The Effect of Social Media on Supply Chain Sensing Capability: An Environmental Scanning Perspective

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Abstract

Supply chain management relies on sufficient and relevant information. To acquire and supplement such information, organization’s sensing capability of business environments becomes a core aspect of the organization. A burgeoning avenue to sense surrounding environments is through social media. Researchers are beginning to recognize the ability of social media in environmental scanning (ES) activities and witness its impact on business performance. However, published evidence detailing the effect of social-media-enabled ES on firms’ sensing capabilities is sparse. From ES perspective, we propose a research model to bridge this gap under the supply chain background. Results from 117 survey responses indicate that turbulent environments increase a firm’s scanning activities on supply market, while intense competition increases the firm’s scanning on both supply and customer markets via social media. The social-media-enabled ES on both markets boosts the sensing capability of firms’ supply chain management. Research implications and limitations are also discussed.

Keywords

Environmental scanning, social media, sensing capability, supply chain management, environmental turbulence, competitive intensity

Introduction

Supply chain management, like any other type of business management, relies on sufficient and relevant information and appropriate ways to use it (Hult et al. 2004). To acquire and supplement such information, organization’s sensing capability of business environments becomes a core aspect of the organization, which enables firms to stay dynamic in their environments (Pavlou and El Sawy 2011). Generally, sensing capability refers to the ability to identify and create the necessities for the revolution of operation routines in an organization (Pavlou and El Sawy 2011; Zollo and Winter 2002).

In terms of sensing surrounding environments, researchers and business practitioners have directed, in recent years, tremendous attention to social media (Aral et al. 2013; Heath et al. 2013; Kane et al. 2014). It is because researchers have noticed the ability of social media in environmental scanning (ES) activities and recognized its importance on business performance (O’leary 2011). The concept of ES is crucial in terms of sensing environment. Environmental scanning is defined as “the acquisition and use of information about events, trends, and relationships in an organization’s external environments, the knowledge of which would assist management in planning the organization’s future course of action” (Aguilar 1967, p. 1).
Although most firms realize that the adoption of social media is an effective means of generating business performance (e.g., better customer relationship, positive word-of-mouth, low advertising budget, etc.), many of them have not utilized social media into their supply chain management. A recent survey revealed that just less than three percent of supply chain managers effectively use social media generated intelligence from business environments to understand their customers (Cecere 2012). It is unfortunate that very few of the organizations have ever systematically investigated the effect of scanning activities using social media to grasp supply chain environment. In other words, the use of social media is still at its infancy in supply chain settings. As a result, one important question remains unanswered – how can organizations acquire more business environmental sentiments to gain a better supply chain sensing capability?

To the best of our knowledge, only few researchers have made an effort to identify the effect of social-media-enabled ES on firms’ sensing capabilities (e.g., Trainor 2012). Moreover, the effect has sparsely been empirically tested. Therefore, our paper contributes to literature by elucidating the relationship between social-media-enabled ES and supply chain sensing capability under changing and competitive business environments. Thus, we raise the following research questions:

RQ1: To what extent does supply chain environment affect sensing capability?
RQ2: What are the roles of social-media-enabled ES on sensing capability in supply chain management?
RQ3: Does supply chain environment affect social-media-enabled ES on both supply and customer markets?

Through these research questions, our study aims to identify factors affecting supply chain sensing capability by testing empirical data, designed to adopt supply chain environment as an antecedent. The paper is organized in six sections. Section 2 presents the review of the comprehensive literature and past research works for relevant supply chain practices. Section 3 proposes a research model along with six hypotheses. Section 4 describes the execution of the research design and the data collection process. Section 5 presents the results from data analysis, important applications of this research paper on both theory and practice, research limitation, and future research. The last section emphasizes major findings and implications to supply chain management and provides overall conclusions.

