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Integrating the decentralized healthcare delivery supply chain

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Abstract

The healthcare industry is experiencing disturbing trends related to cost, quality, and increased competition. Interest in improving performance in these areas has increased in recent years, highlighting the need for better operational coordination of healthcare delivery. In response, questions have been raised regarding the application of supply chain management (SCM) principles to healthcare delivery to derive the benefits achieved in manufacturing. However, generalizing these integration concepts from manufacturing (a centralized structure) to healthcare (a decentralized structure) can be problematic. This has not been adequately addressed by practitioners and researchers. This study describes how the healthcare delivery supply chain is decentralized, in other words lacking in traditional financial and contractual coordination mechanisms among supply chain actors. It suggests partner relationship as a coordinating mechanism capable of influencing a hospital's integrative information and resource strategy and partnership culture leading to integration of the supply chain during care delivery.

1. Introduction

Significant advancements in medical science and associated technologies have been achieved at unprecedented rates during the past 50 years (IOM, 2001). These advancements enable people to extend their lives, causing an increase in the aging population and an increase in volume and variety demands for healthcare services (IOM, 2001).

These shifts have contributed to new and more competitive trends for healthcare providers centered on cost and quality. In 2009, for example, the Centers for Medicare and Medicaid Services' (CMS) healthcare spend was estimated at over U.S.\$2.5 trillion, or approximately U.S.\$8,160 for each U.S. resident (Kaiser, 2009). This is a substantial increase compared with U.S.\$75 billion, or U.S.\$356 per resident in 1970 (Kaiser, 2009). Some may argue that such cost increases are not unique to the U.S., however, the U.S. does spend considerably more as a percentage of gross domestic product than many other developed countries. Consider that healthcare spending accounted for approximately 15% of GDP in the U.S. in 2006, compared with Japan at 8.1%, the U.K. at 8.4%, Canada at 10%, and Germany and

France at around 11% (Kaiser, 2009). Further, many experts are concerned that this number will grow to around 20% of U.S. GDP by 2015. Given this, some believe that any discussion related to health care today is well served to include a focus on the “unsustainable growth rate of U.S. medical spending,” (Hwang and Christensen, 2009: p. 1329). Concerns over healthcare delivery are not limited to cost alone however. Studies reveal that perceptions related to access to quality care (Cogan et al., 2004) and the quality of clinical outcomes is also of grave concern (Klevens et al., 2007).

These pressures on cost and access to quality care have led to changes in the competitive landscape for healthcare providers. Today more and more consumers are seeking treatment overseas in search of high-quality, low-cost, and timely healthcare; a phenomenon referred to as *medical tourism* (Economist, 2008; Einhorn and Arnst, 2008; Lagace, 2007). *Medical tourism* is gaining currency as it is becoming known that a patient can receive treatment abroad for pennies on the U.S. dollar for the same procedure performed in developed countries (Marek, 2009).

These pressures for cost, quality, and global competition are not unique to healthcare. Today’s business environment places more pressure on firms who now must compete for customers demanding more variety, lower cost, and still better quality (Vonderembse et al., 2006). In response to these pressures, firms have turned to supply chain management (SCM) as a means to improve flexibility, cost, quality, and responsiveness (Chen and Paulraj, 2004). The healthcare industry has also sought to reap some of the proposed benefits of effective SCM in recent years as the concept of partnering with customers, suppliers, and various strategic service providers has gained momentum (Naidu et al., 1999). However, many SCM attempts have failed in healthcare, drawing attention to its unique context, plagued by complex processes and lagging IT investment (Scalise, 2005). This complexity is observed in that the healthcare delivery supply

chain can contain a large number of stakeholders, often with divergent objectives, participating in asymmetric information sharing, and very blurry boundaries (Byrnes, 2004; Singh, 2006; Ford and Scanlon, 2007). Its complexity in company with the lack of coordination mechanisms found in traditional supply chains, positions the downstream healthcare delivery supply chain as unique and very ripe for scholarly investigation (Shah et al., 2008).

