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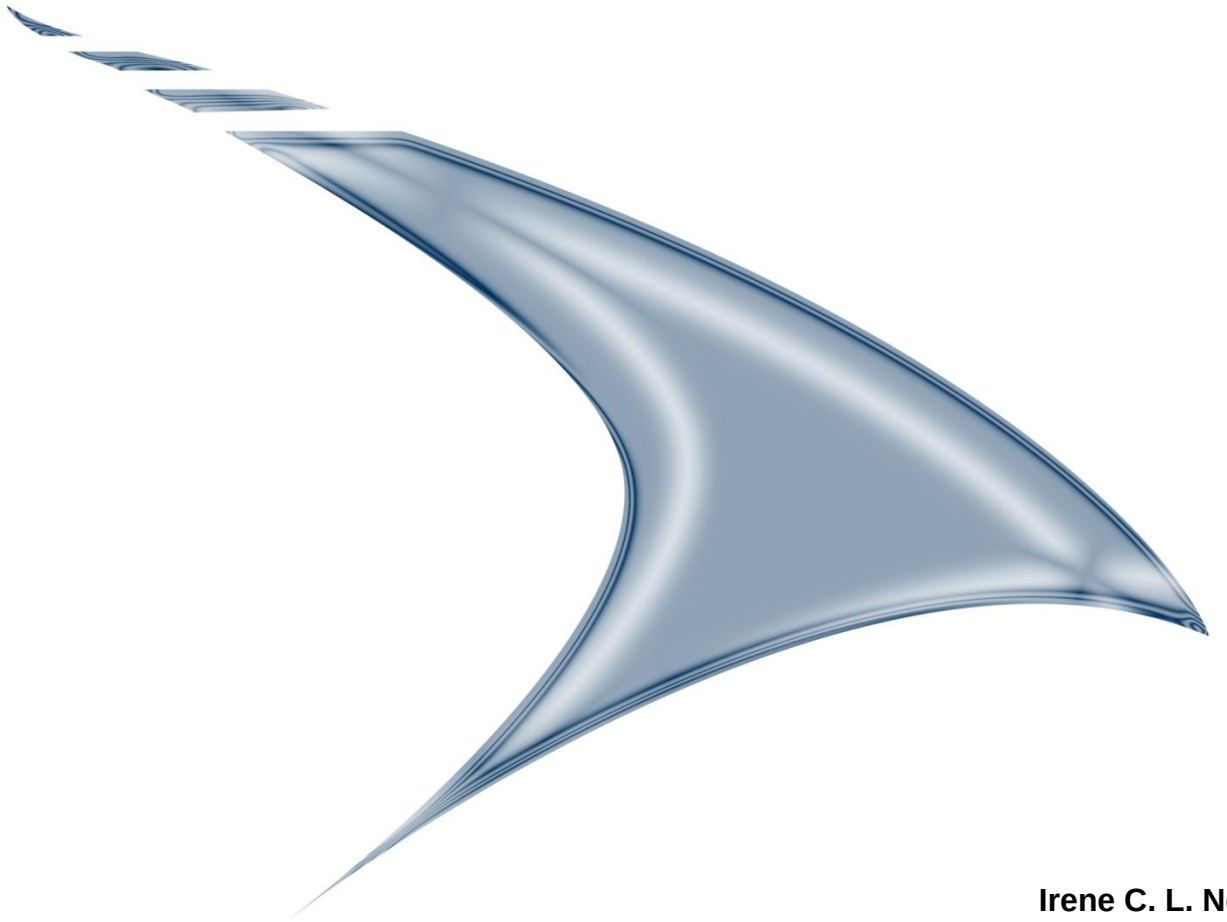
VALUE CO-CREATION IN THE DELIVERY OF OUTCOME-BASED CONTRACTS FOR BUSINESS-TO-BUSINESS SERVICE[1]



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ABSTRACT

This study introduces the concept of outcome-based contracting (OBC) as the mechanism for firms to focus on delivering value-in-use, and as the driver for value co-creation as the firm would need to jointly deliver outcomes with the customer. The paper analyses two OBC-type contracts between the UK Ministry of Defence and two of its industrial partners. We find that in delivering to outcomes and achieving value-in-use, the state-dependent nature of value in usage 'pushes back' into the organization, requiring the firm to re-evaluate the way they are structured to receive changes from customer state-dependencies so as to deliver a better service. Our analysis presents seven generic attributes of value co-creation (AVCs) essential for the capability to deliver value-in-use. These are behavioral alignment, process alignment, congruence in customer expectations, congruence in firm expectations, empowerment and perceived control, behavioral transformation, and complementary competencies. The attributes discovered through qualitative data were matched with previous academic literature and operationalized and a measurement instrument was developed. The instrument was then validated by performing an exploratory and second order confirmatory factor analysis.

KEYWORDS

Value Co-Creation, Outcome Based Contracts, Business-To-Business, Service

INTRODUCTION

Business-to-business (B2B) transacting is currently experiencing phenomenal growth. Businesses are working together more than ever before, buying from each other and collaborating for innovation and sustainable market advantage. Indeed, B2B services have experienced the fastest growth, surpassing 1 trillion US dollars according to some estimates.[1] In the UK, the advanced institute of management research has shown that business services account for 50% of UK job growth over the last 20 years (Abramovsky, Griffith and Sako, 2005).

In the delivery of B2B service, the *value* of the service is embedded in the processes and interactions between the customer and the firm over a length of time and is crucial to quality and service excellence. Recent literature have discussed these interactions as to derive where the value is co-created between the firm and the customer e.g. maintaining and servicing equipment and parts on site, integrating systems, training etc. In the understanding of value, contemporary literature has moved the discussion away from the traditional understanding of value as value-in-exchange to the concept of value-in-use, where the customer would realize the firm's value proposition during consumption. Consequently, whether the firm delivers value-in-use through tangible goods or through the activities, a customer-focused approach on the outcomes rendered by the firm's value proposition is necessary (Vargo and Lusch, 2004, 2008; Tuli, Kohli and Bharadwaj, 2007). Hence this study introduces the concept of outcome-based contracting as the mechanism for firms to focus on delivering value-in-use, and as the driver for value co-creation.

Outcome-based contracting (OBC) is a contracting mechanism that allows the customer to pay only when the firm has delivered outcomes, rather than merely activities and tasks. If one considers the famous quote from Levitt (1960) where "the customer really doesn't want a drilling machine, he wants a hole in the wall", outcome-based contracts enable customers to pay only for holes in walls, instead of buying a drilling machine. While this might still be a little far-fetched for consumer goods, the idea of contracting on outcomes in B2B contracts is becoming increasingly possible. This is the case for Rolls Royce "Power-by-the-hour®" contracting for the service and support of their aerospace engines, where the continuous maintenance and servicing of the engine is not paid according to the spares, repairs or activities rendered to the customer, but by how many hours the customer gets power from the engine. OBCs have been shown to provide huge cost efficiencies to customers as both the firm and the customer's objectives become much more aligned (For a managerial treatise of OBC, see Ng, Williams and Neely, 2009). A critical component of OBC is that the firm

[1] The Economist, Nov 11th, 2004

now has to deliver an outcome *together* with the customer, often co-locating on the customer's site.

OBC poses huge challenges to the firm as the need to jointly deliver outcomes imply that the firm would have to incorporate the customer's processes and competencies within it's proximity. Using the drill analogy, to be rewarded for 'holes in the wall', the firm would have to ensure that the customer knows how best to access firm's skills and resources to use the machine. Thus, by inference, OBC meets the criteria for co-creation previously set out in literature, such as dialogue, mutual access, risk sharing and transparency (Prahalad and Ramaswamy, 2004). However the emphasis is on the development of customer–supplier relationships through interaction and dialog (Payne et al 2008), balanced centricity (Gummeson, 2002) and bi-directionality (Woodruff and Flint, 2006). Although co-creation has been discussed extensively in literature, empirical evidence of its nature and its specification to aid service and organizational design has been lacking.

This study analyses two OBC-type contracts between the UK Ministry of Defence and two of its industrial partners. In these contracts, the outcomes are the aircraft or equipment *availability* to perform its obligations, e.g. a bank of flying hours for a fastjet. The study endeavors to shine a spotlight on a complex service contract to abstract what could be generic attributes of value co-creation and some of the dynamics in co-creating value in outcome-based contracts.

Through qualitative interviews of both customer and firm employees, we found that OBC compels the firm to co-create and co-produce value with the customer. The *customer's s*kills and abilities are now crucial to the *firm's* capability to deliver the outcomes under OBC and the firm has to be empowered to think about its own service capability by *including* the customers' resources and skills. We find that in delivering to outcomes and achieving value-in-use, the state-dependent nature of value in usage changes perception of benefits as well as the way the service is delivered and its derivation of costs. In other words, value-in-use by the customer 'pushes back' into the organization, requiring the firm to re-evaluate the way they are structured to receive changes from customer state-dependencies so as to deliver a better service. Our analysis presents *seven generic attributes of value co-creation* (AVCs) essential for the capability to deliver value-in-use. These are behavioral alignment, process alignment, congruence in customer expectations, congruence in firm expectations, empowerment and perceived control, behavioral transformation, and complementary competencies. The attributes discovered through qualitative data were matched with previous academic literature and operationalized from which an instrument to measure the attributes was developed. The instrument was then validated through a quantitative study by performing an exploratory and second order confirmatory factor analysis.

This paper is organized as follows. A literature review setting out the study is presented, followed by an exposition on the context and methodology. Both the

qualitative and quantitative studies are then reported and discussed. A further discussion on the contribution of the study follows and the paper concludes with managerial implications.

