SUPPLY INTEGRATION, MARKET INTELLIGENCE, AND PERFORMANCE: INITIAL MODEL DEVELOPMENT AND CONSTRUCT FORMULATION

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Abstract. There has been a recent focus in business scholarship on how firms can benefit from integrating their supply chains. However, the benefits of internally integrating the supply management function are less clear. Further, we propose that the benefits of internal integration may be limited, and that firms need to scan the supply market in order to capture new knowledge and developments outside of the current supply base. This working paper will examine how strategic supply management influences internal integration and market intelligence, and their subsequent effects on firm and supplier performance.

Introduction. The purpose of this working paper is to present a conceptual model and create constructs for examining the mediating roles of interfunctional integration and supply market intelligence on the relationship between strategic supply management and supplier and firm performance. Carr and Pearson (1999) initially conceptualized Strategic Supply Management (Purchasing) as consisting of formally written long-term plans that are reviewed and adjusted to match changes in the corporation's plans on a regular basis. From this initial definition, other researchers have expanded the concept to include supply management professionalism, status, and external relationships (Ogden et al., 2007). Although the terms have varied in the literature, we argue, similar to that of Lawson et al (2009) that strategic supply management serves as an enabler of high-level activities focused on the interface between a firm and its suppliers that has a long-term orientation toward improving firm and supply chain performance.

Researchers have examined the mediating role that various supplier management practices play between strategic purchasing and firm performance (Carr and Pearson 1999; Chen, Paulraj, and Lado 2004; Lawson et al., 2009; Sanchez-Rodriguez, 2009). However, supply

managers' responsibilities extend beyond managing external suppliers to managing a variety of internal and other external activities. Thus, this research makes a contribution by examining two of these important roles: a) the interfunctional integration of supply management within the firm and b) the environmental scanning for supply market intelligence.

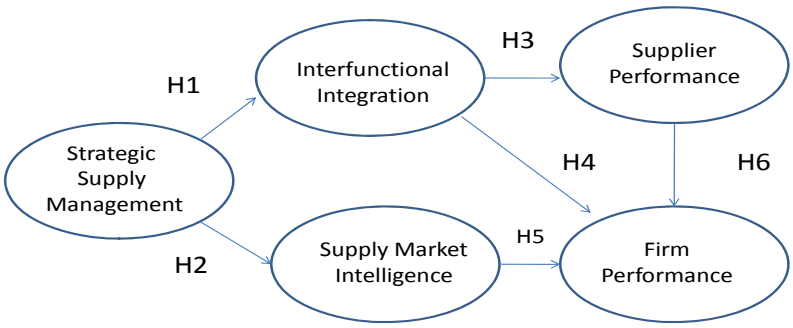
The overall theoretical framework for this study is grounded on the "strength-of-ties" perspective of supply chain management (Granovetter, 1973; Hansen, 1999; Zaheer et al., 1998; Gulati, 1995). The extent of integration between two interacting entities (individuals, functional departments or firms) can be conceptually positioned on a continuum from low level or "weak ties", which consists of relationships characterized by arm's length interactions, to higher levels or "strong ties", which incorporate frequent and "thick" lines of communication and knowledge transfer. Individuals, business functions, firms, and supply chains all interact as part of an overall interconnected social network. In particular, the dyadic relationships between the supply management function and its internal functional counterparts involve ever more interactions and dependence, leading to the development of an internal social web. In this study, we view activities that facilitate interfunctional integration as techniques that strengthen the ties within an internal or external supply chain. Inherent in its definition and conceptualization, Strategic Supply Management creates strong ties at the strategic level of the buyer-supplier relationship, as well as with the top management of the corporation. Further, although less often examined, this integration also occurs within the firm. Interfunctional integration focuses on the relationships formed by the supply management function within a firm and its respective peer departments.

Although strong ties through integration can result in improved supply management performance (Lawson et al., 2009), there are also circumstances and environmental factors under which the structures established by strong ties can become too rigid and preclude quick adaption to changes. Therefore, activities such as Supply Market Intelligence (Handfield, 2006), which consists of continually scanning the supply market for changes and opportunities, can create value for the purchasing firm. Supply Market Intelligence is viewed as a "weak-ties" practice, because it relies on many different potential sources of information. These linkages with the supply market are not done on a frequent, recurring basis with repetitive information exchange, but more instead from the consistent scanning from many potential sources of information that exists external to the direct supply chains that firms participate. These "weak ties" to the external environment can provide firms substantial benefits by leveraging new developments in the marketplace.

In this working paper, we argue that firms need to have a combination of strong and weak ties to achieve positive supplier and firm performance. We present and briefly describe our research model and hypothesis. We then provide a high level overview of the research methodology used in this study and provide some initial data analysis and results concerning the research constructs.

Research Model and Hypotheses. The conceptual model is shown in Figure 1. Each of the research hypotheses will briefly be discussed in this section.