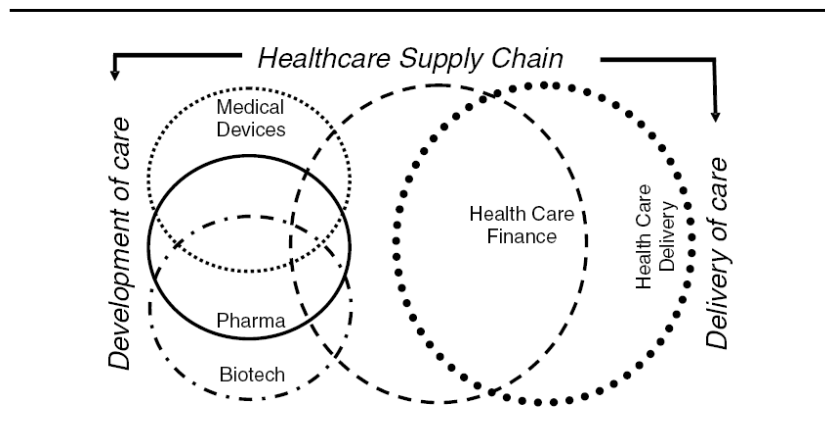
Therefore, the purpose of this paper is to explore the unique context of healthcare delivery and posit key factors and consequent relationships among these factors that can illuminate antecedents of SCM practices. Specifically, this study explores the research question; *what are the antecedents of SCM in healthcare delivery?* Section two conceptualizes the decentralized healthcare delivery supply chain and presents some of the unique characteristics of this context. Section three follows with a brief discussion of service-dominant logic (SDL) as a theoretical grounding for understanding SCM phenomena (Schmenner et al., 2009) and introduces a testable model positing antecedents of SCM in healthcare. This is followed by section four which will describe the methods for conducting this research, and section five which foretells of potential findings, implications, and contributions of the study.

2. Supply chain conceptualization and context

2.1 Supply chain conceptualization

As with most supply chains, the healthcare supply chain in a macro sense can be dissected into micro representations typically referred to as upstream, midstream, and downstream. The macro level view of the healthcare supply chain is no different. See figure 1.

Figure 1 Supply chain for the health care sector: linking the development and delivery of care (from Sinha and Kohnke, 2009: p. 201).

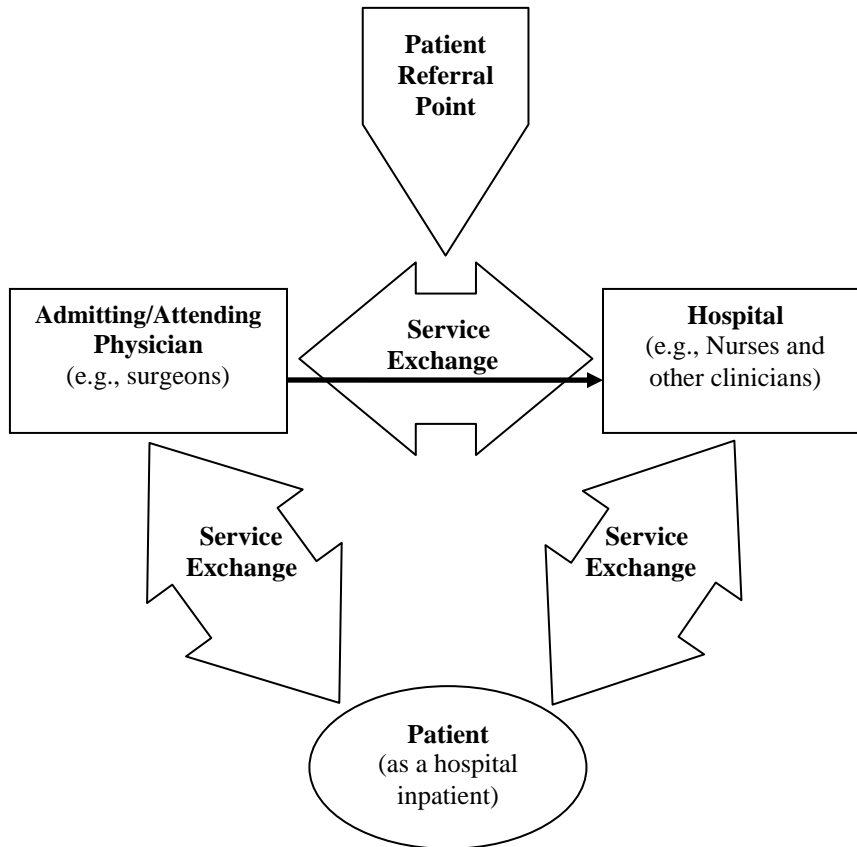


Biotech, pharmaceutical, and medical device firms provide many of the upstream material inputs at a macro level. The midstream of the macro healthcare supply chain is occupied by claims administrators such as third party administrators (TPAs), insurance companies, and other financiers of the system. Finally, the downstream portion is where healthcare delivery actually takes place, and is made up of actors such as physicians, hospitals, clinics, home-health services, and hospice (Sinha and Kohnke, 2009). This downstream conceptualization of the healthcare supply chain has also been embraced by Ford and Scanlon (2007) who describe the key actors as consisting of doctors, specialists, hospitals, pharmacies, the patient, health insurance plans, and employers.