CONCEPTUAL BACKGROUND FOR VALUE CO-CREATION IN OUTCOME BASED CONTRACTS

Growth in B2B has been fuelled by technology and the growth in services (Kinney, 2000). Services now account for about 70% of aggregate production and employment in OECD economies.[2] In the B2B arena, service firms are a major stimulant to productivity and efficiency and through e-commerce, are having a catalytic effect accelerating changes that are already underway in the economy.[3] The rapid growth of B2B services is also a reflection of organizations' tendencies towards outsourcing, "renting" services from independent providers rather than producing them in-house (Wilson and Smith, 1996). Indeed, many firms have found that specialized companies can now handle their internal services, for example, accounting, legal, recruitment or even R&D, much more effectively than if they were to do it themselves (Tschetter, 1987). Manufacturing and engineering firms have also contributed to growth in services. As equipment provision becomes more complex and as competition heightens, firms are feeling the pressure to add value, predominantly through the provision of 'value-added' services. Research has shown that manufacturers provide services in the form of training, integration with clients' capabilities, consultancy and other services related to the provision of equipment (Ren, 2009). Indeed, for many manufacturers to remain viable, research has recommended that they diversify into the provision of services, focusing on meeting the needs of equipment usage, instead of merely equipment alone (Neely, 2009; Baines et. al. 2007). Although manufacturing companies are in a better position to provide many of the downstream activities such as financing and maintenance to supplying spare parts and consumables, the foundations of operational excellence in goods based thinking are inadequate and a re-definition of value chain with customer allegiance is required. Manufacturing firms have to view the value chain from the customer's eye, all the activities performed by the customer throughout the product's life cycle (Wise and Baumgartner, 1999).

The body of work in the general B2B marketing domain is well established. It investigates the nature and scope of business markets (e.g. Fill and Fill, 2005; Ulaga, 2001), the importance of relationships (Dwyer, Paul & Oh, 1987; Möller and Halinen, 1999), organizational buying behavior (Sheth, 1996; Webster & Wind, 1996), channel

[2] Wölfl, A. (2005), "The Service Economy in OECD Countries", STI Working Paper 2005/3, OECD, Paris.

[3] "The Service Economy, Final Report of the Business and Industry Policy Forum on Realising the Potential of the Service Economy", OECD Business and Industry Policy Forum Series. Paris, France. 2000

organization, structure and networks (e.g. John, 1984;), critical success factors (e.g. Eid, Trueman and Ahmed, 2002), and management strategies (e.g. Webb, 2002). From the marketing point of view, B2B research have traditionally focused on pre-purchase choice and buying behavior, a legacy of a goods-based environment where the responsibility of the firm often ends when the customer has purchased the equipment or other industrial products (e.g. Wuyts and Geyskens, 2005) as consumption of the goods often does not involve the firm. Most of marketing's focus on post-purchase is therefore on maintaining customer relationships (e.g. Gadde and Snehota, 2000; Gronroos, 2004; Palmatier, 2008). However, many B2B contracts are now service contracts such as outsourcing, maintenance, repair and overhaul of equipment or professional services where the consumption of the service would now *include* the firm in a long term relationship with customer. (Bolton, Lemon and Verhoef, 2008).Hence in B2B services, there needs to be a greater concern about post-purchase interactions, with an impact on value, customer relationships, future contracts and revenues (Bolton, Lemon and Verhoef, 2008). Vandenbosch and Dawar (2002) demonstrated that managing customer interaction activities is a strong source of value to customers.

Value

The concept of value has long been discussed in academic literature. Organizations have been called upon to deliver superior customer value as a major source of competitive advantage (Payne and Holt, 2001; Eggert, Ulaga, & Schultz, 2006; Liu, Leach, & Bernhardt, 2005; Ulaga & Eggert, 2006). Similarly value and customer orientation is echoed amongst the academics in different fields (Cannon and Homburg, 2001; Chase, 1978; Amit and Zott, 2001; Ramirez, 1999; Kim and Mauborgne, 1999). Indeed, Ravald and Gronroos (1996) claim that a firm's ability to provide superior value is regarded as one of the most successful competitive strategies in the nineties. Within the B2B literature, delivering superior customer value assists firms in developing and maintaining strategic buyer-seller relationships (Liu, Leach, & Bernhardt, 2005), resulting in loyalty (Bolton and Drew, 1991) and the potential to grow margins and profits (Butz and Goodstein, 1996).

The traditional notion of value is that of exchange value which underpins the traditional customer-producer relationships, where each party exchanges one kind of value for another (Bagozzi, 1975), with something in exchange for something else. However, contemporary literature has moved the discussion of value away from this understanding to the concept of value-in-use (see Vargo and Lusch, 2004, 2008; Schneider and Bowen, 1995), which is evaluated by the customer rather than the currency for the transfer of ownership of a particular "good". Value-in-use, as Marx described it, as "value only in use, and is realized only in the process of consumption" (Marx, 1867 (2001), 88). Thus, as proposed by Ballantyne and Varey (2006), the exchange value implicitly includes an estimate of the value-in-use of any "good" and activity that has been contractually exchanged or promised for consumption.

Value has also been discussed in marketing literature. Early researchers took on the task with Zeithaml (1988) positing that "(1) value is low price; (2) value is whatever I want in a product; (3) value is the quality I get for the price I pay and (4) value is what I get for what I give. Such early definitions of value suggest that value is a state of being, while researchers such as Holbrook (1996) proposed an axiological approach, defining it as an "interactive relativistic preference experience."

The most cited definition of value that has since become normatively accepted is one presented by Woodruff:

> *'Customer value is a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations'.*

Woodruff's model proposes that customers think of products as bundles of attributes, and attribute performances to achieve benefits. For Woodruff, this structure of attributes, consequences, and goals is a critical conceptualization of customer value.

Woodruff (1997) also acknowledged that customer value concepts differ because of time and context. The contextual conditions of value have been investigated by Eggert, Ulaga, and Schultz (2006) who complemented the work of Flint, Woodruff, and Gardial (2002). This is echoed by literature in marketing and economics that describe 'utility', a proxy of value, as state-dependent i.e. dependent on the state of the world (Shugan and Xie, 2000, Xie and Shugan, 2001; Ng, 2008; Fishburn, 1974). Ng (2009) describes the concept of valuation risk as the uncertainty faced by buyers when they buy services in advance as they may not be able to consume the service in future. More recently, the concept of customer value has been considered from a relationship marketing perspective, with value comprising of customer–firm relational processes (Tuli, Kohli and Bharadwaj, 2007; Eggert, Ulaga & Schultz, 2006; Flint, Woodruff, and Gardial, 1997; Liu, Leach & Bernhardt 2005; Payne & Holt, 2001). Gummesson (1999) describes relationship marketing in terms of interactions, relationships and networks. These views accentuate value creation as the creation of an experience which occurs within a relationship, as opposed to transaction-based exchanges. Indeed, Danaher and Mattson (1994) found that value is evaluated through an aggregate of interactions with the firm. Thus goods, activities, and environment are all "carriers of experience" (Prahalad, 2004). Work in this area has evolved into more current ideas around value co-creation, where resources (i.e. "people, systems, infrastructures and information" (Gronroos 2004)) work together through processes to achieve the optimum benefit for the consumer (Tuli, Kohli and Bharadwaj, 2007; Vargo and Lusch, 2004, 2008).

Value Co-creation

In co-creating value, researchers have proposed that firms do not really provide value, but merely value propositions (Vargo and Lusch, 2004) and it is the customer that determines value and co-creates it with the firm. As Ballantyne and Varey (2006) puts it, a "customer's value-in-use begins with the enactment of value propositions" (p.337). Hence, a firm's product offering, be they goods or activities, are merely value unrealized i.e. a 'store of potential value' (Ballantyne and Varey, 2006, p.344), until the customer realizes it through co-creation and gains the benefit.

This has also been suggested by Woodruff and Flint (2006) when they proposed a new *bidirectionality* for mutual satisfaction. Gummeson (2002) also suggested the term *balanced centricity* to illustrate this concept. Woodruff and Flint suggested that customers have an obligation to assess the needs of the firm and to assess resources to deliver these needs as part of the co-creation of value. In doing so, there is a need to understand the role of the customer in the firm's processes and systems, and the role of the firm in the customer's processes and systems. Payne et. al. (2008) developed a process-based framework for co-creation in which they proposed customer's value-creating processes, firm's value-creating processes and encounter processes where customers derive benefits from the firm's value propositions. In industrial marketing literature, research on value in B2B markets has moved towards being balanced in perspectives between the firm and the customer. B2B markets are often organized as a system or network where value is jointly co-created with superior value arising from joint core competencies (Ulaga, 2001; Kothandaraman and Wilson, 2001).

Thus, for understanding co-creation to the fullest, the researchers would have to face the challenge of understanding customer consumption processes as the customer judges the value-in-use through consumption and confirmation (Ballantyne and Varey, 2006). This implies that while firms and customers have the potential to co-create better (highest) value, we argue that not all co-creation result in the highest potential benefits. Consequently, bi-directional thinking, together with current thinking in relationship marketing, have to consider that the co-creation towards mutual satisfaction must demonstrate incentive compatibility and alignment of interests towards delivering outcomes (Tuli, Kohli and Bharadwaj, 2007).

The concept of co-production, as opposed to co-creation, has also been extensively covered in academic literature. Current understanding of co-production tends to revolve around assisting the firm in designing and delivering its value proposition (exchange value) such as providing inputs to product design or self service (e.g. Ordanini and Pasini, 2008; Meuter et. al. 2005; Fang, 2008). Value co-creation in contrast, is the customer realizing the value proposition to obtain benefits (value-in-use). While this seems intuitively plausible, it is conceptually challenging. First, the notion of value-in-use in the original Marxist definition, speaks only of 'utility' derived from use,

with ‘use’ defined in the broadest sense. Thus it would be possible for a customer, in his/her role as both a co-producer and co-creator, to derive utility from both. In short, one could argue that the customers are always co-creators of value, even if they are co-producers of exchange value with the firm. Second, the boundary between co-production and co-creation may be easier to ascertain for tangible goods since consumption is held separate from production. However, for service systems where value is co-created and co-produced in interactive networked environments, it would be impossible to distinguish between the two. Indeed, some scholars have described value co-creation and co-production interchangeably (e.g. Nambisan, 2002; Kristensson, Mathing and Johansson 2008). Others have introduced the term ‘prosumer,’ denoting the customer as both the consumer and the producer of that which is being consumed (Toffler, 1980; Humphreys and Grayson, 2008; Xie, Bagozzi and Troye, 2008). For the rest of the paper, we would use co-creation as a term to denote both co-production and co-creation towards value-in-use.

