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# EXAMINING VALUE CO-CREATION IN HEALTHCARE PURCHASING: A SUPPLY CHAIN VIEW

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**Abstract.** Healthcare providers are under intense cost and quality pressures. Extant literature indicates that healthcare's unique operational context necessitates collaboration, but suffers from factors that inhibit coordination. At the same time, general views on value creation are evolving toward a service-dominant logic (SDL) view, which focuses more intently on collaborations aimed at the sharing of specialized competencies among actors functioning in a network. This study while highlighting the challenges faced in healthcare supply chain provides a contemporary view of value creation based on competencies and SDL and attempts at proposing a theoretical framework traversing along the boundaries of Prahalad and Ramswamy's (2004) DART framework. This study conceptualizes supply chain management practices along the DART framework and puts forth the logical arguments to establish DART SCM practices as enablers of value co-creation.

**Keywords:** healthcare purchasing, supply chain management, value co-creation, competence, capability.

**JEL Classification:** D83, H57, I11, I18, L25.

## Introduction

Healthcare costs are continuously spiraling up and hospitals are facing steep competition to provide increased access to high quality services (Chen *et al.* 2013; Dobrzykowski 2012). As such, supply chain relationships, value creation activities, and performance with upstream and downstream actors have increased in importance for healthcare providers (Prahalad, Ramaswamy 2004; Nollet, Beaulieu 2003). Although healthcare industry operated in a strong institutional environment (Bhakoo, Choi 2013), inconsistencies exist in terms of information between upstream and downstream supply chain partners (Prajogo, Olhager 2012), leading to several inefficiencies, affecting performance in healthcare supply chains. This is concerning, given that approximately 25% of hospital costs are supply-related (Byrnes 2004). The supply chain is complex and dynamic across a several partners (Vijayasarathy 2010) and thus significant opportunities for collaborative value creation approaches in healthcare exist in key areas linked to purchasing and supply chain management (Dobrzykowski *et al.* 2014; Schneller, Smeltzer 2006). While supply chain management has proven effective in other industries, healthcare has found its adoption to be challenging (McKone-Sweet *et al.* 2005; Meijboom *et al.* 2011). Supply chain networks in the healthcare sector are complex – different from those of other sectors (Meijboom *et al.* 2011). Healthcare supply chains (HSC) involve numerous network partners working autonomously, based on often undefined incentive structure and supply driven self-interest. Such linkages are often sub-optimal, thereby lacking integration, cooperation and multidisciplinary collaborative approaches (Raak *et al.* 2005) where trust and social exchange aspects play critical



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role (Wu *et al.* 2014). In the HSC domain, major barriers exist in terms of communication, integration, information gathering and processing (Schneller, Smeltzer 2006). This creates functional barriers and forms silos among the chainpartners (Boyer, Pronovost 2010).

Concomitantly, views on value creation are evolving to recognize a more networked and relational purchasing environment (Vargo, Lusch 2004; Lusch, Vargo 2006). There is a shift from the goods-centered view to the service-centered view which is based on identification and development of core competences for achieving competitive advantage through developing relationships with key economic actors in the supply chain (e.g., customers and suppliers) (Lambert *et al.* 2006). In the supply chain, actors offer up "competitively compelling value propositions to meet specific needs" of other actors in the network (Vargo, Lusch 2004: 5). The value propositions describe each actor's competencies which are shared or exchanged among the network (Normann, Ramirez 1994). Actors derive benefit when specialized competences are used in the value creation process, thereby becoming a co-producer of services in purchasing and thus assuming an active role in "relational exchanges and coproduction" (Vargo, Lusch 2004). These conditions are observable in the healthcare context where the purchasing function can benefit from collaborating with upstream suppliers of medical and surgical equipment as well as downstream physicians who use these products in the delivery of care (Schneller, Smeltzer 2006). Given the pressures for cost and quality, it is important to understand how value co-creation in healthcare, namely the translation of internal competencies into external capabilities can be enabled by purchasing and SCM practices (Zhang *et al.* 2002).

This study employs an SDL lens to examine how SCM practices influence value co-creation (the translation of competencies into capabilities)? This study: 1) Highlights the challenges faced in the healthcare supply chain; 2) Provides a contemporary view of value creation based on competencies and service-dominant logic (SDL) and 3) Develops a theoretical framework that links SCM practices as enablers of value co-creation.