**Literature Review**

**Supply Chain Environments**

In order to understand supply chain environments, supply chain requires proper clarification. Some might see supply chain as a buying-and-selling relationship; however, a more elaborate definition can help us understand the relationships within supply chain in a collaborative fashion. Mentzer et al. (2001) propose a supply chain as a set of three or more organizations directly involved in both upstream and downstream flows of products, services, finances, and/or information from a source to a customer (p. 4). Supply chain management, therefore, means all the executing and managerial activities on a firm’s supply chain, from supplier(s) to the end user(s) (Cooper et al. 1997; Jones and Riley 1985; Rainer and Cegielski 2010). In order to improve the long-term performance of itself and the supply chain as a whole, an organization must constantly make strategic decisions according to the changing supply chain environments as a system (Houlihan 1988; La Londe and Masters 1994). The changing environments require that a given firm quickly identify new information, integrate it with the existing knowledge, and use the updated insights at the right time. This study includes two environmental characteristics proposed by Kohli and Jaworski (1990) – environmental turbulence, which contains technological and market turbulence, and competitive intensity.

**Environmental turbulence**

Environmental turbulence refers to the general conditions of difficult-to-predict discontinuities because of changes in both technology development and market situations (Mendelson and Pillai 1998). Technological turbulence and market turbulence are the two perspectives of environmental turbulence. Technological turbulence is defined as the rate of technological change (Jaworski and Kohli 1993). Market turbulence is defined as the degree of instability and uncertainty within a firm’s markets (Jaworski and Kohli 1993). Since turbulent environments usually require the adoption of certain IT to
support rapid communications (Pavlou and El Sawy 2006), a firm’s need for IT will become higher when the environments grow more turbulent and dynamic (Mendelson and Pillai 1998).

**Competitive intensity**

Competitive intensity refers to the degree that a given firm is affected by competitors in the market (Zhu et al. 2004). According to Jaworski and Kohli (1993), a firm is more than likely to perform well without a significant amount of market-oriented activities if the competition is moderate in the firm’s environments. Thus, it is possible that an organization does not need to obtain too much information about different suppliers and even consumers along the supply chain, if fierce competition is non-existent.

**Environmental Scanning (ES) and Social-Media-Enabled ES**

Environmental scanning (ES) is “the acquisition and use of information about events, trends, and relationships in an organization’s external environment, the knowledge of which would assist management in planning the organization’s future course of action” (Aguilar 1967, p. 1). ES is critical for a firm to link the current environments (i.e., customers, suppliers, partners, and/or competitors) with its operations and strategic decision making in order to accommodate its business to the environments. Firms tend to conduct routines and make decisions based on the information and knowledge they have already obtained and are likely to neglect new situations outside of their “immediate control” (Maier et al. 1997, p. 179). Rather than predict events and trends that will happen, ES acts as a crucial step in organizational learning and helps firms by identifying events and trends that potentially need to be addressed (Cameron et al. 2008). Therefore, scanning the environments can help firms avoid surprises, identify threats, and conversely, identify opportunities, gain competitive advantage, and improve short-term and long-term planning (Sutton 1988).

In supply chain management, researchers have indicated that organizational learning and environmental scanning are strategic sources in managerial activities (Hult et al. 2003). Several benefits for supply chain that firms receive from environmental scanning have been mentioned. For example, firms can be ahead of the competition by monitoring competitors’ product lines, quality and costs (Badri et al. 2000). An adept firm is also able to obtain and apply insights into sales trends and customer preferences, supply network innovations, and new distribution channels (Kristal et al. 2010; March and Hevner 2007). Research by Srinivasan et al. indicates that scanning activities can help organizations mitigate the impact of environmental uncertainty on supply chain performance (Srinivasan et al. 2011). In RBV perspective, this kind of strategic source works as a crucial source to generate advantages against competition. ES is also called market oriented intelligence in supply chain management, and it consists of two concepts – supply market intelligence and customer market intelligence.

**Supply market intelligence** is one of the supply management capabilities (Handfield et al. 2009). It refers to the ability to develop deep insights into key supply market characteristics, including emerging technologies, price and cost trends, mergers and acquisitions, capacity requirements, quality and delivery performance, and other key supplier capabilities that form the basis for sound strategic sourcing (Handfield et al. 2009). Scanning of suppliers and their networks can improve a firm’s ability on supplier selection for long-term relationships and allow sharing technological and innovative resources with other companies (Choi and Kim 2008; Koufteros et al. 2012). Supply market intelligence reflects how efficiently and effectively a firm can identify and process the amount of information about suppliers and how well the firm adapts the information into strategies. In fact, supply managers are often asked to consistently scan their business environments in order to identify needs and opportunities that may exist in supply markets and bring them to the internal decision makers to review (Handfield 2006).