While there is clearly a need to understand the dynamics and specification of value co-creation, the literature is scarce in this field. Most research has discussed value co-creation in terms such as interactions, relationships, reciprocity, bi-directional and customer orientation. Value co-creation has also been described as “spontaneous, collaborative and dialogical interactions” (Ballantyne and Varey, 2006, p. 344). However such descriptions may not be useful for designing the service to develop the firm’s competence and capability to co-create value. The co-creation needs to be understood to a level of abstraction that would enable service design and delivery capability, particularly for B2B service, where contracts are usually between fewer customers. Hence the investigation into contracts with co-creation is necessary in the development of capability to deliver excellence to have a greater financial impact. Joshi (2009) demonstrated that the contract performance is enhanced when the capability control is high and Palmatier (2008) found that value of B2B relationships came also from “the number and decision-making capability of interfirm contacts and the interactions among relational drivers. Oliva and Kallenberg (2003) also noted that the transition from a transaction-based business model to a relationship-based model requires the firm to develop the capability to co-create value, which in turn requires an evaluation of organizational principles, structures, and processes – a major managerial challenge. This is echoed in management literature, where there were calls for organizations to discard the current dominant logic and redefine the value chain towards a ‘web’ model (Prahalad, 2004) or ‘value constellations’ (Normann and Ramirez, 1993; Ramirez, 1999) that could enable more effective value co-creation.

Despite such calls, the development of knowledge to inform firms to redesign their service to co-create value is still slow. It is unclear about the properties of value co-creation that an organization should exhibit in redesigning the services to achieve benefits for customers. Current literature in marketing emphasizes more on

relationships but less on organizational or service design that could facilitate such relationships. In addition, majority of research in value co-creation resides in the theoretical and conceptual domain with little empirical evidence (e.g. Prahalad and Ramaswamy, 2004; Vargo and Lusch, 2004, 2008; Lengnick-Hall, 1996).

Our paper aims to contribute towards a better theoretical understanding of the attributes of value co-creation which could inform the specification on how a service could be (re)designed in a joint firm-customer environment. We aim to contribute towards the understanding of value co-creation through an empirical study in B2B arena and by developing scales of attributes to measure value co-creation.

A further empirical challenge in studying value co-creation of B2B service contracts is that they may not facilitate true value co-creation. For example, in the MRO (maintenance, repair and overhaul) market for equipment, service contracts often benefit the service provider at the expense of the customer, since the service provider earns revenue only when a particular piece of equipment is faulty. This does not align the needs of the customer with the service provider and indeed, the service provider has no incentive to ensure the equipment continues to function well. At its extreme, it may result in the perverse behavior of a service provider offering low quality equipment just to earn higher revenues from providing services later on. True value co-creation must therefore come from contracts where both the customer and the firm maintain the incentive compatibility to achieve beneficial outcomes (value-in-use) so that the contract remains viable and the service could be sustainable over time (Tuli, Kohli and Bharadwaj, 2007; Joshi, 2009). From an empirical research perspective, this would be a challenge to ascertain. Hence we introduce the concept of *outcome-based contracting* (OBC) as the mechanism for firms to focus on delivering value-in-use, and as the driver for true value co-creation.

Outcome-Based Contracts

Traditional MRO contracts are contracted under an MRO service level agreement where the cost of spares could be excluded or included in the price (Van Weele 2002). Recently, there have been a growing number of MRO contracts that focus on outcomes of equipment rather than the tasks involved in the provision of the equipment with prescribed specification (Bramwell, 2003). For example, in the case of Rolls Royce, the service provided to maintain engines is being remunerated on the basis of how many hours the engine is in the air – a concept known as ‘power by the hour®’. In short, the buyer purchases the result of the product used (utilization of service or performance outcomes) and not the ownership of product. It has been argued that under these circumstances, and in the long term, firms may find it in their interest to invest in designing more reliable products to increase profitability (Martin 2003). This implies that contracting on outcomes has the ability to elicit desired behaviors arising from the

incentives within the contract, thus reducing the cost of MRO over the longer term for the customer. Markeset and Kumar (2005) who investigated the scenario where the customer buys, operates, and maintains equipment versus the customer buying the performance (or outcome) of such equipment and identified that the delivery of performance demands a different approach. Kim et al. (2007) acknowledged that there is more scope for risks and incentives between suppliers and customers in OBC than in traditional contracting. As such, we are beginning to find more B2B service contracts moving towards outcome-based incentives with hopes of witnessing significant reduction in costs and financial audits with increased customer satisfaction.

Outcome-based contracts are similar to solutions selling that are defined as "offerings that integrate goods and services to provide customized outcomes for specific customers" (Sawhney, 2006, pg. 265). There has been an increase in managerial focus on solutions selling (e.g. Davies, Brady and Hobday, 2006; Bennett and Tipping, 2001; Foote et. al. 2001) because both OBC and solutions selling focus on customer end benefits. However, solutions selling tend to be highly customized for each client (Galbraith 2002; Sawhney, Wolcott, and Arroniz, 2006) with a fixed deployment scope (Tuli, Kohli and Bharadwaj, 2007), while the outcome-based contracts tend to achieve relational stability with the customer to deliver consistent outcomes over a length of time. In addition, outcome-based contracts bring the customer into the firm's space and makes the firm responsible for customer's co-delivery processes, whilst solutions selling tend to focus only on the processes and resources within the firm's control to deliver that 'solution'. Finally, recent research has shown that solutions selling would benefit from better incentive compatibility to achieve solution effectiveness between customer and the firm (Tuli, Kohli and Bharadwaj, 2007). We argue therefore that outcome-based contracts provide that compatibility in solutions to increase effectiveness.

For MRO services, there is evidence to suggest that increasing number of contracts are moving towards outcome-based type of incentives to improve effectiveness and efficiency of both the firms' and the customers' resources (Bramwell 2003). Despite this growing interest in OBC from both the public and private sectors in terms of application, little research has been established to examine the fundamental theoretical issues underpinning the dynamic relationship between the firm and the customer under an outcome-based contract where value is co-produced and co-created.

Outcome-Based Contracts and Value Co-Creation

Returning to our earlier review, we proposed that not all B2B service contracts could be appropriate manifestations of value co-creation. In the case of outcome-based B2B service contracts, we argue that the need to jointly deliver outcomes of a contract *would* compel co-creation. OBC therefore meets the criteria for co-creation previously

set out in literature such as dialogue, mutual access, risk sharing and transparency (Prahalad and Ramaswamy, 2004), the emphasis on the development of customer–supplier relationships through interaction and dialog (Payne, Storbacka and Frow 2008), balanced centricity (Gummeson, 2002) and bidirectionality (Woodruff and Flint, 2002). Outcome-based contracts are also consistent with the service-dominant logic (Vargo and Lusch 2004, 2008) where goods and activities are combined to achieve value-in-use (outcomes).

METHOD

Research Context, Design and Administration

In this study, we analyzed the delivery of two MRO service contracts between two defence contractors and the UK Ministry of Defence (MoD) which were based on a type of service contract that delivers the outcome of *availability* of two types of equipment; a fighter jet and a missile system.

Contract 1

BAE Systems' Tornado ATTAC program is an outcome-based contract with the UK MoD for which the primary outcome is to maintain a defined level of available mission-ready flying hours across the UK fleet of 220 Tornado aircrafts. The contract is operated within an overall collaborative agreement with MoD and Rolls-Royce who have a parallel contract for the availability of the aircraft engines. Developed over a number of years between the MoD and BAE Systems, the Tornado ATTAC support service has been a successful[4] response to the UK's imperative initiative to significantly cut the cost of operational flying for Tornado aircraft. The program is operated collaboratively between the UK MoD and BAE Systems with a joint project team comprising staff from MoD's Defence Equipment and Support organization as well as from industry which works in close co-operation with MoD Air Command as the tasking authority and operator. The firm (BAE Systems) is paid and incentivized for performance against outcome-based "key performance indicators".

Contract 2

MBDA's ADAPT program provides partnered support for the British Army's Rapier mobile air defence missile system. This program has been fully operational since late 2008. MBDA is responsible for sustaining the demanded availability of the system whilst maintaining performance and reducing cost of ownership, and responding to inevitable variability in demand (during transition to, and sustainment of operations) with changing customer priorities. The service contract is a collaboration between the MoD and MBDA (leading the industrial support), which is managed through a joint project team. Initial cost savings have been established through improved integration of

[4] NAO 2007 – [Support of UK Fast Jets]

maintenance processes, facilities and staff together with a more integrated view of obsolescence. The contractor is paid and incentivized for their performance against outcome-based "critical performance indicators."

Generally, both contracts were awarded for the maintenance, repair and overhaul of the equipment 'through life' i.e. for the whole operable life of the equipment till its out-of-service date. The total value of each contract exceeded USD$400 million per annum and had approximately 1500 people delivering the outcomes of the contract from both the customer and the supplier organizations. However, unlike the conventional MRO service contracts, these contracts were awarded on the basis of the *availability* of the equipment. This means that the customer has to take the responsibility and abide the level of use stipulated in the contract (in deriving value in use). The firm will be obliged to deliver the outcome of a set number of flying hours on the fighter jet and a fixed percentage of availability over a certain period of time (e.g. 95% availability) for the missile system for the agreed usage. While the MRO service is outsourced, the MoD has a bigger role in the partnership which is to provide Government Furnished Materials (GFX) including supplying physical facilities, material, data, IT and manpower to facilitate the firm in achieving its outcomes.

