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Outcome-based contracts as new business model: The role of partnership and value-driven relational assets

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ABSTRACT

This paper investigates the new business model of outcome-based contracts where the firm is tasked to achieve *outcomes* of equipment as a service contract instead of the traditional maintenance, repair and overhaul activities (e.g., power-by-the-hour® engine service contract). Through a qualitative study of two outcome-based contracts between BAE Systems, MBDA and the UK Ministry of Defence, we derive three value drivers of information, material and people transformation. Mapping it with transaction cost literature we propose five relational assets based on the value drivers; three value-driven alignments and two partnership inputs. We then study the relationships between the relational assets and contract performance through a quantitative survey by applying the partial least square (PLS) method. Our study shows that behavioral and information alignments are important to achieve outcomes. However, material and equipment alignment (i.e., joint supply chain) does not have a significant effect on contract performance. In addition, perceived control and empowerment mediated the relationship between partnership inputs and value-driven alignments. Our study provides a more integrated view of how various theoretical management domains overlap in the understanding of business models, and contribute to the understanding of value drivers and partnership factors in achieving performance in outcome-based contracts.

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1. Introduction

The concept of business models has been increasingly discussed in academic literature since the advent of the internet and the proliferation of e-businesses in the 1990s (Morris, Schindehutte, & Allen, 2005). To attract funding, the early "dot.com" companies used the idea of business models to pitch the attractiveness of their proposed business ventures (Shafer, Smith, & Linder, 2005). The literature encompasses several themes contributing to key concepts of a business model. First, value drivers are important elements for businesses and new business models are often a consequence of changes in these value drivers. These are defined as value-creating activities or transformations that generate revenue for the firm (Chesbrough, 2007). Second, the performance of a company, through the change in such value drivers, is an essential element in a business model. Literature has described the performance of business models as that which requires a joined-up, systems-focused and holistic understanding across the firm's existing resources and capabilities, to retain or achieve a competitive advantage in the industry it sits within as environmental conditions change (Wirtz, Schilke, & Ullrich, 2010).

Third, the formation of successful partnerships is a feature of new business models. This is echoed in strategy literature where the ability to establish strong partnerships as capabilities is recognized as core-competencies (Johnson, Christensen, & Kagermann, 2008). According to Demil and Lecocq (2010), the firm's "value chain of activities" should include the fostering of partnerships as part of the building blocks of a business model. Clearly, business models exhibit a need to be value-driven, partnership-focused, and with the unit of analysis centered on the value-creating system that transcend traditional boundaries (Zott & Amit, 2010). There is also the need to understand the inter- or intra-organizational activities that contribute to that system, of which revenues are derived from its performance.

Despite the proliferation of the term, we argue that there are three major gaps in business model literature. First, new business models emerge across different industries in different ways and there may be greater heterogeneity in both their theoretical conceptualization and their empirical and practice characterization. This is evidenced by the number and the inconsistency of "key concepts" that seem to emerge from the literature, as well as by the different definitions of a business model ranging from "*an underlying core logic*" (Shafer et al., 2005) to "*system manifested in the components*" (Tikkanen, Lamberg, Parvinen, & Kallunki, 2005).

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Second, it is also important not only to understand the key concepts, but also to appreciate how these concepts – such as value drivers, partnerships, customer-centricity – relate to one another both theoretically and empirically, and how they manifest themselves in practice for different types of business models. Finally, since business model investigations require a holistic approach, there should be a concerted attempt to bring together extant approaches of the various disciplines of marketing, strategy, operations and OBHRM in a trans-disciplinary manner and into an empirical context, to understand the characterization of new business models so as to both critique and draw insights into intra-disciplinary assumptions. Only when the new knowledge is reconciled with the existing, can we build on its scholarship and transfer the knowledge of business models across other new contexts.

Our study examines a particular new business model of outcome-based contracts (OBC) in equipment service, and empirically investigates the firm's capability to achieve the expected performance. Equipment-based services have traditionally been contracted on the basis of revenue-generating activities, materials and time required to maintain, repair or overhaul equipment such as engines and elevators. This often results in provider opportunism since the very activities that disrupt the customer's use of the equipment are those that generate revenue for the firm, and the firm has less incentive to ensure the long-term care of the customer's equipment.