Consistent with the work of these previous authors, the present study conceptualizes the downstream healthcare delivery supply chain as consisting of admitting/attending physicians, inpatient acute care hospitals, and inpatients. Admitting/attending physicians are conceptualized as 'suppliers' in a traditional supply chain sense, as they refer (or supply) patients (or material) to hospitals as well as provide (or supply) services to patients while in the hospital. The hospital is

conceptualized as the ‘focal firm’ where care (services) are coordinated and provided to patients. It follows then that patients are the ‘ultimate customer’ of the healthcare delivery supply chain (Schneller and Smeltzer, 2006). See figure 2.

Figure 2 The healthcare delivery supply chain.



Note: Solid arrow indicates patient referral from physician to hospital. Double-headed arrows indicate the service exchange among the admitting/attending physician, the patient and hospital clinicians.

The downstream healthcare delivery supply chain is a meaningful target for scholarly research with regard to improving cost and quality. More than 50% of health spending in the U.S. is for hospital, physician, and various clinical services, (Kaiser, 2009). While some may intuitively argue that cost reductions in the downstream healthcare delivery supply chain result in

a quality trade off, “research has shown that more services and higher spending do not result in better outcomes; indeed, they often produce just the opposite result,” (Miller, 2008: p. 1). This supports the notion that the downstream healthcare delivery supply chain is an attractive target for improvement. Further support can be found from Coye et al. (2009: p. 126) who go so far as to suggest that “the most pressing task of health care [delivery] is to make care effective and affordable,” (Coye et al., 2009: p. 126). A paucity of scholarly supply chain research has been conducted in this context, however it has been recognized as unique from the traditional manufacturing context and worthy of investigation (Shah et al., 2008). This is perhaps owing to the observation that the hasty application of traditional manufacturing supply chain/OM concepts in the healthcare delivery context should be carried out with caution, as generalizations have proven thorny (Smeltzer and Ramanathan, 2002).

2.2 Characteristics of the healthcare delivery supply chain context

The context of this study can be understood by exploring some of the key characteristics of the healthcare delivery supply chain. These characteristics can differ greatly from manufacturing, the primary focus of operations management (OM) and SCM research (Machuca et al., 2007). Such an understanding may therefore be useful as “health care supply chains are organized quite differently from... .product-based scenarios,” (Shah et al., 2008: p. 765).

To begin, as is consistent with extant research into service characteristics, healthcare delivery also inherently involves: 1) co-production of value, 2) heterogeneity of outcomes, 3) service perishability, and 4) customer inseparability during value creation (Dobrzykowski, et al., *forthcoming*; Hong et al., *forthcoming*; see also Smeltzer and Ramanathan, 2002). These characteristics are well known and can be referred to as *the co-production phenomenon*. While

the co-production phenomenon may be fairly obvious, the healthcare delivery supply chain features other less apparent characteristics such as the role ambiguity suffered by value co-creation actors.

Actor ambiguity begins with the notion that a hospital's customer in the healthcare delivery supply chain is not clearly defined (Smeltzer and Ramanathan, 2002). Many important actors engage in multiple roles in the value creation process. "The patient, of course, is the ultimate client or beneficiary of an effective [healthcare] supply chain," (Schneller and Smeltzer, 2006: p. 6). However, patients experience role duality in the healthcare delivery supply chain, serving not only as the 'customer', but also as the 'material input' and consequently influence cost and quality outcomes because of a sort of 'material' variability (Schneller and Smeltzer, 2006). "Disease in any one individual is frequently characterized by its 'emergence,' or change, rather than its steady state," (Schneller and Smeltzer, 2006: p. 7). Given this demand variability, highly personalized interactions among clinicians and customers are necessary to achieve quality outcomes (Shah et al., 2008).

Physicians, nurses, and other clinical staff actors are the end users of many materials (e.g. hip replacement devices, sutures, syringes, etc.). This can lead to the view that these actors are internal customers in the healthcare delivery supply chain of the hospital (Schneller and Smeltzer, 2006). Role ambiguity is apparent with regard to the patient also, as patients can be conceptualized as customers, while they also serve as a material input in the conventional production transformation process, turning 'inputs' into 'outputs' (Schneller and Smeltzer, 2006). Likewise, physicians act as a hospital supplier by referring patients for treatment. This actor ambiguity is amplified by the centrality of the physician in the healthcare delivery supply chain.

