciate that serving customers takes collaboration between many firms. 2) The ability to capture and analyze data from enterprise resource planning systems across the firm, combined with business intelligence

methods, can reveal opportunities to take out additional costs previously not recognized and 3) the need for executives to understand the enterprise as a whole. Zhou and Benton (2007) contend that incorporating best supply chain practice with real-time information sharing is important in enhancing supply chain performance. Effective supply chain practice and real-time information sharing are essential in achieving efficient physical/material and information flows (Chopra and Meindl, 2001; Premkumar and William, 1994). Cooperation, collaboration and information sharing among firms and supply chain partners (Mentzer, 2001; Lee et al., 2000a; Lee et al., 2000b; Gavirneni et al., 1999) are important in today's information-based social media universe. According to Zhou and Benton, "the importance of effective supply chain practices increases as the level of information sharing increases." Bloom (2012) describes social media as an important that is adding new value to supply chain management for organizations of all sizes and external sites like Facebook and Twitter are being increasingly used in a new, flexible supply chain cycle.

Social Media Role in Supply Chain (Competitive) Intelligence

Although competitive intelligence primarily focuses on understanding competitors' strategies, it is imperative to gain insight of their products, services, customers, finances and partners (Barnes, 2011). This is possible because of the availability of social media content-generated information sources that offer real-time supply chain intelligence. Social media represent a significant technological advancement that bode well with competitive intelligence (Gudgeon et al., n. d). Rice (2010) indicates that competitive intelligence is all about understanding competitors' strategies by gaining insight into their products, services, finances, partners, and customers. In today's increasingly open and social Web, there are few better places to gather all of this important data than from social media. This is because "competitors are leaking more information than ever into social media channels [and] snooping on these dropped hints and disclosures can" (Rice, 2010) provide a significant strategic competitive intelligence and winning edge. Supply chain intelligence-based social media will help organizations deal with the difficulty associated with untimely and unreliable data. Bets (2005) surveys indicate that 75% of firms experienced financial problem due to lack of data quality. In agreement, Stefanovic et al. (n. d) emphasized that defective quality costs organizations financially in terms of lost productivity and poor business decisions. Stefanovic et al (n. d) recommend organizations can use business intelligence to enhance their supply chain analytic areas, including plan – matching supply chain resources with requirements; source - improving inbound supply chain consolidation and optimization; make - providing visibility into the manufacturing process; deliver - improving both inbound and outbound supply efficiency and effectiveness; and return - managing reverse logistics effectively and efficiently.

Organizations and supply chain professionals can leverage the speed and global reach of social media to gain supply chain competitive intelligence. Gonzalez (2011) notes "…the vast potential for social media to enhance the way people up and down the supply chain communicate and collaborate with one another; improve the way companies discover and analyze real-time information to make smarter and faster business decisions; and enable new, more efficient supply chain processes." Nevertheless, "up to now, social media has been used mostly by business-to-consumer (B2C) companies to promote their brands and market their products to consumers [and

in particular] largely on enhancing external communication, mainly with consumers" (Gonzalez, 2011).

Oxford consulting (2011) reports that social media tools enable supply chain managers to track customer complaints and quickly provide remedies to the customer's complaints. Social media utilization enhances coordination, collaboration, and information sharing among supply chain actors. McKinsey (2009) survey of 686 executives report that working with suppliers and partners reduced supply chain cost by 23 percent. Further, respondents reported achieving greater ability to share ideas; improved access to knowledge experts; reduced costs of communications; operations; decreased time to market for products; better interactions with organizations and customers; improved innovation skills because by jointly shaping and co-creating products with their customers using social media; better ties to suppliers and partners. Types of social media technologies heavily used by the firms surveyed include blogs, wikis, and podcast. These social media assist companies or competitors to track information and gain supply chain strategic competitive intelligence. Essentially, supply chain managers can derive actionable intelligence by way of user generation content. Social media platforms give supply chain C-level executives the ability to sense and respond real-time to changes in the global marketplace. Various aspects of social media such as LinkedIn equip companies and supply chain professionals with the know how to sense and respond to increasing changes in consumers' demand and changes in competitors' strategies. Companies can track their competitors' strategic moves by *monitoring what employees, consumers, and supply chain members are posting on their companies websites.* Companies can also gather actionable information and opinions about their competitors, products, new technologies, new ideas and consumers' preferences through LinkedIn, twitter, blogs, Yammer, among others (http://www.globalintelligence.com/insights-analysis/newsletters/gia-newsletter-2-2011/).