The delivery of these contracts serves as an exemplar for value co-creation (with the customer) where both parties are focused on achieving outcomes e.g. the flying hour bank of the fastjet. Although these service contracts were operating under complex relationships with clients and service providers, they heavily relied on both operand (tangible equipment) and operant resources (intangibles such as knowledge and experiences) to deliver the outcome of the contract (Constantin & Lusch, 1994; Vargo & Lusch, 2004; 2008).

This study was carried out in two parts as a component of work package 3 within the S4T project,[5] a research program involving 10 universities and 37 researchers.

Study 1: Qualitative Study - Discovering the Attributes of Value Co-Creation

We used a qualitative method to derive insights into the service delivery of the contracts. Qualitative research is often characterized by the use of multiple methods, which is often referred to as triangulation. There are a number of different methods to be used in qualitative research such as participant observation, analysis of texts and documents, interviews, recording and transcribing (Dooley 2001). The logic behind using multiple methods is to secure an in-depth understanding of the phenomenon in question.

We collected the data in four ways. Firstly, defence contracts tend to be riddled with jargon, so meetings and interviews were held to provide researchers with an

[5] The S4T project is a £2 million grant programme on Service Support solutions: Strategy and Transition, funded by the UK government through the Engineering and Physical Science Research Council and BAE Systems

understanding of the service rendered under these contracts. The explanation of these contracts and the jargon in itself provided invaluable sets of qualitative data because employees used their understanding of world to convey their interpretation of the service delivered as well as the role they (and the customer) played within the system. Secondly, in-depth interviews were conducted to solicit a deeper understanding of employee's world and their role in the social construction of the environment, which provided further insights. A total of 32 in-depth interviews with employees from the firm and the customer organization were conducted over six months. Thirdly, with the customer and firm's permission, we also accompanied key employees in walking around the bases and the sites, observing, taking notes and recording their audio interactions with one another. Finally, minutes of meetings between the employees of both sides were collected and analyzed, together with an analysis of presentations, reports and other text-based documents such as maintenance logs.

In analysis, a grounded theory approach was used (Strauss and Corbin, 1990). Meetings and interviews conducted were transcribed and collated with rest of the data. The data was coded and categorized by three researchers and triangulated through discussion. The coding and categorization were centered on distilling and reducing the data to generic sets of categories, which were crucial in describing the phenomenon. The researchers' brief was to code and categorize for the purpose of theory building and knowledge transferability.

Study 1: Findings

Our qualitative study revealed three key issues in service delivery:

The service capability to deliver value-in-use includes customer's ability to co-create value. Our study found that a big milestone in the organization came at the point when the firm realized that the *customer's* skills and abilities to access its resources is crucial to the *firm's* capability to deliver the outcomes. Even the best value proposition from only the firm's perspective may not result in the best benefit for the customer, if the customer is not included in the firm's design of the service. Consequently, the firm has to be empowered to think about its own capability as that which *includes* the customers' processes, systems and skills as well as how it *interacts* with the customer. Particularly in the B2B context, the focus on *how* both organizations interact in co-creating value became paramount to that capability.

Value co-creation occurs at all levels, through a complex 'web' of interactions with a lack of boundaries. Our study also found that relationships were developed between the firm's and the customer's employees at all levels. From five-minute phone calls to technical call centers and joint firm-customer meetings, the interactions between firm and customer were varied in terms of its mode (emails, phone calls, meetings) as well as its content (information sharing, communication). With both the firm and the

customer co-creating the service to ensure availability, the outcome-driven nature of the service and the co-production resulted in a lack of boundaries as to what was 'acceptable' under the contract. Our findings suggest that there have been instances where boundaries were held rigidly ("*this is their problem"*) and also instances where boundaries were flexible, with out-of-contract requests being accommodated to build better relationships.

*Value-in-use is state-dependent***.** Our study found that contracting for outcomes led to the need for the firm to understand value-in-use in multiple states. Understanding usage over a variety of states (past, now and future) was crucial for the contracts because value-in-use impacts on customer satisfaction, costs and delivery of the service. Understanding usage, and more specifically *changing usage*, brought about more effective and efficient service solutions that resulted in the following benefits to both the customer and the firm:

1. *Usage changes benefits, and thus the value-in-use of the service (impact on satisfaction)*. Our interviews revealed several instances where usage changed the way the customer value the service. When in operation or in training, the troops could be using the equipment in a certain manner which could highlight the need to tailor or re-design the equipment so that it could be used more effectively. We also found that firm's employees who have a better appreciation of customer's usage are able to tailor their responses to suit the customers variety of use, resulting in higher satisfaction.
2. *Usage changes costs of service delivery (impact on costs).* Both contracts were priced on the basis of a fixed sum, subject to performance measurements. In at least six instances, we found that the way the customer uses the equipment had a direct impact on the costs of delivery. For example, a simple change of request by the firm asking the customer to carry a particular piece of equipment by four people instead of two people has reduced equipment damage substantially. Evidences were also noted on influencing customer's behavior resulted in increased equipment availability.
3. *Usage changes the way the value is co-created (impact on delivery).* We also found that understanding usage had an impact on how the service was being delivered. Due to the state-contingent nature of value-in-use, the usage of equipment would vary across the different environments such as in barracks, battle field, etc. This in turn had an impact on the way service was delivered to ensure the most effective usage. Based on this service activities were redesigned for better equipment usage and equipment and vice versa.

We then turned towards exploring the attributes of value co-creation that enabled the firm to achieve effective and efficient service to deliver value-in-use. We re-analyzed the content into three categories – the challenges of managing, delivering or supporting the outcome-based contract that delivered value-in-use (challenges); how the

employees met the challenges (solutions); and their interpretation of how and what they were doing in the contract environment (meaning).

The attributes were abstracted by focusing on two specific issues on the analysis of data: Firstly, what were the possible attributes that were *resulted* in the challenges, solutions and meanings (presence of attributes). Secondly, what attribute were possibly *lacking* in the environment that drove the challenges, solutions and meanings (absence of attributes).

The data was distilled, coded, abstracted and categorized into seven generic attributes. Table 1 presents the findings from the qualitative study.

Table 1: Seven Attributes of Value Co-creation from the Qualitative Study abstracted from qualitative data of interviews, meeting notes, observations and company documents

Attribute	Explanation and Example quotes from interviews
1. Complementary competencies	Both the customer and the firm have to provide the right competencies, in terms of expertise and judgment. This attribute measures perception of complementary competencies rather than the actual competencies. *CUSTOMER EMPLOYEE: "So it happens that you may have an individual that gets told right you liaise with [the firm], you liaise with [the firm] to actually carry out that contract. And it doesn't necessarily know that that individual, his personality might not be right for a start, as I say he may not have this, this ability to build a rapport with somebody or anything like that, he may not have the technical expertise, he may not have the military expertise. Erm especially in a maintenance contract like this you need the technical expertise. You also need to know the military aspects you know can a sponsor's reserve physically do that? You know are you allowed, is this civilian allowed to go and do this?"*
2. Process alignment	In a multi-environmental state, value-in-use changes and as such, value co-production and co-creation need to build in the alignment of processes whereby customer changes would flag up changes in the alignment. The current situation where customer processes change and the firm discovers only later the impact on value co-production is clearly untenable. *CUSTOMER EMPLOYEE: "They thought that the solution on the table was an engineering solution and in fact it's all about the joint supply chain which obviously now realises but it's too late. Erm so erm very frustrating initially because I could see that I had a role to play but there wasn't a door open for me to go in to play that role if you see what I mean. Erm the last couple of years that's changed considerably they did realise that actually we've made this assumption that's wrong come on [Name omitted] how do we get out of this and that, that is still happening today. In fact just before I came here erm somebody from [the firm] came to see me to ask me if I could help out because they've got a solution that they can't deliver and they want to know if I can help them deliver it so it's interesting isn't it."* *CUSTOMER EMPLOYEE: "I have been basically like the regimental focal point for [contract] so I am like a conduit so something will come to me and I go to the commanding officer and tell him, I may get a lot of shouting at and things like that but I just, that's just generally what I get and I'll do that. With [the firm], [the firm] have got, they've got certain milestones, certain things to achieve by a particular time whether it be training, whether it be maintenance, whether it be supply support or anything like that. So you've probably got five running along at one point. But being the focal point for one, for all of them people coming in and people tend to think right well I'll phone [name omitted] up and he'll do this. They'll phone me up and go well look I've got the military aspect here to work with and I've got like you know a hundred odd soldiers to manage and I've got all these other things that I can't physically can't spend all my time doing this [contract]."*