Figure 1: Conceptual Model



Markets are characterized by intense foreign competition, rapid technological change, and shorter product life-cycles have imposed great adaptive pressures upon firms. This, coupled with the need for greater flexibility, has forced firms to increase interfunctional interactions. Due to the inherently boundary spanning nature of the supply management function, supply managers are usually responsible for managing the connections between the internal functions and external suppliers (Moeller, Fassnacht, and Klose 2006). Strategic supply management involves planning, implementing, evaluating, and controlling so supply management's activities are focused on attaining a firm's long-term goals (Carr and Smeltzer 1997; Carr and Pearson 1999). Supply managers, therefore, need to work with other internal functions to ensure that sourcing decisions are in the best interest of the organization's overall goals. Based on an extensive review of the literature, Pagell (2004) suggests that strategic census is a driver of interfunctional integration. Because of the focus on the organization's overall goals, when supply management is more strategic, we would expect greater levels of communication and interaction between supply management and other internal functions. These dyadic internal relationships between the supply management function and its functional counterparts should lead to strong ties, or functional embeddedness, over time, which is a relational type of integration. Thus, we propose that:

Hypothesis 1: Strategic supply management is positively related to internal integration.

Supply managers also have a key responsibility to scan the environment, gathering information on factors such as supply, demand, and technology. Supply managers must understand, identify, and capitalize upon opportunities that exist for their organizations in supply markets (Handfield, 2006). When the supply management function is more strategic, the importance of this environmental scanning role is likely to increase. Thus, we propose that:

Hypothesis 2: Strategic purchasing is positively related to supply market analysis.

Better alignment of supply management and functional goals should clarify goals and expectations for suppliers. When suppliers more clearly understand their customer's goals and expectations their performance is likely to increase. Thus we propose:

Hypothesis 3: Interfunctional integration is positively related to supplier performance.

Increasing interfunctional integration increases an organization's ability to process information that it needs for decision-making (Galbraith, 1973). Firm-wide integration has been shown to be directly related to overall firm performance (Haozhe, Mattioda, and Daugherty, 2007). In addition, strong interfunctional ties should provide more flexibility for decision-making, enhanced innovative potential, and more agile implementation of actions, all leading to better performance. As suggested by Pagell (2004), better alignment of supply management with other internal functions is also likely to directly impact firm performance. Thus, we propose:

Hypothesis 4: Interfunctional integration is positively related to firm performance.

Internal integration in the form of strong ties should lead to higher firm performance. However, although strong ties may facilitate decision-making and action-implementation, due to its inherent nature, it may also be detrimental to the infusion of new knowledge. Thus scanning a broad array of weakly-tied suppliers should offset the potentially negative effect of functional embeddedness. Scanning the environment for information has long been viewed as an important organizational level activity (Aguliar, 1967; Hambrick, 1982). Environmental scanning has been explored in a strategic management context and shown important for developing both marketing and R&D competencies (Danneels, 2008). Supply market intelligence is essential for developing effective supply management strategies (Handfield, 2006; Hanfield et al., 2009) and should contribute to the infusion of product, process, and strategic innovations. Thus, we propose:

Hypothesis 5: Supplier market analysis is positively related to firm performance.

For most organizations, purchases from suppliers account for a large percentage of the buying organization's overall costs. Researchers have shown that there is a relationship between supplier performance and the buying firm's overall performance (Tan and Kannan, 1998). Supplier performance has been shown to be directly related to a firm's cost performance

(Carter 2005) as well as its quality and delivery performance (Park and Hartley, 2002). Thus, we propose:

Hypothesis 6: Supplier performance is positively related to firm performance.

Research Methodology. The instrument used for data collection is part of a wider project involving researchers in North America and Europe. The researchers identified an initial list of items from past literature to represent aspects of supply management in terms of context, strategy, structure, process and skill sets of supply management professionals in developing the survey instrument. Interviews with practitioners across the different countries and discussions between and among the international teams, all of which consist of active researchers in the field of supply management, were used to ensure and assess face and content validity of the constructs.

The initial data analysis for this study first consists of forming constructs from the data collected in the U.S. The data was collected through an internet-based survey instrument. A cover email was sent to supply management professionals during the summer of 2009 inviting them to participate and directing them to the survey-website. The implementation of the survey followed the guidelines of Dillman's (2000) total design method: an initial email distribution was sent, followed by two waves of reminders. From the US data, 72 usable surveys were completed.

The U.S. data were gathered from two different sources. One source was the American Purchasing Society. The second source of respondents was a list of alumni of an undergraduate supply management program, whose emails were on file with the alumni office. Because these graduates may not currently be working in supply management, an initial email was sent explaining the survey and asking if they were interested in participating. A more thorough description of the survey sample demographics and protocol, as well as tests for nonresponse bias (Lambert and Harrington, 1990; Armstrong and Overton, 1977), will be provided during the presentation.

Data Analysis and Findings. At this stage in the research project, the data analysis consists of scale and construct development and purification for the research model presented in Figure 1. Appropriate references will be provided during the presentation.