## 1. Healthcare supply chain: the highlights of challenges

In a hospital supply chain (HSC), supply and purchasing services are one of the largest cost components; second only to labor (Schneller, Smeltzer 2006). Purchasing decisions and network relationships are gaining attention as executives are finding it difficult to provide quality care, while making efficient decisions in the face of rising uncertainty and cost-consciousness (Zheng *et al.* 2008). The dynamic nature of the network makes purchasing decisions even more challenging and healthcare has been identified as having some of the best and worst supply chain practices extant in any industry (Byrnes 2004); necessitating identification of apt processes, activities, and competencies.

Some key highlights of the challenges in the healthcare (hospital) sector exist. First, the healthcare supply chain is highly complex with a large number of actors who must work collaboratively to create value (Boyer, Pronovost 2010) and is characterized by high number of interactions among said actors (Sinha, Kohnke 2009; Schneller, Smeltzer 2006). Second, the HSC is highly decentralized in nature where manufacturers, distributors, group purchasing organizations, and providers (i.e. hospitals) largely operate independently from one another, with very little upstream demand signaling (Sinha, Kohnke 2009; Schneller, Smeltzer 2006; McKone-Sweet *et al.* 2005) in the absence of any common framework of value-creation and established practices for the health-care supply chains (Boyer, Pronovost 2010). Third, operational integration is also a major challenge, considering the slow adoption of IT (Dobrzykowski 2012); leading to information asymmetries and suboptimal outcomes involving physicians, hospitals, patients, and key suppliers (Ford, Scanlon 2007). Fourth, actor roles in the HSC are not always as clearly defined as is the case in traditional supply chains (Smeltzer, Ramanathan 2002). Though patients actually pay, but the nurses, physicians, and other clinicians are mostly the end users of most materials (e.g. sutures, devices, syringes, etc.), and as such may be viewed as internal customers and make most decisions (Schneller, Smeltzer 2006). Given this discussion, there is a need for an integrated framework providing chain partners with visibility and which should help to reduce costs due to inefficiencies (Ford, Scanlon 2007).

There exists several process related problems, which require expertise from diverse functions. However such expertise or competence might naturally exist outside the functionalities of a particular partner or firm (Schoenherr, Swink 2012). Hence the need for cross-functional or cross-organizational teams for effective solutions arises.

## 2. A contemporary view of value creation based on competencies and SDL

There is a shift a foot towards a service oriented perspective and the understanding of value-creation (Metters, Marucheck 2007). This shift is based on identification and development of core competences for achieving competitive advantage which center on fostering relationships with key actors who can derive benefits from each other's value propositions and competences (Vargo, Akaka 2009). Benefits derived from the specialized competences can be used by suppliers and customers in the value-creation processes, thereby positioning these actors as co-producers of value and thus assuming an active role in the "relational

exchanges and coproduction" (Vargo, Lusch 2004). This nascent view is referred to as service-dominant logic (SDL) and it is thought to have strong potential in explaining purchasing and supply chain phenomenon (Caldwell *et al.* 2009; Schmenner *et al.* 2009).

SDL explains the exchange protocol as a process through which supply chain actors use specific key specialized abilities or skills in sync for mutual benefit (Callaway, Dobrzykowski 2009). It is when these benefits to an actor (including access to knowledge, skills, and abilities) exceed the perceived acquisition costs including money, effort, and time that value is created (Field 2012). Because accesses to resources and capabilities from other actors are requisite in value creation, value is always inherently co-created (Vargo, Lusch 2004). It follows then that co-creation is not the same as co-production which refers specifically to the labor contributed by actors in the co-creation of value or execution of a task (Field 2012). Thus, a necessary ambience exists where the providers of services and the recipients of those services communicate and coordinate effectively to co-create value (Lusch, Vargo 2006). Through an SDL lens, co-creation is not a temporally bound phenomenon, but rather can take place in a time-shifted or even place-shifted way (Greenberg 2008). In other words, a customer (e.g., a physician) may apply operant knowledge to an operand resource (e.g., a robotic surgical device) provided by a supplier (e.g., medical manufacturer), that has been purchased by the focal firm (e.g., hospital), ultimately co-creating value in a non-temporally and physically disconnected fashion. Key here is the notion of value co-creation through the exchange of specialized knowledge and abilities (Lusch, Vargo 2006). These specialized knowledge or abilities, that Callaway and Dobrzykowski (2009) discuss, are referred to as competences by Zhang *et al.* (2002).