**Customer market intelligence** is the ability to identify market factors that affect current customer needs and preferences as well as future needs of customers (Kohli and Jaworski 1990; Verhees and Meulenberg 2004). Knowledge of buyers, like that of suppliers, is a key resource for the success of a firm. Through customer market intelligence, firms are able to detect customer satisfaction or predict future customers’ needs and are expected to respond accordingly (Verhees and Meulenberg 2004). Therefore, a swifter identification and reaction to the customer needs results in a greater customer attitude toward the products and/or services the firm provides.
The Effect of Social Media on Supply Chain

Social-media-enabled ES on Supply market and Social-media-enabled ES on Customer market

Based on the arguments of both supply and customer market intelligence, we derive two constructs: social-media-enabled ES on supply market and social-media-enabled ES on customer market. Our basic reasoning of how to derive those constructs follow below.

Due to the fast growing IT innovations and the ever increasing competitive landscape, firms are facing to volume and range of external information overload and coupled with increased environmental complexity and uncertainty (Fabbe-Costes et al. 2014). Under this pretext, new scanning methods, such as the use of the internet and social media, are of merit (Abrahams et al. 2012; Lau et al. 2012). Existing research has revealed that the use of social media is significantly increased when suppliers and/or buyers have greater needs to explore their external environments for opportunities and threats (Rapp et al. 2013). This implies that social media, which are designed to strengthen ties and facilitate social learning, can be leveraged in supply chain management as a tool to conduct ES.

Along a supply chain, meaningful information and knowledge does not manifest at a single point for a firm to retrieve and analyze. Rather, useful information and knowledge are spread out over all the participants and might be easy to ignore. Researchers have recognized that online environmental scanning, which empowered by the rapid growth of Web 2.0, provides organizations with unprecedented opportunities to utilize the collective web intelligence in order to obtain better insights for doing businesses (Lau et al. 2012). With the help of social media, a supply chain manager is able to gather information from a broad base of a variety of sources, from experts to supply chain participants (O’leary 2011). For example, Best Buy uses a Twitter account to gain recommendations for improvement from customers and others (O’leary 2011). By doing so, Best Buy is able to monitor customers’ opinions and quickly identify opportunities and issues (customer market intelligence). Social media, such as Twitter, blogs, and Facebook, can also be used to monitor and gather information about a supply chain’s view on a particular organization or its partners to determine one’s reputation (supply market intelligence) (O’leary 2011). Accordingly, through this paper, we use social-media-enabled ES on supply market to describe supply market intelligence and social-media-enabled ES on customer market to describe customer market intelligence in order to specify the scanning subjects for supply chain management.

Sensing Capability

In dynamic capability view, companies are trying to obtain any capability that can help strategically and successfully configure and re-configure organizational competences to address changing environments and thus achieve competitive advantage (Eisenhardt and Martin 2000; Pavlou and El Sawy 2011; Teece et al. 1997). Teece (2007) points out that sensing, shaping and seizing opportunities as well as identifying threats is crucial for developing and maintaining a firm’s overall dynamic capabilities. Sensing capability is the principal ability to fulfill that goal; it refers to the capacity to identify and to create the necessities for the revolution of organizational operating routines (Pavlou and El Sawy 2011; Zollo and Winter 2002). Indeed, this type of business capability is a monitoring, or observing ability that helps enterprises to focus their need for change on environments. The need for change can be triggered either by the changing external environments (e.g., supply market changes, customer needs, technology innovation, competitors’ moves, etc.) or by the dynamic internal environments (e.g., internal crises, new products (or services) development, and IT updates) (Zollo and Winter 2002). This study focuses on the intervention of external environments and its influence on building sensing capability.

Sensing capability can be expanded beyond the boundary of firm management into supply chain. Firms cannot gain sound sensing capability without taking their supply chain environments into consideration. The process of sensing usually follows information processing activities (e.g., scanning channel environment, identify buyers’ needs, etc.) that firms use to learn (Day 1994). Supply chain managers might want to learn more about opportunities and threats by thoroughly scanning their chain environments including suppliers, customers, competitors, and technologies. In fact, researchers have already revealed the supporting effect of organizational learning mechanism on gaining capabilities such as sensing (Zollo and Winter 2002).
Research Model and Hypotheses Development

**Conceptual Research Framework**

Based on the aforementioned literature review, we propose a conceptual research framework (Figure 1).