Recently, OBC for equipment-based service have come into prominence in marketing practice and theory (Ng, Maull, & Yip, 2009; Ng & Nudurupati, 2010). With outcome-based contracts such as Rolls-Royce's "Power-by-the-hour®", the firm is paid not according to its service activities such as material and repairs, but based on the outcome of such activities in continual use situations i.e., the number of hours of engine in the air. This is analogous to the well-known story in marketing of being paid for holes-in-walls, rather than for the maintenance, repair and upkeep of the drill (Levitt, 1960). This new business model is challenging for marketing theory because continual use of equipment sits within the customer's space and requires the customer's resources to achieve their own goals. From the delivery standpoint, OBC is unlike traditional service contracts where there is a sequential process (call comes in, processes triggered, equipment repaired, activities invoiced). In OBC, there is usually no sequential 'value chain' to speak of; effective equipment use is a consequence of collaborative processes and practices with the customer in a value-creating system to achieve positive outcomes. Achieving the performance of an 'outcome' is therefore dependent on the nexus of logistics, relationships, operations and management within the system and how they come together effectively so that engines continue to generate power and planes continue to fly. Such a system requires a complete rethink of the firm's business model and its capability, in particular its capability to cooperate reciprocally with the customer. We argue that such a business model capability would require all stakeholders to invest in relational assets that are both value-driven and partnership-focused.

Our investigation begins with a qualitative study within which we found three value drivers that are part of the value-creating transformations of the system. These are material transformation, information transformation and behavioral transformation. Based on a comprehensive review of a diverse set of theoretical literature in operations, OBHRM, strategy and marketing, we integrate the literature with our qualitative findings and propose five value-driven and partnership constructs we consider to be relational specific assets (cf. Madhok & Tallman, 1998) for OBC. We hypothesize the relationships between the constructs and contract performance, with two intervening variables from OBHRM literature. We subsequently operationalize the variables and quantitatively investigate their interactions and impact on contract performance through a survey. We then analyze the resultant two partnership input constructs, three value-driven alignments, and the intervening variables with partial least square (PLS) analysis. Our analysis reveals that, counter-intuitively, OBC performance is dependent on the relational assets of behavioral and information alignments rather than on material/equipment process alignment (i.e., the joint supply chain). This suggests that the new business model of OBC has to completely re-think how the supply chain towards equipment performance should be designed and configured for consistent use outcomes, since the system of material and equipment use interacts with other value drivers and is no longer linear. Our results also show that all three alignments are driven by partnership inputs of complementary competencies and congruence of expectations, and the relationships are further mediated by HR constructs of perceived control and empowerment of individuals. This means that the complex value-creating system in OBC includes multiple management interactions to achieve contract performance and it is a challenge to understand where management begins and operations end. These cross-function interactions suggest that more research is needed on how firms could be better organized to achieve outcomes with their customers in this new business model, but also to consider how disciplinary knowledge can stay relevant when boundaries between them collapse.

This paper is organized as follows. We first review relevant literature to set the foundation for this study. We then introduce the research context and the qualitative study. Based on the findings from the qualitative study, we further propose several hypotheses to be tested in a quantitative study. The result of the quantitative study is then reported, followed by discussion and conclusion.

2. Literature review and research context

2.1. Business models

The concept of business models has been increasingly discussed in academic literature since the advent of the internet and the proliferation of e-businesses in the 1990s. Academic use of terms such as "internet business models", "e-business models" and "new business models" appeared to compare and demonstrate how firms successfully or unsuccessfully conducted their businesses (Osterwalter, Pigneur, & Tucci, 2005). For example, Johnson et al. (2008) discussed how Apple's new business model combining "hardware, software and service" elements were more effective in revolutionizing digital and portable entertainment compared to earlier pioneering firms such as Diamond Multimedia in the 1990s. Conversely, Pisano (2006) examined how biotech companies suffer from a flawed business model.