SDL argues that service is the true basis for understanding customer value co-creation as it is not tangible resources, but the services rendered by such resources emerging as competencies that act as primary inputs and in SDL terminology are addressed as operant resources (Vargo, Lusch 2004; Lusch, Vargo 2006). Operand resources are those which must be acted upon to create value (e.g., an MRI machine), while operant resources are those which act upon operand resources in value creation (e.g., knowledge of how to operate the MRI machine) (Callaway, Dobrzykowski 2009). The basic underpinning of SDL centers on the understanding of a shifting focus from the traditional tangible aspects of skills, knowledge and information power towards more coherent intangible aspects involving interactivity, connectivity and building relationships with up and downstream stakeholders (Vargo, Lusch 2004). Thus, the SDL literature stream largely suggests the idea that supplier and customer are no more external to the system, but rather have integral role in the value creation process of the focal firm in the supply network through the sharing and application of each actor's competencies (Lo Nigro *et al.* 2006; Schmenner *et al.* 2009).

The foundational principles of SDL are observable in healthcare purchasing where the exchange and activation of competencies is where real value is derived. Services from the vendor are often more important than the product due to the inherent variability in the demand and consumption and ordering pattern of the healthcare segment itself (HFMA 2012). There is a need for accommodating such fluctuations and thus maintaining a vendor-buyer interaction platform becomes very important. This draws attention to the link between competencies extant in the network and value creation.

### 2.1. Competency exchanges and value co-creation

The competency literature is largely based on core competence theory (Prahalad, Hamel 1990; Day 1994), resource advantage theory (Srivastava *et al.* 2001) and the contrasting transformational viewpoints of the goods-centered and service-centered views (Vargo, Lusch 2004). This literature stream provides a platform of understanding which highlights the notion of a transition process that can occur from inward facing competences to outward facing capabilities. Hamel and Prahalad (1994) have indicated that competences are intangible non-physical processes, acting as bundles of skills and technologies. As such, competencies can be thought of as operand resources extant in the supply network. In other words, competencies must be acted upon in order to facilitate value creation (Vargo, Akaka 2009). Capabilities, on the other hand, are outward facing resources that can be exploited by actors in the network for value creation (Zhang *et al.* 2002). In this way, capabilities can be thought of in an operant way as intangible resources capable of value creation (Vargo *et al.* 2008, 2010). Value co-creation is defined as the extent to which network actors exchange specialized competencies to develop desirable capabilities (Zhang *et al.* 2002; Vargo, Lusch 2004, 2006; Vargo, Akaka 2009; Callaway, Dobrzykowski 2009). Value co-creation, or competency exchanges among supply chain actors, in essence facilitates the transformation process from internally facing competencies to outward facing capabilities necessary in value creation (Zhang *et al.* 2002; Vargo, Lusch 2004; Lambert *et al.* 2006). Competencies such as knowledge, skills, and abilities (KSAs) of actors in the supply chain both individually and in combination form the capabilities embedded in processes that drive value (Field 2012). This occurs through the exchange of specialized actor competencies owing to the notion that value can only be created when value propositions are relevant to the actors involved in co-creation (Essig, Batran 2005; Vargo, Akaka 2009). In healthcare for example, an orthopedic surgeon may have general knowledge that an

implant may effectively improve a patient's condition (operant resource from the physician), but in the absence of the implant itself (operand resource from purchasing), as well as counsel from a device manufacturer's representative (operant resource from the manufacturer), the outward facing capability to improve the patient's condition does not exist. This value co-creation process is illustrated in Figure 1. Thus, this study proposes:

*Proposition 1: Inwardly facing competencies are transformed into outwardly facing capabilities during value co-creation.*

### 2.2. A framework that links DART SCM practices and value co-creation

SDL asserts the advantages of integrative approaches to value co-creation in a way consistent with the SCM literature (Schneller, Smeltzer 2006). While most of the SDL literature remains in the conceptual stage of development, Zhang and Chen (2006) offer an early empirical examination of value co-creation which indicates that customer integration has positive influence on value co-creation system and also shows association development of new capabilities which support a firm's competitive advantage. Similarly integrative activities on the supplier side of the chain also support superior performance (Lambert *et al.* 2006; Li *et al.* 2006).