In the future increasing number of B2B firms will not only leverage social media technologies to acquire competitive intelligence but will also ameliorate their "external communication and collaboration with customers, suppliers, logistics service providers and other partners, as well as improve internal communication and collaboration between co-workers and across functional groups (Gonzalez, 2011). Patel (2011) reports that Anand Rjaraman of Wal-Mart emphasizes that "while store receipts help stores see which products sell well where, social media can help predict demand and determine new products to add to inventory." Social media as proxy for early warning system can provide valuable information regarding 1) potential disruption in supply chain and likely change in industry procurement practices; 2) change in customer and competitors perception of other firms, their products and services; 3) performance of key suppliers in terms of financial position, quality and cost issues (Johnson, 2006). Competitive intelligence enables firms to sense and respond to risks and opportunities as follows. Strategic decisions – new opportunities for growth; operational decisions – structuring business units to most effectively compete for and win market share; tactical decisions – engagement with customers vis-à-vis equivalents (Johnson, 2006) .

RESEARCH METHODOLGY

The role of social media in improving supply chain intelligence is a typical multi-criteria decision making problem that involves multiple criteria that can be both qualitative and

quantitative. A multi-criteria approach proposed for this study is AHP. AHP allows decision-makers to model a complex problem in a hierarchical structure, showing the relationships of the overall goal, criteria (objectives), and alternatives. Due to its usefulness, the AHP is widely used in both practitioner and academic research. Studies that have used AHP include supply chain management (e.g., Gaudesi and Borghesi 2006), marketing (Dyer and Forman 1992), and pharmaceutical risk management (Enyinda et al. 2009).

Application of AHP to Social Media in Supply Chain Intelligence

A typical AHP is composed of the following four-phases. 1) Construction of a hierarchy, which describes the problem. The overall goal is at the top of the structure, with the main attributes on a level below. 2) Derive weights for the lowest-level attributes by conducting a series of pair-wise comparisons in which each attribute on each level is compared with its family members in relation to their significance to the parent. However, to compute the overall weights of the lowest level, matrix arithmetic is required. 3) The options available to a decision-maker are scored with respect to the lowest level attributes. Similarly, the pair-wise comparison approach is used. 4) Adjusting the options' scores to reflect the weights given to the attributes, and adding the adjusted scores to produce a final score for each optimum (Roper-Lowe and Sharp 1990). The hierarchy structure is consists of the supply chain intelligence factors, including supplier intelligence, logistics intelligence, demand intelligence, production and process intelligence (Haydock, 2003) competition intelligence, and supply chain visibility intelligence. The social media alternatives include Facebook, Twitter, LinkedIn, YouTube, and Blogs as shown in Fig. 1.

AHP steps

1. Define an unstructured problem and determine the overall goal. According to Simon (1960), the methodology of decision-making process encompasses identifying the problem, generating and evaluating alternatives, designing, and obtaining actionable intelligence. The overall goal of is depicted in the first level of the hierarchy, shown in Figure 1.
2. Build the hierarchy from the top through the intermediate levels (criteria on which subsequent levels depend on) to the lowest level, which usually contains the list of alternatives.
3. Construct a set of pair-wise comparison matrices for each of the lower levels. The pair-wise comparison is made such that the attribute in row i ($i = 1, 2, 3, 4...n$) is ranked relative to each of the attributes represented by n columns.

Figure 2: Decision Hierarchy of Gaining Supply Chain Competitive Intelligence

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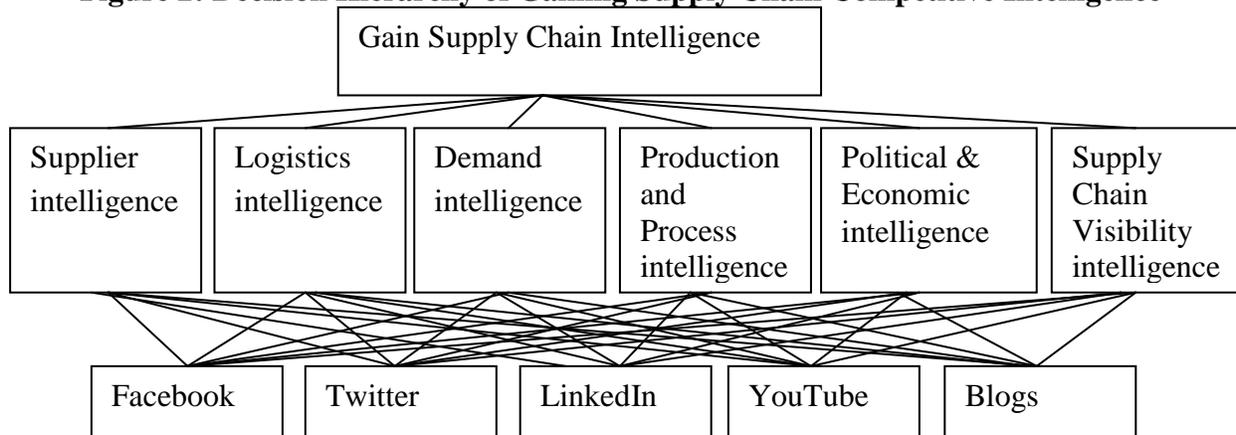
DATA SOURCE AND ANALYSIS