In management studies, its research appears to have grown independently with little cross-disciplinary understanding (Zott, Amit, & Massa, 2011). However, despite different views, most marketing researchers seem to agree that business models include concepts relating to the 'firms value offering', 'economic model', 'customer interface and relationships', 'partner network and roles', 'internal infrastructure/connected activities' and 'target markets' (Morris et al., 2005). Nonetheless, the precise definition of a business model has been elusive. For instance, Shafer et al. (2005, p202) define business models as "*a representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network*", while Zott and Amit (2007, p181) consider it as "*the structure, content, and governance of transactions between the focal firm and its exchange partners, and represents a conceptualization of the pattern of transactional links between the firm and its exchange partners.*"

Other notable definitions include "*system manifested in the components and related material and cognitive aspects comprising key components including the company's network of relationships, operations and resource base*" (Tikkanen et al., 2005, p792) and "*configurations of interrelated capabilities, governing the content, process and management of the interaction and exchange in dyadic value co-creation*" (Nenonen & Storbacka, 2010, P9).

Notwithstanding, common themes have arisen from its substantial body of research. Shafer et al. (2005) and Osterwalder and

Pigneur's (2010) suggest that business models consist of four primary components; strategic choice in terms of the market to serve, the value proposition, value creation, and the commodification of the value created (value capture) (Ng, 2013; Ng & Smith, 2012). Alternatively, Baden-Fuller and Morgan (2010) propose that the study of business models means understanding scale models (taxonomy) and role models (typology) where successful firms that shape their industries inspire others to directly imitate their business model. Business models can also be studied as an organism model in biology, stimulating thoughts of systems thinking for understanding how knowledge is built in a particular discipline (Creager, Lunbeck, & Norton, 2007). Similarly, Zott et al. (2011) recently proposed four emerging themes; (a) the business model should be seen as the unit of analysis rather than in its component parts; (b) there is a need for systems-level thinking in business models because dynamic activities are performed by the firm and by third parties (partners, suppliers, customers) as part of the firm's business venture; (c) these organizational activities play an important role; and (d) business models seek to explain how value is captured and created i.e., how value is created at the different levels of the organization as well as with the different stakeholders connected to the organization.

For the purpose of our study, we highlight three over-arching marketing themes that have been presented as key concepts of business models. First, *value drivers* are important elements for businesses and new business models often are a consequence of changes in these value drivers (Ehret & Wirtz, 2010). In this respect, value drivers are viewed to be value-creating activities or transformations that generate revenue for the firm, i.e., what the firm actually *does*. For example, Motorola moved from making consumer electronic components in the 1970s to producing more high-technology industrial and mobile telecommunication devices in the 1990s when the technology landscape changed in favor of more advanced mobile communication devices. Similarly, Microsoft moved from personal computer operating systems and software to also include the capability of developing web browsing applications when internet usage increased phenomenally. In each case, the firms were able to identify changing value drivers and adjusted their business models to adapt to the changes in the business environment.

Second, the firm is able to stay viable and improve performance through the change in such value drivers (Ng & Briscoe, 2012). Current literature describes the performance of business models as that which requires a joined-up, systems-focused and holistic understanding across the firm's existing resources and capabilities to achieve competitive advantage in the industry in which it sits (Zott et al., 2011). A successful business model performance is then achieved when a firm is able to narrow the gap between the firm's existing resources and capabilities, and the basis of its competitive advantage in the industry as it evolves (Chesbrough, 2010).

Third, network or *partnership* is a common feature in business model literature. Its literature proposed that firms recognize that multiple stakeholders (internal and external) need to interact and co-operate in order to face challenges (Zott & Amit, 2009). Also, its studies identified the formation of successful partnerships as capabilities in themselves, which are recognized as core competencies in marketing strategy literature (Johnson et al., 2008). Recently, Nenonen and Storbacka (2010) discussed the ability of a firm to integrate customers into business transactions as partners under a co-production environment. Furthermore, according to Demil and Lecocq (2010), the firm's "value chain of activities" should include the fostering of partnerships as part of the building blocks of a business model.

In summary, new business models are seen to be more customer-centric (Mansfield & Fourie, 2004), and they take on new forms of collaboration for value creation that necessitates a whole-system approach (Zott et al., 2011). More importantly, there is a change in the unit of analysis from the firm to that of the value-creating system, which spans boundaries (Zott & Amit, 2010) and necessitates focus on organizational activities that contribute to that system.