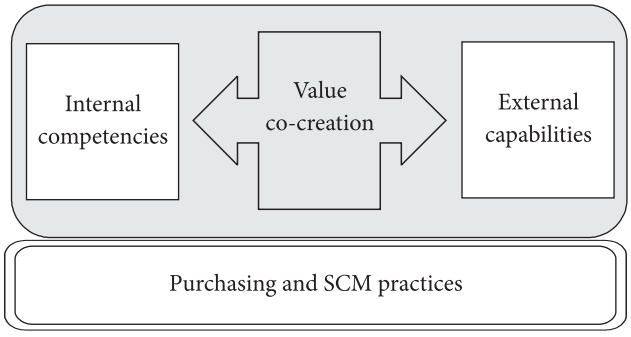


Fig. 1. Conceptual model of the competency – capability transformation during value co-creation in SCM practices

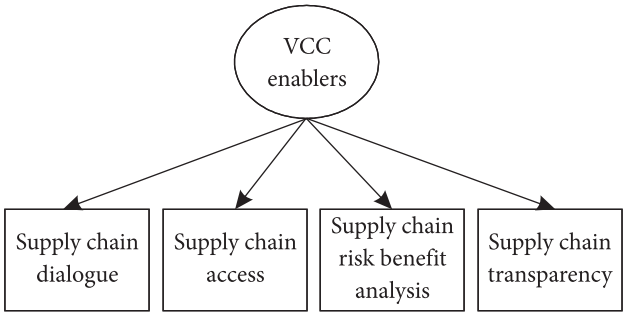


Fig 2. Enablers of value co-creation

For example hospitals in many cases give access into their procurement database to the key medical surgical suppliers which help in real-time information sharing, material tracking and inventory maintenance, thus both co-create a synergistic system which helps in avoiding costly inventory losses and critical stock-out situations (Chen 2002; Lau Antonio *et al.* 2007). This provides a foundation suggesting a link between SCM practices and value co-creation exchanges; the competency – capability transformation (Fig. 1).

SDL emphasizes that specialized skills and knowledge are the fundamental unit of exchange (Vargo, Lusch 2004). Likewise, in the hospital supply chain, exchanges occur involving many suppliers owing to the dependence on varied but specialized types and sources of material supplies and information (Schneller, Smeltzer 2006). Thus, there is a need to have a broader set of skills and knowledge which can be achieved through integration of multiple functional activities with key suppliers and customers (Boyer, Pronovost 2010). The very nature of SCM is cross-functional and involves several actors. Different competencies are required for such multi-firm relationships (involving supplier, focal and customer firms) to be successful and such specialized skills are often found to reside in different functions (Lambert *et al.* 2006). Integration of different functions or processes along the SC becomes very important when looked at from SDL viewpoint. The Global Supply Chain Forum (GSCF) defines SCM as: "Supply Chain Management is the integration of key business processes from end user through original supplier that provides products, services and information that adds value for customer and other stakeholders" (Lambert *et al.* 2006). Certainly then this convergence towards integration and value creation links SCM processes by SDL.

In order to conceptualize a set of SCM practices that may be useful in value co-creation, we turn to the work of Prahalad and Ramaswamy (2004). These authors indicate that across the sectors, there has been an emergence of *"connected, informed, empowered, and active…"* network partners challenging the traditional perspective and participating into increased value co-creation. Prahalad and Ramaswamy (2004) used the term "consumers" to indicate the buyers in the market who increasingly expressed interest of interacting with the supplying firm and thereby co-creating value in course of their transactions; thereby redefining the very nature of the buyer-supplier interaction and redefining the new cult of value "co-creation" instead of mere "creation" and processes associated with it. They proposed a framework referred to as the DART framework (D-A-R-T is the acronym for dialogue, access, transparency, and understanding of risk-benefits) which enables the co-creation and co-extraction of value (Callaway, Dobrzykowski 2009) (see Fig. 2). VCC is at the center of the S-D logicprinciple, focusing on value co-creation process.