Centrality of the physician refers to the dominant role he/she plays in diagnosing a patient's illness and shaping the treatment plan within some acceptable parameters (Schneller and Smeltzer, 2006). Physician assessments and decisions regarding the patient's needs (e.g., how much stress a patient will apply to a hip implant) generate significant variation in the materials considered necessary during care delivery, even for patients with similar demand characteristics (Schneller and Smeltzer, 2006). Large inventories and consequent inefficiencies are often borne by the hospital as a result. Physician decisions also affect important outcomes metrics such as the patient's length of stay (LOS) (Gnanlet and Gilland, 2009), as well as other resource consumption drivers for the hospital (Schneller and Smeltzer, 2006). "Probably no other organization in the United States has such important members who are not employees but perform their work within the organization," (Smeltzer and Ramanathan, 2002: p. 2562). This centrality issue leads to two unique challenges for the healthcare delivery supply chain related to: 1) an agency dilemma (Ford and Scanlon, 2007) and 2) a lack of coordination mechanisms (Shah et al., 2008).

Consider the physician's agency relationships with 1) the hospital where services are provided, 2) the patient receiving treatment services, and 3) the contracted health insurance plan remunerating both the hospital and the physician. The physician maintains an important responsibility in fulfilling the insurance contract as well as ensuring service quality. "In meeting these responsibilities, an agency conflict can arise between reducing costs, as a representative of the health plan [and hospital], and ensuring quality as an agent for the patient," (Ford and Scanlon, 2007: p, 194). For the physician, providing abundant services, often in the form of state-of-the art clinical procedures, diagnostic tests, and/or pharmaceutical medications is an effective approach to meeting the patient's quality expectations. In a fee-for-service

arrangement, this approach has the potential to increase physician payments while possibly reducing medical malpractice exposure and consequent costs (Ford and Scanlon, 2007). On the other hand, these actions may also drive inefficiencies in the healthcare delivery supply chain, contributing to poor which is exacerbated by the absence of coordination mechanisms.

The healthcare delivery supply chain can be considered a decentralized supply chain, largely lacking coordination mechanisms such as financial or contractual arrangements amongst physicians, hospitals, and patients. It should be acknowledged that a small number of insignificant coordination mechanisms are present among these actors. The credentialing agreement between the hospital and the physician granting the physician 'privileges' to practice at said hospital is one example. This is considered inconsequential however, as such agreements are rarely revoked, barring egregious clinical wrongdoing. It is also worth mentioning that this conceptualization assumes an employment scenario whereby the physician is independent of the hospital. That said, field interviews conducted by the researchers have indicated that physician employment status alone is likely insufficient to coordinate the healthcare delivery supply chain. Finally, with regard to the patient-hospital or patient-physician relationship, relatively de minimis financial deductibles are usually the only coordination mechanism in place. Such deductibles provide little incentive for the patient to align the healthcare delivery supply chain. In the absence of financial and contractual coordination mechanisms, there is little motivation for independent economic actors to assume risk or harmonize their respective efforts (Gan et al., 2005). The opposite is the case for traditional supply chains linked by contractual agreements or common ownership. The centralized supply chain can be perceived as one entity with intentionally distributed work designed at optimizing value creation performance (Shah et al., 2008).

Finally, IT systems capable of effectively managing data and information are not widespread, nor fully integrated in the healthcare delivery supply chain (Ford and Scanlon, 2007). “There are problems getting information about healthcare procedures and products,” (Smeltzer and Ramanathan, 2002: p. 2562). Incomplete or asymmetric information flows among physicians, hospitals, patients, and other key stakeholders occur in the supply chain giving certain members negotiating power and can result in suboptimal outcomes (Ford and Scanlon, 2007). This is of concern in the context of supply chain given that IT and information integration have been key factors in supply chain improvements in manufacturing (Smeltzer and Ramanathan, 2002).