Despite the interest in business models, there seems to be a foregone conclusion that changes in business models exhibit similar characteristics when in fact, new business models emerge across different industries in different ways. For example, the changing business model of a brick-and-mortar business into an e-business (such as Borders evolving from a physical bookstore into an online bookstore) may exhibit structural changes in governance, value creation or partnership that would be different from the changing business model of a camera manufacturer to a provider of digital images (such as Kodak). These changes suggest greater heterogeneity in the characterization of business models. Marketing literature has yet to successfully develop a reconciliatory framework on the essence of a business model and why that is important; why, how and when business model changes occur or how or what marketing capabilities should the firm be investing in. While current business model literature presents similar cross-cutting themes, more research is needed to empirically understand how these marketing themes such as value drivers, partnerships, customer-centricity manifest themselves, and the relationships between them for different types of new business models, especially since a systems understanding of business models has constantly been proposed.

In addition, while it is clear that new business models cut across various disciplines and theoretical approaches, there has been no concerted attempt to bring together extant theoretical approaches of the various disciplines of marketing, strategy, operations, and OBHRM in a trans-disciplinary manner and into an empirical context, to understand the characterization of new business models. This would enable a better appreciation of how disciplinary approaches aid or hinder the understanding of a holistic business model. Only when we understand what is new and what is known can we build on its scholarship so that it can be meaningfully applied.

Based on the above discussion, our study aims to contribute to business model literature by integrating existing academic literature in strategy, operations management, and OBHRM into marketing theory through an investigation of a new business model of OBC in equipment service.

2.2. The new business model of OBC

Outcome-based contracts between firms and customers are increasingly touted as the new business model for manufacturers underlined by more complex value-creating systems of products, people and activities. Traditional equipment-based service contracts are anchored on billable time and materials, with the cost of spare parts included for the maintenance, repair or overhaul of equipment as and when required to do so; the customer is billed for the service once the activities have been performed (Van Weele, 2002). Alternatively, the firm could also provide the customer with a cost-plus contract with detailed cost structures to ascertain reimbursement with a pre-determined profit percentage (Kim, Cohen, & Netessine, 2007). Performance of such contracts are typically assessed based on respond time to breakdowns, speed of repairs, price (Crocker & Masten, 1991) and other activities where there is a measurable way to assess the provider's performance (Dehoog, 1990).

Recently, there have been a growing number of contracts that focus on outcomes of equipment rather than the resources involved in its provision. For example, Rolls-Royce's service to maintain engines is remunerated on the basis of how many hours the engine is in the air — a concept known as 'Power by the Hour®'. Such outcome-based contracts focus on achieving required outcomes rather than meeting a set of prescribed specifications (Bramwell, 2003). As an analogy to Levitt's Marketing Myopia (1960), this is akin to being paid for holes-in-walls, rather than for the maintenance, repair and upkeep of the drill. We argue that such a fundamental change to

the value proposition of the firm would constitute a change in its business model.

Theoretically, OBC manifests a change in the traditional business model in three ways that could be explained by strategy literature. First, it aligns the incentives of both parties towards the outcome. In relationships dominated by protection against opportunism, such as traditional contracts, firms may be reluctant to make unilateral and voluntary commitments outside the terms of the contract, preferring to take costly safeguards instead (Parkhe, 1993). In the case of service contracts, there is an issue of opportunism as there is no incentive for the firm to repair and maintain the equipment in such a way that would reduce future breakdowns, since breakdowns in equipment actually generate revenues for the provider. In addition, OBC can help mitigate customer opportunism (Wirtz, 2011), and the customer may be more likely to take ownership of their actions to create jointly favorable outcomes. OBC therefore creates a structure of *mutual orientation* that could mitigate such opportunistic behavior (Kale, Dyer, & Singh, 2002). This implies that OBC has an ability to elicit desired behaviors arising from the incentives within the contract, thus reducing the cost of servicing over the longer term for the customer. Current strategy literature suggests that if partners share ownership of an entity, such as an outcome, and are both 'mutual hostages' to the outcome, their incentive to behave opportunistically is likely to decrease (Teece, Pisano, & Shuen, 1997).