### 2.2.1. Supply chain dialogue and value co-creation

The first dimension of DART stands for the dialogue which is very important for any exchange to be successful and subsequent relationships to flourish. Contemporary studies by Raelin (2013) and Gambetti and Giovanardi (2013) establish the need for a more nuanced view about the need for managerial dialogue which acting as a discourse between two or among network partners can lead to mutual learning, deep understanding and consensus for an insightful collaborative consciousness and action. A study by Levine *et al.* (2001) conceptualized the network environment (i.e. the market) as "sets of conversation" between the buyer and the supplier. This conceptualization also holds well for B-2-B scenario between a buying firm and its suppliers. The conceptualization of dialogue forms the basis of interaction and engagement. It contributes towards building a platform based on ability and willingness from both the sides (i.e. the buying firm as well as the suppliers), thereby providing a convenient environment for mutual benefit and development of a business scenario, which favors co-creation principles (Prahalad, Ramaswamy 2004). The conceptual understanding behind dialogue can be viewed from the perspective of *communication practices* necessary for creating a collaborative environment along the supply chain and understanding the needs and expectations of the actors in the network. The DART framework also drives its conceptual base from the same. The "dialogue" parameter of DART indicates and carries the same understanding of "communication" as in the S-D logic literature. S-D logic argues for communication based on the conceptualization of communication consisting of "conversation and dialogue" in which the network partners (i.e. the customers are communicated with); be it the customers of the supplying firm i.e. the suppliers to buying firms in B-2-B setup or the customers of the focal firm in B-2-C. Therefore, this study defines Supply Chain Dialogue as *the extent to which network actors demonstrate a manifested willingness to communicate* (Prahalad, Ramaswamy 2004; VanVactor 2011).

In the perspective of healthcare sector, such communication practices have been indicated to be very effective and important for the smooth continuation of the supply activities among the networks. VanVactor (2011) highlighted that such communication practices (referred to as collaborative communication) has been successful in not only creating a collaborative network environment and enhanced healthcare supply chain operations, but also had potential cost savings and higher efficiency in achieving enhanced synergy between network organizations, multi-stakeholders working together. Given this, the "dialogue" dimension of the DART framework can be conceptualized as a supply chain practice centered on communication that enables value co-creation. Thus, this study proposes:

*Proposition 2: Supply chain dialogue among actors will support value co-creation.*

### 2.2.2. Supply chain information access and value co-creation

The "access" dimension of DART represents a simplistic yet critically important supply chain practice. Access refers to availability and reach of information and knowledge existing in the network and the related transactions between the network actors that achieve better understanding of the associated risk and benefits of actor exchange decisions (Prahalad, Ramaswamy 2004). In this study, supply chain information access is defined as *an approach towards provision of timely, accurate and relevant information, more precisely having inclusions of the previously hidden or unavailable information to be used by the organizational decision makers* (Datta, Christopher 2011; Prahalad, Ramaswamy 2004; Ford, Scanlon 2007; Strader *et al.* 1999; Lee *et al.* 2000; Zhao *et al.* 2002; Sezen 2008). Prahalad and Ramaswamy's (2004) conceptualization of "access" centered primarily on a downstream perspective (with the customer base), however, the SCM literature prescribes that access is also an important dimension in upstream practices (Ford, Scanlon 2007).

Information sharing have been shown to as a means of information access, evident in the plethora of SC information sharing literature (Strader *et al.* 1999; Lee *et al.* 2000; Zhao *et al.* 2002; Sezen 2008). While Strader *et al.* (1999) endorsed the idea regarding sharing of supply and demand information with up and downstream SC partners for both financial and operational gain in terms of cost and time savings respectively, Lee *et al.*(2000) highlighted that such information sharing practices between network partners enhances the responsiveness of the network environment and benefitted the focal firm. For critical industry sectors such as healthcare, where responsiveness and agility to respond to sudden demand variability are vital attributes, this SC practice has a particular significance (Shah *et al.* 2008). Sezen (2008) findings endorse the relevance of the practice in influencing another operational performance attribute (flexibility), especially in variable uncertain delivery and demand environments. Many other studies indicate that cooperative information sharing among SC members enhances the effectiveness and competitiveness of the SC, by enabling actors to incorporate necessary information into their work (Sahin, Robinson 2005; Li *et al.* 2006). Studies indicated that coordinated sharing of supply and demand information with SC partners reduced cost and shortened order cycle time (Strader *et al.* 1999), increase in information sharing amidst volatile demand environment led to better SC responsiveness (Lee *et al.* 2000) and enhanced operation, product and delivery flexibility (Sezen 2008).

Other studies showcase the relevance of information sharing along the SC among the related partners and advocated its influence in enhancing competitiveness and effectiveness (Zhao *et al.* 2002; Cao, Zhang 2011).