![Figure 1. Research Framework](image)

To represent the supply chain environment, we employ two constructs: environmental turbulence and competitive intensity. Our social-media-enabled ES is split into two further constructs: social-media-enabled ES on 1) customer market and 2) supply market. Within the context of supply chain management, the following hypotheses are proposed to measure any impacts of those constructs on supply sensing capability (Figure 2).

![Figure 2. Research Model with Hypotheses](image)

**Environmental Turbulence and Social-Media-enabled ES**

The first two hypotheses address the relationship between environmental turbulence and social-media-enabled ES in supply chain environments. Environmental turbulence is an important indicator for supply chain managers to estimate environmental complexity and to respond with appropriate actions accordingly. Past research has shown that firms are more engaged in scanning dynamic environments because of the inherent difficulty to understand such environments (Albright 2004; Elenkov 1997). Demand turbulence, which is caused by the lack of meaningful insights provided from documented sale information (Celly and Frazier 1996, p. 201), requires that firms actively scan their environments for sufficient intelligence on customers. Social-media-enabled scanning on supplier market is likely to help firms identify a large amount of information on their suppliers. Fast changing technology is one of the major factors driving a firm’s needs to acquire supply market intelligence for supplier development (Hahn et al. 1990) and greatly affects procurement activity (Heide and John 1990). Also, it is usually challenging to maintain supply availability, supplier stability, quality consistency, and stable prices in a turbulent supply market (Premkumar et al. 2005). Thus, firms tend to pursue more information for a clearer picture of their supply market if their business environments have high supply uncertainty. It can be expected that supply chain managers would scan social media to learn changes in supply markets to prepare better for the later environmental analysis and decision making. Therefore, we propose:
H1: Environmental turbulence positively influences social-media-enabled ES on customer (H1a) and supply (H1b) market.

**Competitive Intensity and Social-Media-enabled ES**

Research shows that competition intensity is closely related to an organization’s interaction with the customer and/or supply market (Jaworski and Kohli 1993). Intense competition means that alternatives of a material, product, or service in the market are abundantly available. In such environments, a firm, as a buyer, is likely to search for information about many participants (e.g., competitors, suppliers, and customers) in the market and along the supply chain in order to make wise decisions. As a provider, the organization is also likely to actively scan the external environments to gain a clearer picture of its advantages and disadvantages in its supply chain. Research has shown that suppliers and buyers tend to use social media more commonly to scan both customer and supplier markets when they have greater necessity to explore opportunities and threats (Rapp et al. 2013). Therefore, we propose:

H2: Competitive intensity positively influences social-media-enabled ES on customer (H2a) and supply (H2b) market.

**Social-Media-enabled ES and Sensing Capability**

Being able to leverage certain IT to scan business environments can enable a firm to acquire sensing capability (Overby et al. 2006). Thanks to Web 2.0, social-media-enabled ES on both customer and supplier markets allows a firm to reach external information (e.g., consumers’ preferences, suppliers’ IT innovation, and distribution issues) through online sociological interaction with other participants in the market. This information capability can increase the firm’s awareness of opportunities or deficiency and therefore strengthen the ability to recognize current situation on demand and/or supply and adapt certain routines (sensing capability) of key supply chain events (Madhavan et al. 1998). Moreover, social-media-enabled ES provides firms access to real-time information and further the ability to rapidly recognize changes in the environments as well (Wei and Wang 2010). These arguments, thus, lead to the last two hypotheses:

H3: Social-media-enabled ES on customer market positively influences a firm’s sensing capability in supply chain management.

H4: Social-media-enabled ES on supply market positively influences a firm’s sensing capability in supply chain management.

**Research Methodology**

This section describes the research methodology employed to pre-test the hypothesized research model proposed in Figure 1. First, we describe the background for the empirical study. Second, the applied research instrument is introduced. Last, the sampling and data collection for this study are depicted.