3. Behavioral alignment	Even where competencies and processes are aligned, both customer and firm have to ensure that the right behaviors are in place to ensure effective and efficient value co-production and co-creation. *CUSTOMER EMPLOYEE: "So you, if you had to pin it down to what skills that you have that allow you to do what you do best now, you would call that skills, what skills? You are a trained military personnel now only that particular skill to be able to do a job well what would you call that skill? MUTTERS ..No .., flexibility is one of the biggest things. Erm flexibility, adaptability and I'll keep going back to it the biggest thing is communication."* *FIRM EMPLOYEE: "I brought the [OFFSITE] guys here three days a week for three months erm and made them go and build a relationship with their counterparts which were all sat in these hangers well there was only one hanger at the time but erm and basically it was all about building the relationship, the trust, the confidence erm so that when we started to have the erm the debates around how we could see this working and bring in the cost dimension and say well the reason we've been asked to do this is because you are only going to have 50% of the budget. Oh well we didn't realise that you know there was, they had not been informed, there was communication breakdown and err and so as soon as that was all on the table and we started to have a meaningful debate very quickly the relationship well we are only people so it very quickly they were having drinks in the Officers' Mess Bar, they were going out err you know some people were socialising. So very much a more joined up, I would say erm in the first three of four months you know we had made big strides erm actually building the trust took a much longer period of time."*
4. Perceived Control	Perceived control is a basic need. Control is a principal human driving force and people are motivated to demonstrate their competence and superiority over their environment. Research has shown that perceived control is a crucial dimension in interpersonal interactions and human-environment interactions. In services, perceived control is an important element of the service experience. Hence, in value co-production and co-creation, establishing a system that allows both parties to have a perception of control is essential. *FIRM EMPLOYEE: "I've spent half my day to day wasted in my view because somebody is feeling uncomfortable because this is right in the limelight now and, and they feel, they feel exposed, insecure because they are not close to it, why do they need to feel like that and don't worry about it. You've put a team, well when I say that you've put a team of people in there, you know you've got some senior people in here and trust them, empower them don't kill them, help them"* *CUSTOMER EMPLOYEE: "Do you know what we actually do? What we do is we collect risks we label things as risks we put them into a database and then we admire them."*

5. Empowerment for customer and firm transformation -	Behavioral transformation must be preceded by a willingness and sense of empowerment to recognize a situation that needs to be changed, and a willingness to change others for effective co-production and co-creation. This means teams are pro-active in their engagement of others. *FIRM EMPLOYEE: "Yeah. I am sat in here now knowing that I've got one or two of my team doing something that I need for Monday I have totally empowered them to do it, I've told them roughly what I want I haven't got a clue what I'm going to get but if I didn't do that I would end up getting nothing and I'd be trying to do it myself or I've told them to do it in a way that's probably not the right way anyway.* *FIRM EMPLOYEE: If you detach yourself from your team and empower it that is one hell of a scary thing to do because you are actually trusting them to deliver something and it might not deliver it the way you want it to, it might not be totally what you want it to but is it going to be a million miles away from what you want and if you were to tell them they probably all sit down and do nothing because you are telling them to do it anyway and they don't believe in it."*
6. Behavioral transformation	In an environment of value co-production and co-creation where value-in-use changes and where usage has an impact on costs, satisfaction and delivery, both customer and firm have to ensure that their people have the skills and are able to transform each other's behaviors to achieve greater effectiveness and efficiencies. *FIRM EMPLOYEE: "so I sit with the Station Commander and his team once a week and we go through they tell me things erm which are military, we go through military issues and they, they ask me for my industrial erm opinion. So they'll say err we are thinking about closing the base next week … for a day because we've had a really good err ALC inspection how does that affect output for us? Erm I'll say well you'll lose a day's production erm you know it's, it'll cost us X number thousands of pounds but I am consulted. The issue isn't the answer, the issue is the consultation. Erm and as a result err just recently err only a couple of months ago I went on a, on a military field trip with them into Germany you know just another member of the team basically that's how I get treated."* *FIRM EMPLOYEE: "Yes. 'Cos he is a key player. His behaviours have led others to behave in the right way and I am, what I don't know is whether he naturally behaves like that whether he believes in that or whether he's just adopted the right behaviours in order to achieve the outcome."* *CUSTOMER EMPLOYEE: "It's cost benefit, technical expertise erm, training for the individuals in uniform, because the soldiers will learn from [the firm] technicians and vice versa on the military aspects because [the firm]'s sponsored reserves will be expected to deploy with the military so they will have to deal with an element of training, they will learn from the military personnel."* *CUSTOMER EMPLOYEE: "And one of the fundamental things as well about this is the management of the change from, and it's a change in behaviour, it's a change of ethos and everything like that, that when you are walking around here you will see a civilian coming and fixing your vehicle or something like that, you won't get military personnel. And these things are, all need to be sort of linked together."*

7. Congruence of expectations	To be successful in co-producing and co-creating value, expectations must be in congruence. This means that the customer expectations of the firm must match the firm's understanding of the customer's expectations of the firm. Conversely, the firm's expectations of the customer must match the customer's understanding of the firm's expectations of the customer. A lack of congruence results in 'boundary issues.' *FIRM EMPLOYEE: "Yeah just again by talking to them and saying you know the role that [the firm] are playing we are forward facing with the customer, we have to be customer focused, we have to try and meet the customer's expectations or exceed those expectations where we can but knowing the fact that the customer will abuse that expectation at times because he is trying to get us to do a lot more than we are actually contracted to do."* *CUSTOMER EMPLOYEE: "well … awareness of other people's tasks and other people's roles and responsibilities. Everybody no matter who you are yourselves you are probably, particularly focused in that right you want to achieve this and you want to achieve this but you are not the only person."*

Study 2: Quantitative Study - Developing and Validating the Scales and Measures for Attributes of Value Co-Creation

Following the qualitative study, we proceeded to both validate the attributes through a quantitative exercise anddevelop an instrument for the measurement of value co-creation. As there were no single measures to validate these proposed attributes, we considered the measures and scales from an extensive and diversified literature search with the focus on concepts related to the seven dimensions of value co-creation (Brakus 2009). Where there were gaps in operationalization, we proposed modification or construction of new scales for the purpose of measuring the constructs. Because of the adaptations and modifications in the items scales, one of our objectives was to perform content face validity of the items and scales with the experts in this field (Gatignon et al, 2002, Nunnally and Bernstein, 1994). These items were submitted to five academics and five industrialists working in the field of service research with particular expertise on availability-based contracts, to corroborate the content face validity of the items. We provided each expert with a detailed definition of the items and asked them to either accept or reject whether the corresponding item reflected the construct (or attribute). When the majority of experts responded that an item did not reflect the construct, we removed the item. Similarly we included a few items based on expert's comments (Gatignon et al, 2002). Some measures

(questions) were worded to be positively slanted while the others were negatively worded to reduce the possibility that the respondents would simply agree or disagree with all the measures without providing adequate attention to reading and comprehending the questions (Venkatraman 1989). The measures developed are presented in Table 2.

Table 2: Operationalization of Constructs and Development of Measurement Instrument for Value Co-creation

Construct	Measures on a Likert Scale of 1-5 with 1= strongly disagree and 5 strongly agree
Complementary Competencies (Sheridan et al 2001, Wong et al 1999, Yusuf et al 2004, Hanna 2007, Zhu et al. 2004, Stratman et al 2002)	Q97. Myself and the personnel I interact with on the customer/company side have complementary skill sets to get the work done Q98. Myself and the personnel I interact with on the customer/company side have complementary roles (i.e. job title and description) to get the work done Q99. Myself and the personnel I interact with on the customer/company side are able to access resources necessary to get the work done Q100. Myself and the personnel I interact with on the customer/company side are able to access the technology necessary to get the work done
Process Alignment (Hung et al 2007, Guimaraes et al 1996, Evans et al 2000, Gunasekaran et al 2002, Yusuf et al 2004	Q71. The company's processes of GATHERING information is aligned with the customer's processes to enable the gathering of information Q72. The company's processes of GIVING information is aligned with the customer's processes to receive the information Q73. The company's processes of STORING information is aligned with the customer's processes to enable the storage of information Q74. The company's processes of MOVING the information is aligned with the customer's processes to enable the movement of information Q75. The company's processes of COLLECTING the material and equipment is aligned with the customer's processes to enable the collection of material and equipment Q76. The company's processes of STORING the material and equipment is aligned with the customer's processes to enable the storage of the material and equipment Q77. The company's processes of MOVING the material and equipment is aligned with the

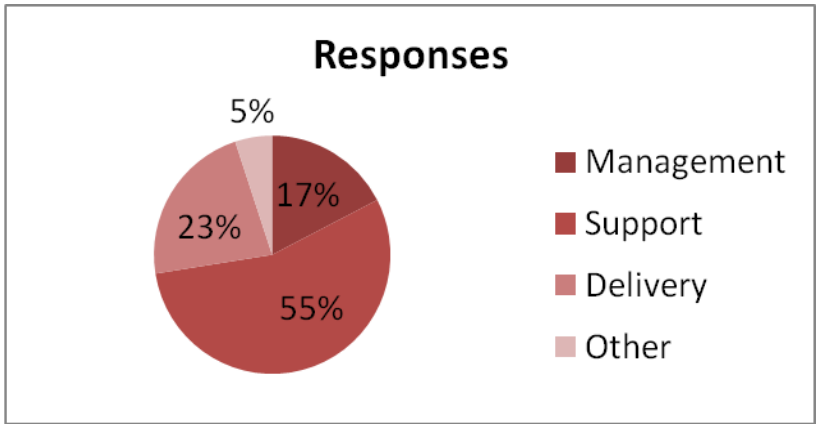
	customer's processes to enable the movement of the material and equipment Q141. The company's processes of REPAIRING the material and equipment is aligned with the customer's processes to enable the movement of the material and equipment Q96. The company's processes of INSTALLING the material and equipment is aligned with the customer's processes to enable the installation of the material and equipment
Behavioral Alignment (Leuthesser et al 1995, Reich et al 2000, Reich et al 1996)	Q35. Myself and the personnel I interact with on the customer/company side give each other a clear picture of what goes on behind the scenes in our organization that may impact our work Q36. Myself and the personnel I interact with on the customer/company side give each other ample notice of planned changes that might impact our operations Q37. Myself and the personnel I interact with on the customer/company side do a good job of notifying each other in advance of any schedule changes Q38. Myself and the personnel I interact with on the customer/company side would discuss any plans that might change the nature of the work we are doing Q39. Myself and the personnel I interact with on the customer/company side take the time needed to discuss new ideas Q40. Myself and the personnel I interact with on the customer/company side co-operate in order to APPLY new ideas Q41. Myself and the personnel I interact with on the customer/company side share (reasonable) resources to help in our day to day operations
Perceived Control (Smith et al 1997, White 1959, Rodin et al 1980, Karsek 1979, Ganster 1989, Dwyer and Ganster 1991)	Q24. I feel that I have control over the decisions that affect my work Q25. I feel that I have control over the VARIETY OF METHODS I employ in completing my work Q26. I feel that I can choose among a VARIETY OF TASKS to do Q27. I feel that I have total control over the quality of the work I'm delivering Q28. I feel that I can dictate how quickly or slowly I have to work Q29. I feel that I am able to decide when to schedule my rest breaks Q32. I feel that I have influence over the policies and procedures of my work unit
Empowerment (Conger et al 1988, Schulz et al 1995,	Q48. When interacting with personnel from the customer/company side, I am good at turning problems into opportunities Q49. When interacting with personnel from the customer/company side, I feel I can use my