Superior performance has been attributed to joint decision making activities (Arshinder, Deshmukh 2007), joint inventory management between network partners (Holweg *et al.* 2005) and ordering coordination (Zhao *et al.* 2002); all leading to enhanced total supply chain cost savings as high as 60%. These phenomena when considered through a SDL lens can be explained as the resultant gain out of VCC activities and can be attributed to information sharing or access. Agility – the capability to respond to uncertain consumer demand more quickly (Faisal *et al.* 2006) – as an example is aided by information sharing. Yusuf *et al.* (2004) emphasized that high degrees of cooperation and information based integration are key agile supply chain capabilities. This supports the arguments by Christopher and Peck (2004) that the most essential element that influenced supply chain agility is visibility and the extent of effective information sharing largely reflected visibility. In a SC environment, performance dimensions such as responsiveness, flexibility, competitiveness, and agility are activated outward-facing capabilities (Yusuf *et al.* 2004) which are created through the transformation of inward facing inactive precursors (competences).

Information sharing among network actors from the beginning of the decision-making process is very vital in healthcare sector so as to not only develop consensus about the purchasing decision, but also garner buy-in and commitment, thereby avoiding helping in anticipation and avoidance of many potential problems (HFMA 2012: 6). The physician, who represents the patients' needs, is a vital stakeholder on the consumer side. Thus, regular dialogues between the managers and physicians to update each other's needs and purchasing options become important. This concept might hold well in both up and downstream situations (i.e., not just with physicians but also with upstream suppliers). Thus, this study proposes:

*Proposition 3: Supply Chain Information Access among actors will support value co-creation.*

### 2.2.3. Supply chain risk-benefit analysis and value co-creation

We conceptualizes the third DART parameter – analysis of risk and benefit as the extent to which network actors are able to adequately assess the consequences of their decisions to interact (Hu *et al.* 2012; Tummala, Schoenherr 2011; Prahalad, Ramaswamy 2004; Chen, Paulraj 2004). This interaction decision might also include their decision to participate in any group purchasing alliance and most importantly the type of relationship practices to involve the upstream supply partners and downstream customers (Hu *et al.* 2012). Also hospitals often engage in outsourcing practices. Such decisions, the associated interactions and shared information also pose concerns for the managers. Thus, the understanding and ability to conduct risk-benefit analysis becomes not only important for the SC procurement managers but also for operations managers.

Berger *et al.* (2004) discuss the hazards associated with integrative supply chain practices. They indicate that with the enhancements in IT, supply chains have become efficient, but also more risky; the interconnectedness of the chains and the weak common links have increased which are often fallible to disruptions and sudden changes. Thus, assessment and management of risk have become vital in selecting suppliers for participation in network settings; the importance of which has grown with the outsourcing phenomenon (de Boer, van der Wegen 2003). Wholey *et al.* (2001) identified that large percentage of institutes in healthcare practiced outsourcing, thereby highlighting the prominence of outsourcing since the last decades in healthcare. The importance of outsourcing decisions in healthcare is evident from the large volume of studies on healthcare outsourcing in different country perspectives.

The group purchasing phenomena in healthcare illustrates a more collaborative approach to value co-creation, but brings with it a degree of risk that ought to be assessed in hospital purchasing decisions. The literature is quite rich and varied offering both support for and identifying the risks of group purchasing practices. The literature indicates that group purchasing alliances are very effective in reducing cost, as high as 20% of procurement cost (Hendrick 1997). This savings is achieved through reduced procurement pricing, reduction in administrative cost and asset utilization cost (Anderson, Katz 1998). Also studies in specific healthcare and hospital perspective on group purchasing indicate such practice to enhance hospital revenues and provided more negotiating power to the buying firms than individually could be gained (Burns, Lee 2008). Thus from the procurement perspective of a SC manager, associating with a formal purchasing group or being a member of group purchasing organization is often lucrative and supposed to be value creating, where the similar actors (suppose the buying firms) of the network come together to negotiate favorable supply and price with single or many supply partners.

However other studies in the group purchasing literature provide evidence against such claims and argues that Group Purchasing Organizations (GPOs) increase the distance between the network partners and acts as an extra link (Young 1989). A section of literature suggests that the claim regarding the advantages of group purchasing practices and is of opinion that prices negotiated through