Second, OBC puts the risk of delivering outcomes primarily on the firm, and secondarily on the customer. Bearing a larger proportion of the risk in achieving outcomes provides the firm with an opportunity to integrate resources for value creation in the use of the equipment with the customer (Madhok & Tallman, 1998), thus allowing the firm an opportunity to earn better revenues through more efficient and effective integration of both parties' resources (Dyer, 1997). Often, OBC includes a pain and gain-share mechanism so that savings or losses under some accepted median costs are shared. By doing so, risks from opportunism can be mitigated. Under these circumstances and in the long term, firms may then find it in their interest to invest in designing more reliable products and more efficient repair and logistics capabilities to increase profitability.

Finally, a firm that is capable of achieving such a coordination role in OBC, especially in its ability to coordinate, co-operate and collaborate with the customer, acquires superior organizational capability, which would allow it to extract further rents from the market through more of such contracts. The potential extraction of future rents from such a capability could incentivize the firm to willingly make commitments outside the terms of the contract, thus increasing the strength of the mutual orientation and turning OBC into a self-enforcing agreement. Scholars in strategy have discussed such an alliance capability as an important part of the firm's strategies and a source of competitive advantage (Kale et al., 2002).

All of this suggests that OBC is a new business model, as it changes the value drivers from billed activities to partnered outcomes (Demil & Lecocq, 2010); changing the focus from value capture to value co-creation (Shafer et al., 2005); changing the dominant logic of 'selling to' to 'creating value with' the customer (Nenonen & Storbacka, 2010); and changing the unit of analysis away from the organization to that of the collaborative value-creating system (Zott & Amit, 2010).

Yet, achieving performance in OBC is challenging and requires the firm to be able to manage its collaboration with its customers in a different way (Ng & Nudurupati, 2010), since the firm is now directly involved in achieving the customer's outcomes, rather than leaving it to the customer to do so under traditional contracts. Business model literature proposes the need to understand the change in organizational activities as a consequence (Zott & Amit, 2009), particularly with the increased involvement and resource contribution by the customer. Indeed, there is a need to examine fundamental theoretical issues underpinning the dynamic firm–customer relationship in an OBC, particularly the issue of what constitutes the capability to coordinate, co-operate and manage such a business model where the capability lies in the way a firm is able to achieve customer outcomes collaboratively. Literature in strategic alliance suggests that a successful alliance must be able to co-operate and combine resources of parties in the most efficient and effective manner (Nickerson & Zenger, 2004). Conceptual and empirical studies in alliance literature have highlighted the difficulties of achieving such coordination, citing the sharing of information, cultural differences and management of conflict as the three more prevalent challenges (Das & Teng, 2000).

However, OBC as a new business model goes beyond an alliance in three ways. First, the revenues for the firm are obtained from the collaborative performance of the contract, even if the firm has no control over the customer's contribution. For example, Rolls-Royce's 'Power by the Hour®' earning revenues for each hour of engine in flight would depend on where the customer is flying (environmental conditions such as ash, sand, etc.), and the customer's ability to use the engine with due care. Second, this implies that the contract cannot be delivered by the firm on its own because the alliance between the firm and the customer is often implicit. Third, since contract performance is dependent on the customer's involvement, the co-operation must be embedded in the value drivers of the contract itself i.e., the customer is part of the 'production' system and co-produces the service.

We propose that a successful change in a business model to enable it to achieve performance on OBC therefore depends not only on how the firm develops the capability of achieving co-operation with the customer such as that proposed by alliance literature, but also on incorporating the value drivers into the co-operation itself. This view brings in marketing literature and accentuates value creation within a relationship i.e., 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. The value of the contract, and the relationship with the customer, are therefore embedded within a complex system of delivery and use (Normann & Ramirez, 1993). This suggests that achieving outcomes under OBC incorporates co-production and co-creation and necessitates a value-driven cooperative approach integrating marketing and strategy literature. Our study aims to shed light on how this capability can be developed through investment in relational assets.