We assessed the initial dimensionality, validity and reliability properties of the measures representing the theoretical concepts used in our framework. Unidimensionality refers to the existence of one latent trait underlying a set of measures, i.e., the homogeneity of such items, while reliability addresses the extent to which measures are free from random error and, therefore, yield consistent results on repeated trials. Construct validity refers to the extent to

which a set of measures correctly represents the concepts of study. There are various types or ways to establish construct validity, at least two of which are considered fundamental or minimally necessary to support evidence of validity: convergent validity and discriminant validity. Convergent validity refers to the degree of correlation among the empirical indicators used to measure the same latent construct, while discriminant validity is the degree to which empirical indicators of different constructs are unique from each other.

At this early stage of the scale development, we examined various internal consistency and item-based statistics in conjunction with exploratory factor analysis (EFA) to purify the scales and study their initial psychometric properties. A Corrected Item to Total Correlation (CITC) score was calculated for each item to assess item reliability. The intention was to eliminate items with CITC values below 0.30. All the items had values above this threshold (see Table 1). We also conducted the Harmon's one-factor test to assess common method bias, which is present when correlations between measures can be explained by the fact that the same individual provides the responses for all measurement scales rather than by any true relationship between constructs. Using all measurement items, we performed a factor analysis to check if a single factor would emerge. The results revealed that no single factor accounted for most of the variation in the data. So we concluded that any common method bias that may exist should not be problematic for our initial sample analysis. To assess initial divergent validity, all the items were subjected to an exploratory factor analysis using principal components and oblimin as a means of rotation to extract common factors (see Table 2). Initial convergent validity was examined by conducting factor analysis at the individual factor level, and the internal consistency of each factor was assessed using Cronbach Alpha. Results from factor level EFA suggested that all items had significant loadings on their respective factors and Cronbach Alpha for each of the factors ranged between 0.79 and 0.91, as shown in Table 3, indicating acceptable initial internal consistency.

Discussion. The purpose of this working paper is to create constructs for examining a model investigating how supply integration and market intelligence affects supplier and firm performance. Although this conference proceeding paper has provided some initial analysis from U.S. respondents, we have also collected data in ten additional countries. As time permits, we will discuss elements of this additional data collection and venues for future research.

Table 1. Corrected-item total correlations for initial purification

	CITC
Strategic Supply Management	
SSM1. Purchasing views are considered important by most top managers	0.76
SSM2. Purchasing is recognized as an equal partner with other functions of the top management team	0.75
SSM3. Purchasing actively participates in organization-wide process improvement	0.72
SSM4. Purchasing is included in the firm's strategic planning process	0.80
SSM5. Purchasing performance is measured in terms of its contributions to the firm's strategic objectives	0.69
SSM6. Purchasing focus is on longer term issues that involve risk	0.69
Interfunctional Integration	
II1. To what extent do purchasing supervisors and subordinates communicate in your organization?	0.62
II2. To what extent are new ideas from the purchasing department communicated to other departments?	0.60
II3. To what extent are employees supportive of each other?	0.57
II4. To what extent do employees have a sense of belonging to your organization?	0.78
II5. To what extent do employees share ideas freely with each other?	0.78
Supplier Market Intelligence	
SMI1. To what extent do you seek to learn from tracking new market trends in your supply industry?	0.37
SMI2. To what extent you seek to learn from benchmarking best practices in purchasing?	0.64
SMI3. To what extent do you seek to learn from trying out new technologies?	0.81
SMI4. To what extent do you seek to learn from your suppliers?	0.77
Supplier Performance	
SP1. The purchasing price	0.67
SP2. The cost of managing the procurement process	0.64
SP3. The level of supplier conformance to specs	0.82
SP4. The level of supplier product/service quality	0.75
Firm Performance	
BP1. Return on investment	0.80
BP2. Net Profit	0.85
BP3. Sales growth	0.81

Table 2. Exploratory factor analysis after initial purification

Item	Strategic Supply Management	Interfunctional Integration	Supplier Market Intelligence	Supplier Performance	Firm Performance
SSM1	0.76				
SSM2	0.74				
SSM3	0.49				
SSM4	0.83				
SSM5	0.82				
SSM6	0.71				
II1		-0.69			
II2		-0.58			
II3		-0.61			
II4		-0.86			
II5		-0.82			
SMI1			-0.77		
SMI2			-0.84		
SMI3			-0.82		
SMI4			-0.74		
SP1				0.70	
SP2				0.69	
SP3				0.96	
SP4				0.82	
BP1					0.87
BP2					0.91
BP3					0.88
Eigenvalue	7.5	4.5	2.5	1.1	1.1
% variance	25.2	14.9	8.4	6.0	3.8
Cumulative % variance	25.2	40.1	48.4	68.1	71.9

Table 3. Means, standard deviation and correlations

Construct	Cronbach Alpha	Mean	s.d.	1	2	3	4
1. SSM	.90	25.46	6.9				
2. SP	.86	21.7	5.7	0.05			
3. SMI	.88	16.5	4.3	-0.19	-0.11		
4. BP	.91	13.5	5.0	0.02	0.19	-0.12	
6. II	.85	20.14	4.9	-0.36	-0.10	0.22	-0.03

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