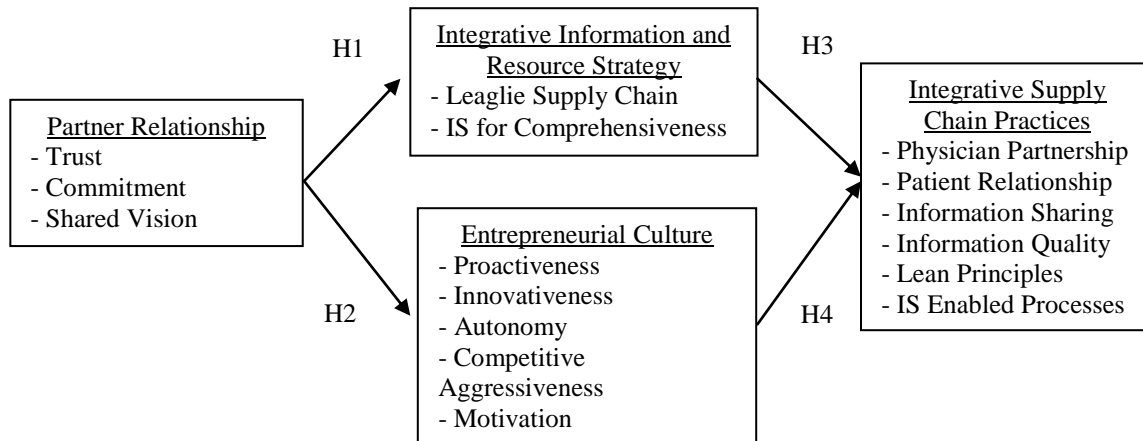
3. Theory development and hypotheses

3.1 Theoretical model

Effective SCM practices appear to have a place in improving hospital outcomes (McKone-Sweet et al., 2005). However, the decentralized nature of the healthcare delivery supply chain (Shah et al., 2008) has resulted in much curiosity regarding the antecedents of SCM in healthcare. Considering the lack of traditional coordination mechanisms, the present study builds upon the work of Shah et al., (2008) to suggest that partner relationship – comprised of trust, commitment, and shared vision with a hospital’s admitting/attending physicians – can serve as a surrogate coordination mechanism in aligning the healthcare delivery supply chain. Partner relationship influences the integrative information and resource strategy and entrepreneurial culture of a hospital, both of which ultimately motivate integrative SCM practices. See figure 2. These factors and posited relationships depict a highly integrative environment, one in which value can

be co-created among a ‘constellation’ of actors, specifically the physician, the clinical staff of a hospital and the patient (Normann and Ramirez, 1993).

Figure 2 Theoretical model



3.2 Value co-creation and service-dominant logic (SDL)

The unique challenges of the healthcare delivery supply chain – *the co-creation phenomenon, actor ambiguity, variable demand, the centrality of the physician, and information asymmetries* – may help to explain why scholars have favored this context in describing value co-creation (for examples, see Normann and Ramirez, 1993; Prahalad and Ramaswamy, 2004; Dobrzykowski and Vonderembse, 2009). Value co-creation has its roots as one of ten foundational premises of SDL (FP6: The customer is always a co-creator of value) (Vargo and Lusch 2004, 2008; Vargo and Akaka, 2009; Schmenner et al., 2009). SDL is an emerging theoretical basis for OM research (Schmenner et al., 2009), which suggests a dichotomous view of value creation to the traditional goods-dominant logic (GDL) view (Vargo and Akaka, 2009). Both SDL and GDL can be traced

back to Adam Smith's (1776) work which developed two broad views for understanding value – 'value-in-use' and 'value-in-exchange.' (Vargo et al., 2008; Vargo and Akaka, 2009).

SDL centers on value in use and posits that 'real' value is created through the interactions of value creation (supply chain) actors, and their consequent application of knowledge and resources to produce some desired outcome (Vargo and Akaka, 2009; Callaway and Dobrzykowski, 2009). On the other hand, GDL centers on value in exchange, suggesting that 'nominal' value is created and measured in the transaction between value creation actors (see Vargo and Lusch 2004; Vargo and Akaka, 2009). These views are very distinct and carry serious implications with regard to the focus of a firm and the role of tangible goods and services in value creation. For example, under GDL, services are considered ancillary to goods, an 'add on' to supplement the value of the product (Vargo and Akaka, 2009). However under SDL, Callaway and Dobrzykowski (2009: p. 226) observe that "goods, if involved [in value creation], serve only as a conduit of service provision (Vargo and Akaka, 2009)." This has its roots in SDL foundational premise three; *goods are distribution mechanisms for service provision* (Vargo and Lusch 2004, 2008; Vargo and Akaka, 2009).

SDL therefore emphasizes the creation of a *value dense environment* (Normann and Ramirez, 1993). This is an *environment* in which all economic actors have access to the appropriate information, knowledge, and resources necessary for value creation, shifting focus away from the actual tangible product itself (Callaway and Dobrzykowski, 2009). Each paradigm has the potential to significantly influence the focus of the firm – either on its goods or services – in creating value. The SDL focus on value creation through service provision (Vargo and Akaka, 2009) positions this line of thinking favorably as theoretical grounding useful in explicating

healthcare delivery supply chain phenomenon. Table 1 displays links between the characteristics of SDL (and value co-creation) and the healthcare delivery supply chain context.