Spreitzer 1995, Thomas et al 1990)	personal judgment to ensure good contract performance Q50. When interacting with personnel from the customer/company side, I feel that my line manager supports me even when I go beyond the normal call of duty Q57. When interacting with personnel from the customer/company side, I feel I can use tactics that would ensure good contract performance Q51. When interacting with personnel from the customer/company side, I feel I can do more than what my job specifies to ensure good contract performance Q52. When interacting with personnel from the customer/company side, I feel I have significant autonomy in that interaction
Behavioral Transformation (Gronroos 2000, Storbacka et al 2001, Leuthesser et al 1995, Hartline et al 1996, Bateman et al 1993)	Q68. If necessary, I would try to influence the behaviors of the personnel I interact with on the company/customer side to ensure good contract performance Q69. If necessary, I would try to influence the attitudes of the personnel I interact with on the company/customer side to ensure good contract performance Q70. If necessary, I would try to influence the location of the personnel I interact with on the company/customer side to ensure good contract performance
Congruence of Expectations (Dean et al 2004, Zeithmal et al, 1993, Parasuraman et al 1994, Leventhal 2008)	Q64. I believe the personnel I interact with on the company/customer side knows what I am doing under the contract Q145. I believe the personnel I interact with on the company/customer side knows HOW I am doing the job under the contract Q65. I believe the personnel I interact with on the company/customer side knows what I WILL DO under the contract Q66. I believe the personnel I interact with on the company/customer side knows what I SHOULD DO under the contract Q146. I believe the personnel I interact with on the company/customer side knows HOW I SHOULD DO my job under the contract Q67. I believe the personnel I interact with on the company/customer side knows what I WANT TO DO under the contract

	Q60. I am clear on what the personnel I interact with on the company/customer side is doing under the contract Q142. I am clear on HOW the personnel I interact with on the company/customer side is doing his/her job under the contract Q61. I am clear on what the personnel I interact with on the company/customer side WILL DO under the contract Q62. I am clear on what the personnel I interact with on the company/customer side SHOULD DO under the contract Q143. I am clear on HOW the personnel I interact with on the company/customer side SHOULD DO his/her job under the contract Q63. I am clear on what the personnel I interact with on the company/customer side WANT TO DO under the contract

The measures were entered into a web-based survey and sent out to 1500 individuals managing, delivering and supporting the contracts. The web-based survey also prevented the users from referring back at the responses they had given to earlier questions. This reduces possible common variance problems that could result in inflated reliability measures (Stanton 1998). Out of 1500, 116 responses were received from the survey. After eliminating incomplete responses, 84 responses were used for further analysis. To ensure that we captured the 'web' like nature of the service and its interactions, we received responses from across the organization and at all levels from management and support (administrative) to the actual technical and physical delivery of the service (see Figure 1).

Figure 1: Distribution of responses by employees of the firm managing, supporting and delivering the contract



The data was analyzed using exploratory factor analysis (EFA) and then using confirmatory factor analysis (CFA). EFA and CFA approaches are often treated as end points on a continuum (Bagozzi 1983). At one extreme EFA represents a procedure of discovering the structure while at the other extreme point, CFA represents a technique for testing the hypothesized structure formed. However, our primary goal for using EFA is not of discovery but to fine-tune the structure of the seven attribute proposed in the qualitative study. The structure modified from EFA is used in developing CFA.

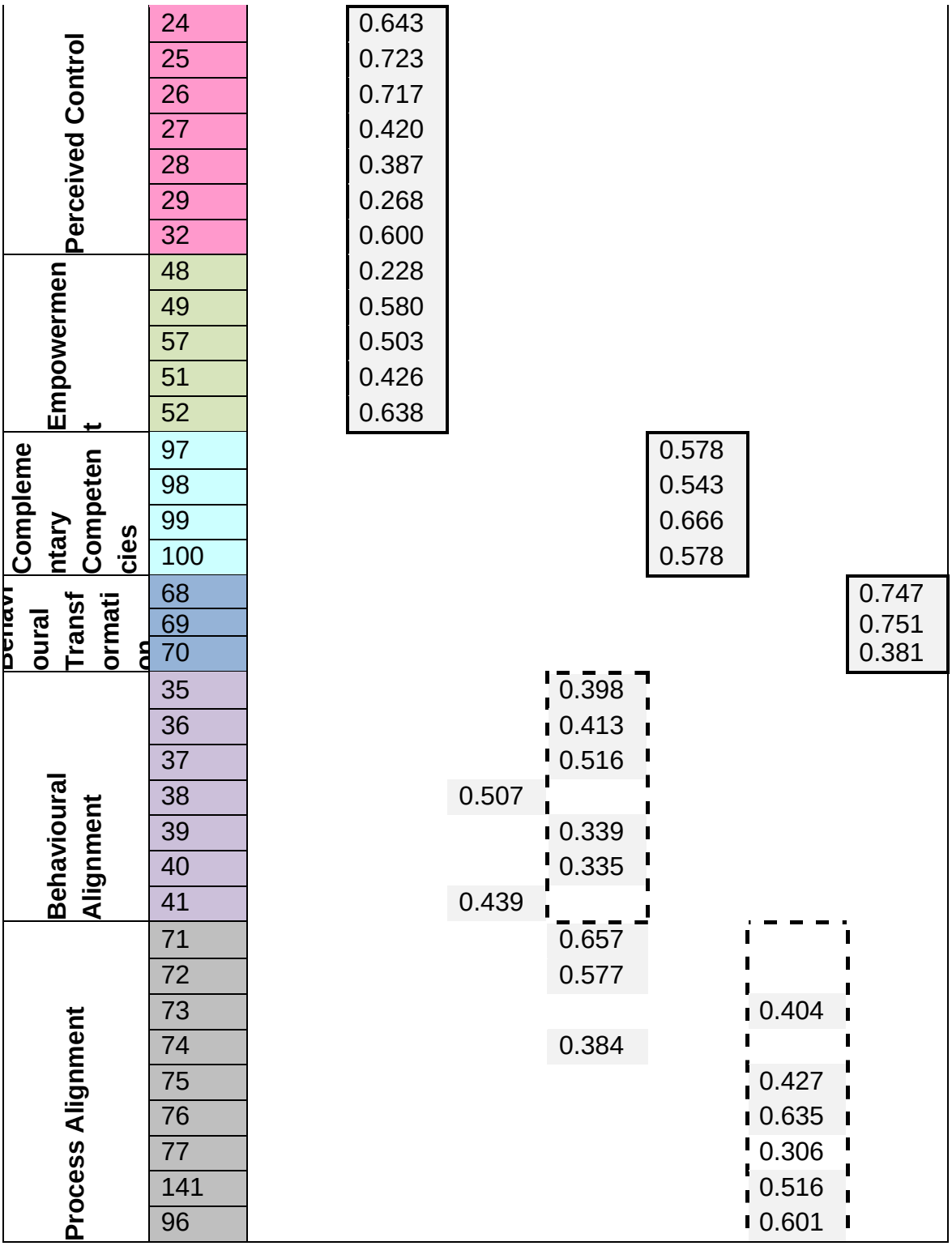
The confirmatory approach subscribes to a causal-indicator model where the operational measures (or indicators) are reflective of the unobserved theoretical attribute constructs (Venkatraman 1989). Since the qualitative study suggested that the seven constructs are the attributes of value co-creation, we developed second order CFA through path diagram in AMOS graphics and tested for its validity by demonstrating goodness of fit indicators, standardized regression weights, convergent validity, construct reliability and discriminant validity. The seven attributes are the first order constructs representing the second order factor that we labeled value co-creation.

Study 2 Findings

The exploratory principal component factor analysis, with varimax rotation, was conducted to validate the underlying constructs and the associated 48 items as shown in Table 2. Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) of 0.684 and Bartlett's test of sphericity significance of 0.000 as shown in Table 4, both suggesting the strength of the relationship among variables as strong and hence it was good idea to proceed with a factory (or component) analysis for the data (Hair et al 2009). The qualitative findings and operationalization suggested that all the items (of seven attributes) would load on to seven principal components as shown in Table 2. However conducting EFA demonstrated that the items have loaded on to seven principal components as shown in Table 3, which made substantive sense. That is, the items of "congruence of expectations" have clearly disintegrated into Component 1 and 3. Hence we call component 1 as "expectations of the firm" (labeled our expectations) and component 3 as "expectations of the customer" (labeled their expectations). In contrast, the items of attributes "perceived control" and "empowerment" have comfortably loaded onto component 2 suggesting that these items are similar and hence we renamed component 2 as "empowerment and control". The items of attributes "complementary competencies" and "behavioral transformation" have satisfactorily loaded on to components. On the other hand, although a few items of attributes "behavioral alignment" and "process alignment" are principally loaded on to components 4 and 6, these items are also moderately loading on to different components suggesting that some of these items are not actually measuring the principal component. However identifying the items for deletion from our analysis was tedious and cumbersome in EFA. Hence we used CFA to identify some of the items not measuring the component (or construct) and deleted from our analysis as demonstrated in the measurement model.