GPOs are not always lower as claimed (Fenstermacher, Zeng 2000). Moreover studies have expressed concerns regarding the risk associated with the sharing of procurement information with such alliances apprehending loss of confidentiality with competing firms as well as proportion of gain perceived by different size of the firms at different stages of the purchasing group (Hendrick 1997; Essig 2000). Thus arisesthe necessity of risk-benefit assessment for the focal buying firms (actors) and their understanding regarding their possession of the necessary information so as to adequately assess the decision consequences. The rationale behind the concept of the SC risk-benefit assessment has been the notion that while participating in different decision activities, network actors may not possess the necessary information to accurately assess outcomes and the associated risk. Tummala and Schoenherr (2011) indicated supply chain risk management to be emerging and highly dynamic and interconnected world, yet risky. For the successful and effective management of Supply chain uncertainty, they prescribed application of Supply Chain Risk Management Process (SCRMP), they discussed and divided principle phases involving risk identification, risk measurement and risk assessment while other evaluation, and mitigation plans happened to be largely dependent on data management systems which in other words support our conceptualization of actors possessing enough resources to fulfill these stage-wise SC risk management process. It is only when actors can accurately assess and understand the risks and benefits of participation in the network that they will engage (Prahalad, Ramaswamy 2004; Callaway, Dobrzykowski 2009). Thus, this study proposes:

*Proposition 4: Supply chain risk–benefit analysis will support value co-creation.*

### 2.2.4. Supply chain transparency and value co-creation

Transparency is the final parameter of the DART framework (Prahalad, Ramaswamy 2004). However the understanding of transparency has not been clear. A primary aim of the procurement function is inter-actor transparency which is the extent to which network actors exhibit trust, and reveal their true motivations, goals, and agenda are gaining importance and this has been the basis of the conceptualization of SC transparency (Handfield, Bechtel 2002; Fawcett *et al.* 2004; Lamming *et al.* 2001, 2004). Su *et al.* (2013) empirically emphasized the key role transparency plays in enhancing supply chain partnerships.

While discussing the step-wise development of the transparency continuum from an opaque extremity to that of complete transparency, Lamming *et al.* (2004: 203) highlighted that information existing in or sharing between SC actors or organizations, opaqueness, translucence and transparency are the situations which have the following characteristics: *Opaque*: When due to various reasons information cannot be shared with other concerned parties and the concern is acknowledged by both parties. *Translucent*: Only restricted information is shared by the focal party with the other parties, but not acknowledged by other recipient and hence results in often limited collaboration and tactically may be considered akin to cheating. *Transparent*: This entails a situation when and where the information between the concerned parties are shared candidly based on "selective and justified basis" ultimately culminating in the development of shared knowledge pool and further collaborative abilities.

SC network partners face several issues that often undermine the chain performance and hamper the SC environment. Advanced technologies provide real-time connectivity, synchronization of data, and improved efficiency. This is observable in the implementation of e-business processes (Zheng *et al.* 2008). Bhakoo and Chan (2011) in their paper on e-business implementation in the Australian healthcare's pharmaceutical supply chain context have highlighted the importance of transparent SC transactions in procurement. The hospital sector also suggests the need for transparency, but laments a lack of connectedness and synchronicity (Burns, Lee 2008; Schneller, Smeltzer 2006). This suggests a lack of SC transparency which diminishes VCC activities among the partners. For example, Bhakoo and Chan (2011) found that overcoming a lack of transparency enhanced performance.

The principle impediments to transparency are: lack in connectedness, trust, alignment of agenda and co-ordination (Hill, Scudder 2002). Literature supports the positive influence of SC integrative practices in creating a synchronous conducive environment and in maintaining trust and connectedness, through goal alignment along the value chain and enhancing performance, both upstream and downstream with suppliers and customers respectively (Frohlich, Westbrook 2001; Drickhamer 2002; Rosenzweig *et al.* 2003; Droge *et al.* 2004). Kim and Narasimhan (2002) supports such claims about SC integration and indicate that it enhances the linkage between the focal firm and network actors through integration of the relationships, activities, processes and strategies, which in other words from the viewpoint of DART can be said to represent SC transparency reflected through alignment of motivation and goals. Studies indicate that the application of technology like EDI, RFID and system wide enterprise solutions and practices like vendor managed inventory (VMI) provide the necessary infrastructure that enables the actors to share critical information, product and payment authentication, and generation of memos and orders in a synchronized way along the chain among the actors (Attaran, Attaran 2007; Bhakoo, Chan 2011).