Table 1 Links between the healthcare delivery supply chain and SDL.

Healthcare delivery supply chain characteristics	SDL characteristics
The co-creation phenomenon	Foundational Premise Six: The customer is always a co-creator of value (Vargo and Lusch, 2008; Vargo and Akaka, 2009).
Actor ambiguity	The focus of value co-creation is not on specific roles, but rather all ‘economic actors’ (Normann and Ramirez, 1993).
Demand variability	An integrative service system is responsive to new customer needs (Callaway and Dobrzykowski, 2009; Maglio and Spohrer, 2008) through “reconfiguration of roles and relationships among the constellation,” (Normann and Ramirez, 1993: p. 66).
Centrality of the physician	The building blocks of value co-creation – stakeholder dialogue, access to information, risk-benefit analysis, and transparency of information – will improve goal alignment between supply chain actors (Callaway and Dobrzykowski, 2009, based on Prahalad and Ramaswamy, 2004).
Information asymmetries	Value co-creation is enhanced by information integration (Prahalad and Ramaswamy, 2004) and is “integral to the new dominant logic,” (Day, 2006: p. 85). An SDL view will “improve the asymmetry of information... ..between provider and customer,” (Callaway and Dobrzykowski, 2009: p. 230).

3.3 Hypothesized relationships

Ramayah et al. (2008: p. 38) observe that “a high level of trust, commitment, and a shared common vision among supply chain partners is indeed essential for inter-organizational collaboration (Spekman et al., 1998).” These types of relationship attributes may serve as coordination mechanisms bringing particular benefit to the firm in managing decentralized supply chains (Shah et al., 2008). Extending this scholarly work, the present study conceptualizes partner relationship and defines the construct as *the extent of trust, commitment, and shared vision among healthcare delivery partners*.

Hospitals develop explicit strategies or implicitly make decisions in managing their healthcare delivery supply chain in an effort to “organize the resources under their control to

achieve their goals,” (McDermott and Stock, 2007: p. 1022). The present study conceptualizes integrative information and resource (supply chain) strategy, which is comprised of two subconstructs: 1) leagile supply chain strategy (Vonderembse et al., 2006; Agarwal et al., 2006), and 2) IS for comprehensiveness strategy (Apigian et al., 2006; Sabherwal and Chan, 2001). This is owing to the notion put forth by Lambert and Copper (2000) that SCM deals with information and resource management between economic actors. Integrative information and resource strategy is defined as *the extent to which a hospital pursues an approach for managing processes, quality systems, and information technologies that balances both efficiency and agility in patient care.*

The focus of this strategy rests in how the hospital plans to collaborate with others to create value and is motivated by the nature of the firm’s external relationships, making relationship attributes, such as trust, key (Miles and Snow, 2007). This is particularly true in the context of SDL and value co-creation where relational attributes such as trust, commitment, and shared vision are key to the building blocks of value co-creation (stakeholder dialogue, access to information, risk-benefit analysis, and transparency of information) (Callaway and Dobrzykowski, 2009; Prahalad and Ramaswamy, 2004). This study therefore postulates that partner relationship will be positively associated with the hospital’s integrative information and resource strategy.

H1: Partner relationship is positively associated with a hospital’s integrative information and resource strategy.

Integrative approaches to value creation require not only trust, but also that the firm foster a culture which promotes equitable treatment and collaboration with external actors (Miles and Snow, 2007). Entrepreneurial orientations are particularly important as firms strive to

maximize value from collaborations, developing a culture of “collaborative entrepreneurship,” (Miles and Snow, 2007: p. 461). The present study extends the work of Jambuligam et al. (2005) to define such an entrepreneurial culture as *the extent of proactiveness, innovativeness, autonomy, competitive aggressiveness, and motivation displayed by hospital employees involved in patient care in when dealing with other healthcare delivery partners* (Venkatraman, 1989; Lumpkin and Dess, 1996).

Partner relationship motivates the development of an entrepreneurial culture. Trust can stimulate positive attitudes and behaviors (Schurr and Ozanne, 1985), thus motivating employees. This is of key importance to the present study given that information sharing between supply chain actors places a premium on trust because of the consequential risks to performance (Young et al., 1999). Likewise, Chen et al. (2007) suggest that trust in supply chain partners is critical for effective collaboration (Ramayah et al., 2008). As such, if a hospital is to develop a culture centered on collaboration to stay in tune with entrepreneurial opportunities, it must first have trust in its partners.