**Measurement Items**

An empirical dataset for testing the research model (Figure 2) was collected by conducting an online survey. Five constructs were measured in this study: environmental turbulence, competitive intensity, social-media-enabled ES on customer market, social-media-enabled ES on supply market, and sensing capability. All constructs were developed and tested using the following phases: (1) item generation, and (2) empirical study with the decided measure. We adapted Li and Lin’s (2006) idea to consolidate construct items.

The items for each construct were generated through a comprehensive literature review. Then, the selected items were reviewed by five academic researchers, one academic outside reader, and one supply chain professional. The six academicians reviewed the survey items first and then brought the revised survey and model to the practitioner for re-evaluation and comment on the appropriateness of the research constructs. According to the feedback obtained from the academicians and practitioner, we revised or deleted confusing or redundant items as well as added items of necessity. After that, the partial
least squares (PLS) method using SmartPLS (Ringle et al. 2014) was applied to empirically analyze the collected data and test the hypotheses in the proposed model.

The items for measuring each aforementioned construct were adapted from previous studies based on the process we mentioned in the last section. Environmental turbulence (ET) items were adapted from Pavlou and El Sawy (2011). Competitive intensity (CI) items were adapted from Cadogan et al. (2003) and Jaworski and Kohli (1993). Two constructs – Social-media-enabled ES on customer market and social-media-enabled ES on supply market (SESCM and SESSM) – were measured by adapting the items from Handfield et al. (2009) and Verhees and Meuleenberg (2004), respectively. The items for the outcome variable, sensing capability (SC), were adapted from Pavlou and El Sawy (2011).

Each construct in this study was modeled as a latent variable, and a seven-point Likert scale with end points of “strongly disagree” and “strongly agree” was used to measure the items. The full list of the measurement is in Appendix A.

**Data Collection**

The purpose of the empirical test was to ensure content validity and reliability within the target context. In order to fulfill this goal, we selected 145 adults who had business background as our sample. The sampling was conducted within the U.S. and contained U.S. citizens only. An invitation e-mail with the survey link was sent to each individual in late 2014. Among the 145 selected contacts, 127 individuals responded to the questionnaire with 117 surveys complete and usable. The effective response rate from the data collection was 80.7 per cent.

<table>
<thead>
<tr>
<th>CR</th>
<th>Cronbachs α</th>
<th>AVE</th>
<th>ET</th>
<th>CI</th>
<th>SESCM</th>
<th>SESSM</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Turbulence</td>
<td>0.904</td>
<td>0.866</td>
<td>0.654</td>
<td><strong>0.809</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive intensity</td>
<td>0.903</td>
<td>0.872</td>
<td>0.609</td>
<td>0.635</td>
<td><strong>0.780</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social-media-enabled ES on customer market</td>
<td>0.894</td>
<td>0.824</td>
<td>0.739</td>
<td>0.518</td>
<td>0.696</td>
<td><strong>0.859</strong></td>
<td></td>
</tr>
<tr>
<td>Social-media-enabled ES on supply market</td>
<td>0.906</td>
<td>0.861</td>
<td>0.706</td>
<td>0.527</td>
<td>0.609</td>
<td>0.702</td>
<td><strong>0.840</strong></td>
</tr>
<tr>
<td>Sensing Capability</td>
<td>0.912</td>
<td>0.871</td>
<td>0.722</td>
<td>0.703</td>
<td>0.734</td>
<td>0.622</td>
<td>0.674</td>
</tr>
</tbody>
</table>

Note: Bolded numbers are square roots of AVEs; ET – Environmental Turbulence, CI – Competitive intensity, SESCM – Social-media-enabled ES on customer market, SESSM – Social-media-enabled ES on supply chain market, SC – Sensing capability

**Table 1. Measurement Validity**

**Data Analysis and Results**

**Measurement Model Assessment**

The statistics indicating the measurement validity of the research model is shown in Table 1. All five composite reliability (ρc) scores are greater than 0.8, which indicate the internal consistency of the measures (Chin 1998). The Coefficient Alpha of the five variables ranges between 0.86 and 0.87, above the threshold of 0.70 (Cronbach and Thorndike 1971). AVEs are larger than 0.5 (Fornell and Larcker 1981), ranging from 0.61 to 0.74. High reliability of the items is evident from the above statistics. After a simple computation, we obtained all the square roots of AVEs larger than the inter-correlations among the variables in the research model (Fornell and Larcker 1981), demonstrating the discriminant validity. These statistics together signify convergent and discriminant validity. The variance inflation factor (VIFs)
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were also computed in data analysis, and the result (i.e., all VIFs are below 3.0) suggests that the multicollinearity is not an issue in the research (Petter et al. 2007).