This paper uses survey to obtain supply chain executives' opinions on using social media technologies to improve supply chain competitive intelligence. For the purposes of this research, obtained responses from the executives will remain confidential. Respondents will receive results of this research. The period for data collection was between November 2011 and March 2012. Data were collected through literature review and validated by seasoned supply chain managers, C-level executives, and consults to determine supply chain intelligence elements and social media types used in their organizations. In effect, literature, interview, and questionnaire methods to collect data in order to evaluate supply chain intelligence elements of order of preference. Essentially, the questionnaire survey was gleaned from the hierarchy tree to enable pair-wise comparisons between all the supply chain intelligence elements and social media technology alternatives at each level in the hierarchy using Saaty's 1-9 scale.

Given the exploratory nature of this research, 20 questionnaires were sent to supply chain executives and consultants to provide their expert judgments. The experts provided response to several pairwise comparisons, where two categories at a time were compared with respect to the goal. Results of the questionnaire survey technique (see the appendix) were employed as input for the AHP. It took total of 15 judgments (i.e., 6(6-1)/2) to complete the pairwise comparisons.

RESULTS AND DISCUSSION

Table 1 reports on the priority scores associated with supply chain competitive intelligence decision criteria and the priority matrix of social media alternatives. For the decision criteria, supply chain visibility intelligence (0.36200) is the most important supply chain competitive intelligence, followed by political and economic intelligence (0.33223), and demand intelligence (0.13418), respectively. With respect to the overall priority scores, Facebook (0.36393) is the most preferred social media platform option, followed by LinkedIn (0.22315), Blogs (0.18422), Twitter (0.17294), and YouTube (0.05576), respectively. That is, Facebook > LinkedIn > Blogs > Twitter > YouTube. Therefore, Facebook is the overall best social media platform option.

Table 1. Priority Matrix of Social Media (Options) Alternatives

Priority	SI 0.08074	LI 0.06125	DI 0.13418	PPI 0.02960	PEI 0.33223	SCVI 0.36200	Overall priority	Rank
Facebook	0.48724	0.38574	0.52204	0.28486	031949	0.35332	0.36393	1
Twitter	0.07463	0.04040	0.03759	0.05806	0.30439	0.11777	0.17294	4
LinkedIn	0.24553	0.32134	0.12314	0.28486	0.07971	0.37951	0.22315	2
YouTube	0.15501	0.08620	0.07349	0.11014	0.03842	0.04164	0.05576	5
Blogs	0.03759	0.16632	0.24374	0.26208	0.25798	0.10775	0.18422	3

CONCLUSIONS AND MANAGERIAL IMPLICATIONS

Firms are experiencing environmental changes resulting from the new source of information encouraged by the advent of social media technology. Supply chain intelligence represents a new initiative that exposes both threats and opportunities to reduce costs, grow revenue, and to enhance customer satisfaction by leveraging collaborative decision-making process. Social media can help firms better understand the customers' needs and competitors' strategic moves by taking actionable information through the value chain to develop both customer and competitor intelligence. In today's rapidly changing business landscape enabled by social media technology, firms who leverage it to acquire supply chain competitive intelligence will be in a better position to anticipate and deploy strategic responses to external threats and opportunities. Supply chain intelligence reveals opportunities where firms can mitigate supply chain risks and minimize competition strategic moves and to meet customers' changing needs. Supply chain competitive intelligence can support organizations in gathering and analyzing information about competitors' activities and strategies, partners, suppliers, distributors/wholesalers, retailers, service providers, and the ultimate end-users by employing fact-based social media. Competitive Intelligence, an important fact-based strategic tool can help organizations detect competitive threats, mitigate and manage unpredictable surprises, enhance competitive advantage, and discover new product or market opportunities (Duhamel, n. d). Social media provides sources of valuable information that can help organizations predict their competitors' strategic moves and impact on their margins. Hence the adoption of social media to develop supply chain competitive intelligence is more that ever imperative for firm who desire to thrive and prosper. In today's global marketplace, social media affect how demand for goods and services are produced. It helps manufacturers monitor demand real-time and plays critical role in supply chain management (Dhekyne and Chittal, 2011).

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