Trust along with a shared vision with supply chain partners drives the culture of the firm toward a collaborative ‘world view’ (Spekman et al., 1998; Lee and Kim, 1999; Li 2002). These relationship attributes combined with commitment to one’s value creation partners is necessary for the development of a culture of external awareness. This external awareness is key in a value co-creation context as the success of the service system, to some extent, depends on its ability to identify and exploit new opportunities (Callaway and Dobrzykowski, 2009). This study therefore postulates that trust, commitment, and shared vision (partner relationship) motivate the hospital to develop an entrepreneurial culture.

H2: Partner relationship is positively associated with a hospital's entrepreneurial culture.

Value co-creation thrives in a highly integrative environment (Prahalad and Ramaswamy, 2004). In healthcare delivery, this integration must extend to external parties such as admitting/attending physicians given their influential (central) role in managing the supply chain (Smeltzer and Ramanathan, 2002.) The development of an integrative supply chain is an attractive approach for hospitals in this regard. Min and Mentzer (2004: p. 63) suggest that “supply chain management extends the concept of functional integration (i.e., the integration of traditional business functions, departments, and processes) beyond a firm to all the firms in the supply chain (Cooper and Ellram, 1993; Cooper et al., 1997; Ellram and Cooper, 1990; Greene, 1991) and, thus, individual members of a supply chain help each other improve the competitiveness of the supply chain, which should improve competitiveness for all supply chain members (Bowersox and Closs, 1996; Cavinato, 1992; Cooper and Ellram, 1993; Lee and Billington, 1992).” The present study develops a construct for integrative supply chain practices defined as *the extent to which a set of activities is undertaken in a hospital to promote effective management of healthcare delivery* (adapted from Li et al., 2005; 2006).

Cabrera et al. (2001: p. 251) advocate that “whether or not the organization is able to achieve its strategic objective will depend on whether it can deploy the right kinds of processes and behaviors, which are in turn determined by the organization's architecture.” Two high impact architectural elements available to the firm in this regard are its strategy and culture (Roh et al., 2008). Jointly, a firm's culture and strategy can guide it to execute integrative supply chain practices such as effective information flow (Leisen et al., 2002; Gallivan and Srite, 2005).

“These decisions lead to hands-on, action oriented activities that dictate how a planned strategy is turned into an effectively implemented one,” McDermott and Stock, 2007: p. 1022).

From an SDL perspective, a hospital’s strategy to create an integrative environment will lead it to execute highly integrative practices (Prahalad and Ramaswamy, 2004; Normann and Ramirez, 1993). These practices include the systematic development of physician partnerships, patient relationships, high quality information sharing among care providers, the use of Lean principles (Li et al., 2005; 2006) and IS enabled processes (Rai et al., 2006). An entrepreneurial culture will also lead to integrative supply chain practices, motivated by an interest to exploit opportunities in the value creation service system (Callaway and Dobrzykowski, 2009). This study therefore postulates positive relationships between a hospital’s integrative information and resource strategy and its integrative supply chain management practices, as well as between a hospital’s entrepreneurial culture and its integrative supply chain management practices.

H3: Integrative information and resource strategy is positively associated with a hospital’s integrative supply chain practices (for healthcare delivery).

H4: Entrepreneurial culture is positively associated with a hospital’s integrative supply chain practices (for healthcare delivery).

4. Research methods

Survey was selected as the research method to test the hypothesized relationships under study. An essential tenet of scientific method is the provision of clearly defined variables, methods, and procedures (Pedhazur and Schmelkin, 1991). The first step in developing valid scientific measures centers on specifying the domain of the construct, which begins with a review of the literature (Churchill, 1979). Therefore, a comprehensive literature review produced clear construct definitions and initial items for refinement.

In an attempt to further develop and refine the scales, interviews with three academic experts possessing sufficient domain knowledge were conducted as part of an experience survey (Churchill, 1979). This enhanced the content validity of the instrument. The theoretical model was presented during the interviews, consistent with the rigorous instrument development approach of Swink and Song (2007), in an Operations Management study focused on supply chain integration practices. Next, seven healthcare professionals possessing an extensive understanding of healthcare delivery/clinical integration served as judges in a Q-sort process (Churchill, 1979). An adapted Q-sort process from Moore and Benbasat (1991) was employed. This provided a measure of construct validity, and identified items or combinations of items which were ambiguous or possessed ‘different shades of meaning’ from the perspective of the respondent (Churchill, 1979). The structured interviews began with the researcher reviewing a standard set of instructions with the judges. The judges were then presented with the construct definitions and presented with randomized index cards each containing a specific candidate scale item. Each judge was then asked to organize the cards into construct categories, creating a grouping of cards for each construct. Their understanding was confirmed throughout the process to ensure outcome accuracy.