Table 3: Rotated Component Matrix

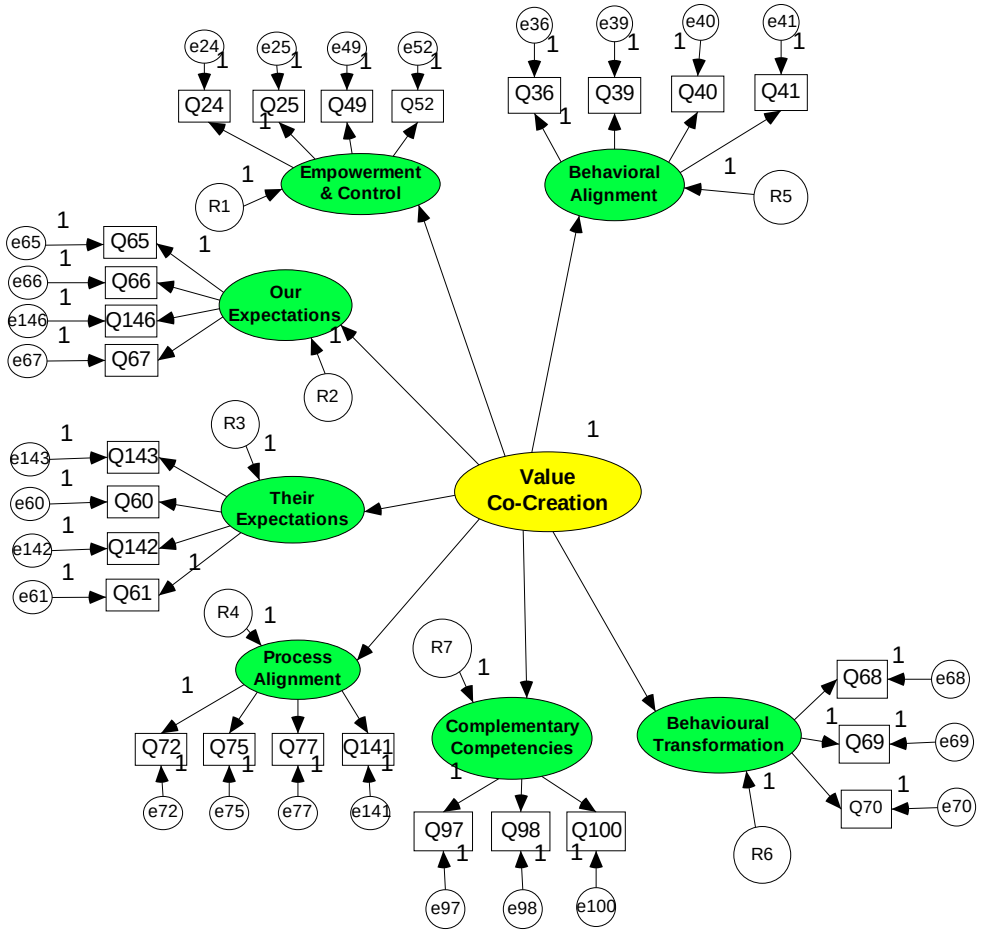
Attributes	Item No	Component						
		1	2	3	4	5	6	7
Congruence of Expectations	64	0.571						
	145	0.699						
	65	0.729						
	66	0.798						
	146	0.762						
	67	0.676						
	60			0.562				
	142			0.667				
	61			0.637				
	62			0.697				
	143			0.787				
	63			0.522				


Perceived Control
24
25
26
27
28
29
32
0.643
0.723
0.717
0.420
0.387
0.268
0.600
Empowerment
48
49
57
51
52
0.228
0.580
0.503
0.426
0.638
Complementary Competencies
97
98
99
100
0.578
0.543
0.666
0.578
Behavioural Transformation
68
69
70
0.747
0.751
0.381
Behavioural Alignment
35
36
37
38
39
40
41
0.398
0.413
0.516
0.507
0.339
0.335
0.439
Process Alignment
71
72
73
74
75
76
77
141
96
0.657
0.577
0.384
0.404
0.427
0.635
0.306
0.516
0.601

Measurement Model

The testing of the factorial validity of scores from the measuring instrument was conducted using *second-order confirmatory factor analysis* (with all 48 items) in SPSS-AMOS software with graphical interface. The resulting overall fitness measures were weak as expected, suggesting that there were underlying measurement model problems. Through the diagnosis, 22 items were dropped from the model and presented the revised model including 26 items (Brakus 2009). The resulting model was built using the 26 items, seven first order constructs and one second order construct as shown in Figure 2. It demonstrated the goodness of fit, which is free from all the known problems.

Figure 2: Second Order CFA Model: 7 Attributes of Value Co-Creation



The second-order CFA model fit was deemed to be acceptable on the basis of a battery of fit indexes (Ramani and Kumar, 2008; Bentler and Bonett 1980). χ^2/DF nearing to 1.24 indicated a good fit. Similarly the relative fit measures CFI, TLI and IFI greater than 0.90 indicated that the measurement model fits very well. This was also demonstrated through

parsimony fit measure indices PNFI = 0.631 (>0.6) and PGFI = 0.641 (>0.6). It was also demonstrated through the badness of fit index such as RMSEA = 0.054 (<0.08), PCLOSE = 0.361 (>0.05).

The convergent validity was attained by demonstrating three measures of standardized loadings (estimates should be > 0.5), the Average Variance Extracted (AVE) for each of the first order construct or second order construct (should be > 0.5) and the reliability of the first order construct or second order construct (should be > 0.7) (Hair et al, 2009); Joreskog and Sorbom, 1992). Table 4 demonstrates that the standardized loadings that link the individual indicators to the first order constructs and first order constructs to the second order factor were all approximately 0.5 or above. Item 70 was loaded with 0.311 on the construct behavioral transformation, which in turn was loaded with 0.317 on the second order factor, value co-creation. Similarly, the AVEs for each of the first order constructs and second order factor were approximately 0.5 (or 50%) or above, except for behavioral transformation, which was 0.34 and value co-creation, which was 0.45. The reliabilities of the first order construct and the second order construct were above 0.7 except for behavioral transformation, which was 0.58. The behavioral transformation has demonstrated an overall weaker tendency against convergent validity due to item 70. However due to face validity of item 70, we made the decision to include it in the model. With the exception of behavioral transformation, which did not satisfy the above criterion, we concluded that the convergent validity criterion was otherwise satisfied.

Table 4: Convergent Validity: Standardized Loadings, AVEs and Construct Reliabilities

	Standardized Loadings estimates (λ)[a]								**Item Reliabilities (λ^2)**	**Average Variance Extracted (AVE)[b]**	**Error (δ)**	**Reliability (CR)[c]**
	Expectations (TE)	**Expectations (OE)**	**Alignment (BA)**	**Process Alignment (PA)**	**Transformation (BT)**	**Competencies (CC)**	**Empowerment & Control (EC)**	**(Second Order)**				
TE								0.746	0.557		0.443	
OE								0.659	0.434		0.566	
BA								0.888	0.789	**44.99 %**	0.211	**0.843**
PA								0.524	0.275		0.725	
BT								0.317	0.100		0.900	
CC								0.76	0.58		0.415	

								5	5			
EC								0.640	0.410		0.590	
Q142	0.830								0.689		0.311	
Q60	0.841								0.707	**56.00%**	0.293	**0.832**
Q143	0.543								0.295		0.705	
Q61	0.741								0.549		0.451	
Q146		0.842							0.709		0.291	
Q66		0.808							0.653	**57.92%**	0.347	**0.845**
Q67		0.718							0.516		0.484	
Q65		0.663							0.440		0.560	
Q36			0.677						0.458		0.542	
Q39			0.743						0.552	**53.22%**	0.448	**0.817**
Q40			0.866						0.750		0.250	
Q41			0.607						0.368		0.632	
Q75				0.799					0.638		0.362	
Q72				0.464					0.215	**52.43%**	0.785	**0.806**
Q141				0.633					0.401		0.599	
Q77				0.918					0.843		0.157	
Q69					0.733				0.537	**33.66%**	0.463	**0.580**
Q68					0.613				0.376		0.624	
Q70					0.31				0.09		0.903	

					1				7			
Q98						0.734			0.539		0.461	
Q97						0.870			0.757	**52.34 %**	0.243	**0.760**
Q100						0.524			0.275		0.725	
Q49							0.775		0.601		0.399	
Q25							0.658		0.433	**54.37 %**	0.567	**0.826**
Q24							0.700		0.490		0.510	
Q52							0.807		0.651		0.349	

[a] All completely standardized estimates (λ) are statistically significant, $p < 0.05$.
[b] AVE = $\Sigma\lambda_i^2/n_i$, n is number of items Hair, Babin and Anderson, 2007
[c] CR = $(\Sigma\lambda_i)^2/((\Sigma\lambda_i)^2 + (\Sigma\delta_i))$ Joreskog and Sorbom (1992).

To demonstrate discriminant validity, we computed the correlations among the first order constructs outside of the second order CFA for this purpose. Table 5 shows the interconstruct correlations, SIC estimates and AVEs, which demonstrated that AVEs were larger than the corresponding SIC estimates (total 21 comparisons of SIC against AVEs for seven constructs). This indicated that the measured variables have more in common with the construct they were associated with, rather than with the other constructs. Hence our second-order CFA model demonstrated discriminant validity.