**Structural Model Assessment**

Figure 3 demonstrates the path coefficients and explained variances of the structural model, while Table 2 shows a summary of the results on the six hypotheses.

![Figure 3. Structural Model Assessment](image)

Note: * p<0.05, ** p<0.01, *** p<0.001, and n.s.=not significant

**Table 2. Summary of Hypotheses Tests**

According to the statistics of the structural model, social-media-enabled ES on customer and on supply markets jointly explained 49.8% of the total variance of supply chain sensing capability. Environmental turbulence and competitive intensity explain 49.4% of the total variance of social-media-enabled ES on customer market. Additionally, those two constructs also explain 40.4% of the total variance of social-media-enabled ES on supply market.

In terms of the construct relationships, environmental turbulence does not have significant impact on social-media-enabled ES on customer market but does significantly influence social-media-enabled ES on supply market. Thus, H1a is not supported, but H1b is. Competitive intensity positively affects social-media-enabled ES on both customer and supply markets. The results support both H2a and H2b. In addition, our analysis result shows that both social-media-enabled ES on customer and supply markets significantly affect supply chain’s sensing capability, which means H3 and H4 are supported.
Discussion

Key Findings

Primarily, our empirical testing provides interesting evidence that environmental turbulence only significantly affects social-media-enabled ES on customer market (H1a) not on supply market (H1b). Regarding our hypotheses of a relationship between competitive intensity and social-media-enabled ES on customer (H2a) and supply (H2b) markets, our findings support all positive and significant relationship between these constructs. Namely, competitive intensity is a more influential factor affecting social-media-enabled ES on customer than the supply market ($\beta = 0.614, p < 0.001; \beta = 0.460, p < 0.001$, respectively). Our fifth hypothesis linked social-media-enabled ES on customer market to sensing capability (H3) with testing results supporting a significant relationship between the two. Finally, our empirical findings substantiate the positive relationship between social-media-enabled ES on supply market and sensing capability (H4). Our findings reveal that social-media-enabled ES on supply market is more highly associated with the sensing capability that the one on customer market ($\beta = 0.467, p < 0.001; \beta = 0.294, p < 0.001$, respectively), which is a noteworthy in the context of supply chain management.

Overall, we found that supply chain environments play an important role in enhancing the environmental scanning ability via utilization of social media. Our results showing that environmental scanning of customer markets using social media relies much more heavily on competitive intensity is an unexpected finding. However, environmental turbulence was identified as a critical factor affecting the environmental scanning on supply market using social media along with the competitive intensity. Another conclusion of our research is that social-media-enabled ES on both supply and customer markets are significant antecedents of sensing capability in the context of supply chain management. Our outcomes suggest some implications that are discussed next.

Implications for Theory and Practice

The research has important theoretical implications. To our best knowledge, this study introduces a novel predictive model to discuss the effect of social-media-enabled ES within a supply chain scenario. Thus, the paper provides building blocks for other researchers who have similar research interests. Our study also reveals that social media is not just for individuals to develop their personal relationships with others but also provides important tools to help firms detect important information from environments and acquire knowledge to strengthen organizational learning and sensing capability. This work can benefit emergent research studying the business role of social media and offers insight regarding its impact to the area of supply chain management and its function in adding competitiveness to the chain. Future research might want to look at social-media-enabled ES from a different angle, identifying more characteristics and providing more rigor to this construct.

Additionally, this study has some implications for practitioners. Although we have seen increasing adoption of social media in business settings, firms have not fully realized the benefits social media can promise to their managerial activities on supply chains. This research demonstrates how a firm can use this type of technology and the net benefits the firm can receive. These insights encourage firm leaders, especially supply chain managers, to take advantage of the scanning power of social media to cope with the dynamic and competitive business environments.