Convergent and discriminant validity was assessed using two methods of inter-rater reliability (Song and Swink, 2007). First, the percentage of correct item placements (into the expected construct categories) was calculated (Moore and Benbasat, 1991). When using this measure, the higher the percentage of correct placements, the higher the degree of construct validity (in terms of convergence and divergence) and the higher the potential for reliability can be expected. The target percentage of correct placements will be at least 80%. Cohen’s Kappa (Cohen, 1960) was then computed for each pair of judges as a means of measuring agreement in

the categorizations. Cohen's Kappa is a widely accepted measure of inter-rater agreement and has been cited more than 2,000 times in literature (Hsu and Field, 1989). A score of 0.65 indicating inter-rater reliability was considered as the minimum acceptable threshold (Jarvenpaa, 1989). These procedures are consistent with those employed in other scholarly supply chain studies (see Swink and Song, 2007) and can be anticipated to provide adequate assessment of convergent validity within each construct, and discriminant validity across constructs (Davis, 1986, 1989). All construct results were above the minimum scientific thresholds indicating that the researchers had developed adequate perceptual measures for the phenomena under study.

At present, a large scale data collection effort, surveying hospitals from across the U.S.A., is underway. The targeted respondents are individuals with domain knowledge of their hospital's clinical integration practices. These individuals are anticipated to hold the titles of Chief Nursing Officer, Chief Medical Officer, Chief Operating Officer, VP or Director - Patient Care Services, VP or Director - Case Management, VP – Medical Staff Affairs, VP or Director – Quality Initiatives or their equivalents. Data is expected to be received in spring 2010 and at a minimum, initial data analysis should be complete for presentation at POMS 21st Annual Conference in Vancouver, Canada on May 7th through May 10, 2010.

5. Implications

This study offers potential contributions in a number of areas. For scholars, this study identifies some of the unique characteristics of the healthcare delivery supply chain context. This is useful for a few reasons. First, the extant literature is rife with differing conceptualizations of SCM practices (Cigolini et al., 2004). One potential explanation for this lack of consensus maybe that insufficient attention has been paid to the context of previous conceptualizations (Liao, 2008).

This would suggest that exploring and clearly defining a study's context will enhance our understanding of SCM concepts as the field matures and becomes more refined. A comprehensive description of context is particularly important with regard to the healthcare delivery supply chain given that it has been recognized as unique from the traditional manufacturing context (Smeltzer and Ramanathan, 2002; Shah et al., 2008). This effort strengthens the conceptualization of SCM practices in healthcare delivery put forth herein. If supported statistically, as is anticipated, scholars can take away an understanding of healthcare delivery SCM practices accompanied by a degree of confidence.

This study also attempts to explain and inform the misalignment and consequent challenges in implementing SCM practices in healthcare delivery. In suggesting partner relationship as a surrogate coordination mechanism, this study can inform scholarly curiosity regarding approaches to aligning the healthcare delivery supply chain. This builds on the work of Shah et al. (2008). Finally, this study has the potential to make significant strides in advancing the nascent scholarly understanding of SDL/value co-creation. A paucity of empirical work has been done with regard to developing measures and testing relationships related to SDL (Zhang and Chen, 2008). In linking SCM and SDL, this study makes one of the first attempts at measuring phenomena in this domain, specifically the antecedents of value co-creation. This extends the early empirical work of Zhang and Chen (2008).

Useful contributions are also offered for practitioners. First, this study has the potential to inform practical curiosity related to effective SCM implementation in healthcare delivery. Provided that the hypothesized relationships put forth herein are supported in data analysis, hospital administrators will come away with a clear understanding of the importance of fostering a partner relationship with their medical staff. Such a relationship is expected to be shown to

serve as a catalyst for an integrative strategy for managing information and resources, as well as the development of an entrepreneurial culture within the hospital. These factors are posited to mediate the relationship between a hospital's medical staff relationship and integrative SCM practices. Again, if these hypotheses are supported as expected, they have the potential to provide clear direction for hospital administrators who seek to leverage their medical staff relationship to develop an integrative healthcare delivery supply chain.

This study also provides empirical measures for the variables under study. As such, an analysis of the operational definitions employed in the study has the potential to provide practitioners with a specific set of 'best practices' for integrating the healthcare delivery supply chain. These practices can shape the management approach of hospital administrators with regard to fostering medical staff relationships, developing an integrative information and resource strategy, promoting an entrepreneurial culture, and ultimately implementing integrative SCM practices in healthcare delivery.

Please direct correspondence including requests for references to the first author. Thank you.