SDL suggests the creation of a purchasing platform where clarity is present and the goals of all the actors are aligned (Dobrzykowski *et al.* 2012). This helps to achieve a globally optimized SC and network-wide trust among the actors. Thus, the role of e-business and associated technologies for data synchronization, interchange and system-wide connectivity to maintain clarity in transactions appears inevitable (McKone-Sweet *et al.* 2005). The healthcare sector is often characterized as having high service criticality and demand variation (Schneller, Smeltzer 2006). However Bhakoo and Chan (2011) indicated the gap that exists in the healthcare sector, in terms of e-business's role in supporting vital SC functions like procurement, distribution and inventory management. Attaran and Attaran (2007) indicated that in a transparent environment companies might be in a position to dramatically enhance their supply chain effectiveness through collaborative planning, forecasting and replenishment of their needed inventory, thereby building a one-to-one relationship. Such conditions enable competency exchanges in support of value co-creation (Dobrzykowski *et al.* 2012). Thus, this study proposes:

*Proposition 5: Supply chain transparency will support value co-creation.*

### 2.2.5. D-A-R-T/A-D-T-R and value co-creation

The literature and logic discussed so far can well be boiled down to the holistic understanding that the entire DART dimensions ought to collectively enhance value co-creation; thereby driving greater interaction among actors and ultimately higher-level capability development. While Prahalad and Ramaswamy (2004:10) emphasize "interaction as the locus of value creation", the sequence becomes more rationale when considered as A-D-T-R. It is "access" that creates and supports the necessary platform, fostering interaction among actors. Access to information facilitates a dialogue and drives transparency which is instrumental for the analysis of the risks and benefits at stake for such transactions or procurement decisions. On a similar note, while van Donk (2003) suggests that value creation in purchasing performance is multifaceted, requiring optimization of information and supplier integration, Walker *et al.* (2008) suggested that value creation in purchasing is evolutionary or accumulative in nature and based on longitudinal collaborations. Thus, this study makes an overarching proposition that:

*Proposition 6: Effective value co-creation requires a multipronged approach necessitating all of the ADTR dimensions – access to information, a willing dialogue among actors, transparency, and the ability to make risk-benefit assessments regarding participation in the network.*

## Conclusions and future scope of research

Healthcare providers are under intense pressure to improve performance along dimensions such as cost and quality. While other industries have overcome these challenges through the implementation and refinement of SCM practices, the healthcare industry has been slow to adopt these approaches. As such, practitioners and scholars alike have called for research that identifies into how healthcare is unique and how SCM practices can be ported into this nascent context (McKone-Sweet *et al.* 2005; Shah *et al.* 2008; Boyer, Pronovost 2010).

In an effort to inform curiosity about SCM in healthcare, this paper began by critically examining the challenges faced in the healthcare supply chain. Succinctly, these challenges include: 1) a high degree of complexity featuring a large number of actors who must work collaboratively to create value (Boyer, Pronovost 2010); 2) a highly decentralized supply chain structure where manufacturers, distributors, group purchasing organizations, and providers (i.e. hospitals) largely operate independently from one another, with very little upstream demand signaling (Sinha, Kohnke 2009; Schneller, Smeltzer 2006; McKone-Sweet *et al.* 2005); 3) a lag in operational integration owing to slow IT adoption (Dobrzykowski 2012), and 4) highly ambiguous and multi-faceted actor roles exist which exacerbate coordination problems (Smeltzer, Ramanathan 2002; Schneller, Smeltzer 2006).

These challenges can be addressed by adopting the contemporary view of value creation based on competency exchanges and SDL discussed herein. Specifically, healthcare administrators would be well served to create an environment that supports the exchanges of competencies of all supply chain actors aimed at mutual benefit (Vargo, Lusch 2004). It is clear given the challenges described herein that the performance of the healthcare delivery supply chain is driven by teamwork (Boyer, Pronovost 2010), coordination (Shah *et al.* 2008), and collaboration which can be fueled by the purchasing function (Dobrzykowski *et al.* 2012). A conceptual SCM model grounded in the work of previous authors and rooted in the ideas of Prahalad and Ramaswamy's (2004) DART framework has been developed to provide a contemporary approach to SCM in healthcare. The model has been re-conceptualized and extended to explain the inter-relations of access to information, dialogue among SC actors, transparency, and risk-benefit analysis. In doing so, we have provided an early attempt at explaining how SCM practices might influence value co-creation – in other words, the translation of competencies into capabilities (Zhang *et al.* 2002; Lambert *et al.* 2006; Field 2012). In summary, we developed a theoretical framework that links SCM practices and value co-creation, capable of advancing the extant understanding of SCM in healthcare. While this paper has provided a valuable commentary on SCM in

healthcare, scopes for further improvement exist. The most significant shortcoming of this paper is its conceptual base and hence future research should be aimed at empirically validating the proposed framework. Further studies may be aimed at generalizing the conceptualization with respect to other sectors through cross-sectional studies.

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