Limitation and Future Research

During the empirical test, the individuals we sent the survey to were relatively new to the supply chain domain. While we assert that these respondents have sufficient knowledge about supply chain and use of social media, we do understand that it is an incomplete sample and cannot generalize the findings to those who have a much longer experience. Thus, we intend to continue the research with a more generalizable sample and expect deeper insights.
Conclusion

The purpose of this research is to identify factors affecting supply chain sensing capability by testing survey data. We framed our research model around the supply chain environment as a primary antecedent affecting social-media-enabled ES on both supply and customer market, which in turn influence sensing capability. To identify supply chain sensing capability, a total of 117 survey participants answered questions regarding their perceived impact of environment, SE and sensing capability. Our research findings suggested that supply chain environments play a salient role in increasing the ability of environmental scanning by using social media both on supply and customer market. Furthermore, such social-media-enabled environmental scanning is a critical core of enhancing sensing capability.

We believe our research contributes meaningfully to the supply chain industry who use social media actively for their business performance. It concedes that social media is not merely an individual tool for communication but recognizes that social media has become a vital means of environmental scanning to achieve better business performance. The theoretical and practical implications we have outlined extend the view of social media usage and evidence its significance toward the supply chain management industry.

REFERENCES

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**Appendix A. Research Measurement**

<table>
<thead>
<tr>
<th>Code</th>
<th>Construct and Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET</td>
<td>Environmental Turbulence (adapted from Pavlou and El Sawy 2011)</td>
</tr>
<tr>
<td>ET1</td>
<td>The environment in our industry is continuously changing.</td>
</tr>
<tr>
<td>ET2</td>
<td>The technology in our product area is changing rapidly.</td>
</tr>
<tr>
<td>ET3</td>
<td>Technological breakthroughs provide big opportunities in our product area.</td>
</tr>
<tr>
<td>ET4</td>
<td>Marketing practices in our product area are constantly changing.</td>
</tr>
<tr>
<td>ET5</td>
<td>New product introductions are very frequent in this market.</td>
</tr>
<tr>
<td>CI</td>
<td>Competitive Intensity (adapted from Cadogan et al. 2003, Jaworski and Kohli 1993)</td>
</tr>
<tr>
<td>CI1</td>
<td>In our industry, there are many “promotion wars.”</td>
</tr>
<tr>
<td>CI2</td>
<td>One hears of a new competitive move almost every day.</td>
</tr>
<tr>
<td>CI3</td>
<td>In our industry, aggressive selling is the norm.</td>
</tr>
<tr>
<td>CI4</td>
<td>Competition in our industry is cutthroat.</td>
</tr>
<tr>
<td>CI5</td>
<td>Price competition is a hallmark of our industry.</td>
</tr>
<tr>
<td>CI6</td>
<td>Our competitors are relatively weak.</td>
</tr>
<tr>
<td>SESCM</td>
<td>Social-media-enabled ES on Customer Market (Customer market intelligence) (adapted from Verhees and Meulenberg 2004):</td>
</tr>
<tr>
<td>SESCM1</td>
<td>We ask our customers regularly on social media whether they are satisfied with our products or services.</td>
</tr>
</tbody>
</table>
We regularly interact with customers via social media to understand whether our products or services correspond with what our customers want (in addition to the information provided by the price).

By using social media, we have information on customers, competitors and important social developments.

By using social media, we are able to obtain information about the locations and people that our customers sell their products or services to.

**Social-media-enabled ES on Supply Market (Supply market intelligence)** (adapted from Handfield et al. 2009):

- **SESSM1**: Our organization has the necessary social media skills to monitor and interpret changes in the supplier market/product base.
- **SESSM2**: Our organization use social media to help our suppliers improve their processes and products.
- **SESSM3**: Our organization use social media to improve the firm’s total cost of doing business with the firm’s suppliers.

**Sensing Capability** (adapted from Pavlou and El Sawy 2011)

- **SC1**: We frequently scan the environment to identify new business opportunities.
- **SC2**: We periodically review the likely effect of changes in our business environment on customers.
- **SC3**: We often review our product development efforts to ensure they are in line with what the customers want.
- **SC4**: We devote a lot of time implementing ideas for new products and improving our existing products.