Table 5: Discriminant Validity: AVEs, Interconstruct Correlations and SICs

Interconstruct Correlations	**TE**	**OE**	**BA**	**PA**	**BT**	**CC**	**EC**	
TE	1.000							
OE	0.535	1.000						
BA	0.644	0.575	1.000					
PA	0.351	0.347	0.455	1.000				
BT	0.248	0.162	0.243	0.266	1.000			
CC	0.625	0.457	0.722	0.375	0.259	1.000		
EC	0.417	0.502	0.554	0.471	0.308	0.439	1.000	

Correlations Squared (SICs)	TE	OE	BA	PA	BT	CC	EC	AVE
TE	1.000							0.560
OE	0.286	1.000						0.579
BA	0.415	0.331	1.000					0.532
PA	0.123	0.120	0.207	1.000				0.524
BT	0.062	0.026	0.059	0.071	1.000			0.337
CC	0.391	0.209	0.521	0.141	0.067	1.000		0.523
EC	0.174	0.252	0.307	0.222	0.095	0.193	1.000	0.544
AVE	0.560	0.579	0.532	0.524	0.337	0.523	0.544	

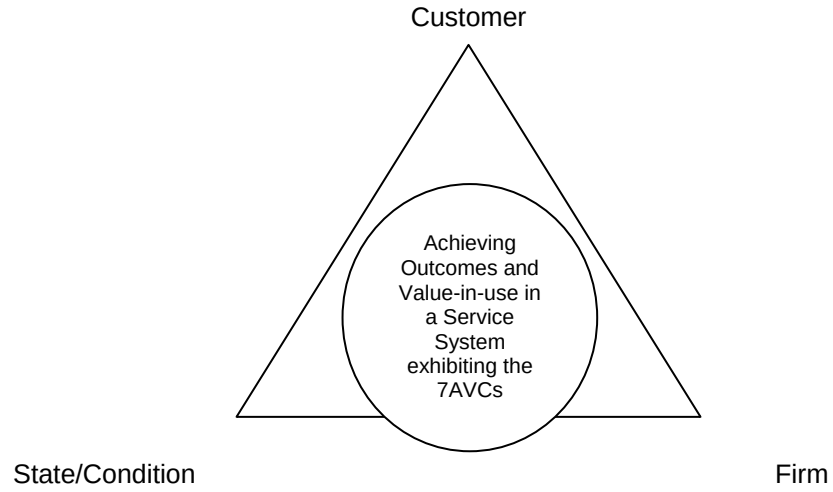
One drawback of the second order CFA model is that we can only have paths from first order constructs to the corresponding second order factor. Thus we cannot determine if there is a significant and meaningful relationship amongst the first order constructs as well as any other constructs in the model (other than the second order factor) (Hair et al 2009). However the authors opted for the second order CFA model as the testing of 7AVCs had a genuine contribution to theory

A further limitation of the study is its small sample size. Hence, we present the strength of our data in three ways. First, the majority of the communalities (75%) are greater than 0.5 as demonstrated in the latter part of the study. Second, more than three items were significantly loaded on each factor. This suggests that our proposed rotated structure derived from the qualitative findings is not wrong.

GENERAL DISCUSSION

Our study shows the role of the customer's state in value co-creation for achieving outcomes or value-in-use. Clearly, value-in-use is not a static concept, nor is the idea of 'use' a simple one. As literature has shown (c.f. Karni, 1983; Fishburn, 1974; Ng, 2008; Shugan and Xie, 2000, Xie and Shugan, 2001), 'use' is dependent on the state of the world and customer's use in different states has a tremendous impact on the firm delivering to outcomes. In other words, as the study demonstrated, even when the customer and the firm did exactly the same thing each time, the state of the world changes and together with it benefits, satisfaction, costs and the way the service is being delivered. Our findings found that through use, both equipment and activities were being redesigned to achieve better use. Figure 3 shows how value co-creation has three players in achieving outcomes.

Figure 3: Entities in Value Co-creation



Attributes found in the study together with the institution of HR policies for better empowerment and control helped stabilize the service system delivery for more effective value co-creation across multiple states, with more effective behavioral transformation of the customer (and internally as well) when the state of the world is uncertain. By focusing on the dyadic 'space' between firm's and customer's employees as the unit of analysis, our findings show that such attributes facilitate the two-way interactions necessary for co-creation.

To deliver excellent service and be economically viable, our study found that firms also need to develop the customer as a core competence, a point echoed by Prahalad and Ramaswamy (2000). Customer's failure to co-create value results in the firm not being able to achieve the outcomes they have been contracted to deliver. Hence, customer's capability to co-create value is now the firm's responsibility under OBC.

Our study contributes to current conceptual thinking around value co-creation. Specifically Prahalad and Ramaswamy's (2004) development of the conceptual DART (dialogue, mutual access, risk sharing and transparency) co-creation model would now be better specified for organization and service design. The study also provides empirical evidence and extends current knowledge. Our seven attributes of value co-creation compels research and practice to consider true bidirectionality (Woodruff and Flint, 2006) and balanced centricity (Gummeson, 2002) or reciprocal focus (Ballantyne and Varey, 2006), where customer systems (its journeys, resources, skills) to co-create value needs further research.

The paper also contributes to research in relationship marketing. Within this domain, much of the research involves networks, alliances and customer relationship management (e.g. Gronroos, 2004). Our study finds that relationship management in B2B services is embedded in tasks and functions between the firm and the customer. In other words, it is not much of a point to have great communication and network when the fundamental core service

delivery and transformations (which the customer has purchased) is not incorporated into a relationship system. This is alsoechoed by past research, where scholars have described the relational process as a social exchange arising from transactions (Narayandas and Rangan, 2004; Bolton, Lemon and Verhoef, 2008). Hence, relationship management is embedded within delivery and one has to consider the building of relationships as *part* of the delivery processes and not separated from it. Our study also extends the work of Tuli, Kohli and Bharadwaj, (2007), providing empirical evidence of the need for customer variables to be included in service design for effective solutions and outcomes.

Finally, our study reiterates the need for structural change in organizations to enable knowledge sharing, communication, interaction and innovation (e.g. Sawhney and Prandelli, 2000; Gronroos, 2004). Achieving value-in-use clearly does not follow the typical value chain (Porter) with interactions compartmentalized into marketing, HR, operations, supply chain and logistics etc. Instead, we found that value co-creation as a transcended discipline with functional boundaries of both the customer and firm, focused only on outcomes and value-in-use. Indeed, the seven AVCs were attributes that crossed functional and discipline boundaries – empowerment and control, behavioral alignment and transformation would have traditionally belong to the HR domain, process alignment in the operations management and supply chain/logistics, congruence of expectations and complementary competencies in strategy/marketing domain. Value was being co-created through interactions at every level and with every resource be it equipment or people, and through a web/network and system-like behavior. Recent literature has also pointed the need for organizations to reconfigure their value chains (Davies, 2003; Araujo and Spring, 2006). Our findings suggest there is a need for systems thinking in value co-creation in line with other researchers (Checkland, 1981; Ng, Maull and Yip, 2009; Vargo, Maglio and Akaka, 2008).

In addition, as Moran and Ghoshal (1999) propose, “it is not resources per se, but the ability to access, deploy, exchange and combine them that lies at the heart of value creation” (p. 409). We extend that understanding further and argue that it is not about resources *within* company, but that of both customers and the firm, and how they are utilized for value co-creation, a point echoed by Kohli (2006) where he proposes more complementary resource focused strategies for co-creating value

Managerial Implications

The knowledge required for an enterprise to organize itself to co-create value with customers is clearly inadequate. Current firms tend to design service operations based on rules previously used. In particular, organization and supply chain design, process design and performance measurement come from the cognitive systems engineering and operations thinking prevalent in goods-dominant logic where the mindset is of a linear value chain with compartmentalized functional activities (marketing, operations, sales, HR) (Porter, 1985). Whilst this has been demonstrably successful in delivering some benefits, much more effort is required to change that mindset towards delivering true service excellence.

The seven AVCs provide a starting point towards changing the internal organization in terms of roles, governance and responsibilities to ensure more effective interfaces with the customer. The seven AVCs also provide initial insights to the organizational influencers that need to be addressed to achieve co-creation of value. This leads to the need to address the roles and scope of actors within the customer organization, within the firm's organization and within the shared or joint space between customer and firm resulting in the need for different rules for managing the joint space. In thinking about complementary competencies, we therefore need to be very clear about the competence that is the customer's and which needs to remain the customer's in terms of both operations and governance. We also need to take a similar perspective on the firm's competencies and thus on those that need to be held jointly with an organization, and develop a set of integrated delivery processes that allow clear empowerment and control.

Ascertaining the attributes for outcome-based contract delivery would show where the gaps (and therefore the risks) are. The customer or the firm may be inadequate in certain attributes, and contracting on these attributes would raise the issue of the degree of substitutability of the firm's capability to achieve these attributes on the customer's behalf, or on the sensitivity of changes in the attributes on costs.

CONCLUSION

In recent times there seems to be an increased focus on value co-production and co-creation in various academic disciplines and industry practice in the effort to be more customer focused. However, most studies are conceptual in nature, and there is lack of empirical studies in this area.

Our study provides evidence that the legacy of linear, one-directional and clearly boundaried thinking from the manufacturing-based environment needs to be replaced with the interactive, fluidly boundaried, multi-dimensional thinking of a complex service system that includes people from the customer organization and the firm, equipment, processes and physical environments, consistent with the thinking around the service-dominant logic. Outcome-based contracts could therefore change the configuration of the 'production' and 'manufacturing' architecture and push firms to be much more innovative in service value co-creation.

This study contributes to service research by providing researchers with the instrument to measure attributes of value co-creation within B2B outcome-based service contracts. Although the study abstracted useful insights into value co-creation, one of its major limitations is that the results are significant for outcome-based contracts in the defence industry on which the data was collected and the study was conducted, and that the results are statistically only generalizable to the population of outcome-based contracts in B2B services and to not to all B2B contracts. While this is a statistical limitation, we believe that this does not weaken the contribution. Outcome-based contracts are rare and our study has endeavored to keep the attributes at an abstract level so that more contracts could move towards being outcome-based. The instrument could be used to measure and benchmark

other B2B service contracts against outcome-based contracts. The study also lays the foundation for the understanding of the design and delivery of future service contracts when moving into delivering outcomes to customers.

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