2.3. Relational assets

Within the strategy domain, some alliance literature suggests a transaction cost economics (TCE) approach to achieve co-operation. First, formal governance mechanisms compel co-operation by specifying contractually, the responsibilities and obligations of all parties (Reuer, Zollo, & Singh, 2002). Complex contracts may outline roles, procedures and penalties for non-compliance and determine outcomes to be delivered. Such governance arrangements are necessary, usually as safeguards against dire consequences in the event of a breach (Joskow, 1988). Literature in TCE has shown that formal mechanisms come with the hazards of asset specificity (i.e., the hold-up problem), measurement difficulty and technological uncertainty (Poppo & Zenger, 2002). Second, co-operation can also be achieved through relational governance. In such cases, inter-organizational exchanges involve exchanges embedded in social relationships (Macneil, 1978) which could reduce transaction costs (Dyer, 1997). Such social relationships are more fluid in nature and allow for flexibility, which facilitates adaptation to environmental changes that could strengthen co-operation through information sharing and solidarity (Mayer & Teece, 2008).

Recent studies show that formal contracts and relational governance could be complementary, and that outcomes are achieved from an optimal configuration of formal and relational governance (Hoetker & Mellewigt, 2008). Additionally, some scholars argue against transactional cost approaches, as it does not give sufficient credit to the benefits from collaboration such as learning, trust development, resource pooling and the reduction of environmental

uncertainty from the trust. Common to most approaches is the need for both customer and firm to invest in relational specific assets of the alliance as described by Madhok and Tallman (1998) to be a "*unique and productive resource for value creation and realization.*"

Studies into relational mechanisms between firms are also centered around trust and relationships which are essentially links between individuals in the firms. In changing the business model to deliver on OBC, relational assets would have to involve the firm and individual level links. A great number of literature agree that inter-organizational relationships stress the value created by such alliances, and many studies have extolled the fact that alliances lead to better firm performances (Deeds & Hill, 1996) which is also echoed in business model literature. However, as we have discussed earlier, the new business model of OBC is not merely the building of an alliance to appropriate resources, but to incorporate value drivers within it. Hence, relationship specific assets are not just about the relationship as strategy or transaction cost literature would propose, but about the relationship in the actual value-creating activities towards outcomes i.e., the 'production' relationship has to be value-driven in OBC. The investment in these value-driven relational assets would then fundamentally determine the performance of the contract, and the successful performance of the new business model.

2.4. Value drivers

Business model literature proposes that a new business model must fundamentally understand how value is created at the different levels of the organization as well as with different stakeholders connected to the organization. Although some scholarly literature in alliances, especially within the resource-based view (RBV) domain discuss how firms seek partners to increase value-creating potential (Das & Teng, 2000), they are often discussed from the perspective of partner selection (Lin, Yang, & Arya, 2009). There is little understanding in marketing literature of what resources or capabilities are required to co-produce and indeed, what the value drivers are (Storbacka & Nenonen, 2011). Clearly, the nature of such value drivers – in terms of what is being transformed and how – is critical to the co-operation between the firm and its customer in an OBC, as it would dictate what resources are complementary. Thus, to understand value drivers, one would need to understand the key transformational processes that create value. This is particularly important in marketing literature as value drivers can be seen as managing relationships to improve performance (Richards & Jones, 2008).

Hence, for our study, our research question is to examine what are the value drivers in the management and delivery of OBC as a new business model. We reviewed a diverse set of literature to discover the relational assets that could be specific to the firm–customer partnership, which would incorporate the value drivers discovered. We then operationalized and measured the relational asset constructs through a survey instrument so that we could quantitatively evaluate the influence of the relational assets on OBC performance and their mitigating factors. From a marketing perspective, this advances theoretical and managerial knowledge on value creation and how partnerships can be better implemented.

2.5. Research context, design and administration

This study investigates the delivery of two maintenance, repair and overhaul (MRO) OBC between two defense contractors and the UK Ministry of Defence (MoD). The outcomes were the *availability* of two types of equipment; a fighter jet and a missile system. The first contract is to maintain a defined level of available mission-ready *flying hours* across a fleet of some 220 Tornado (fastjet) aircraft. The contractor is paid and incentivized for performance against outcome-based key performance indicators. The second contract provides partnered support for the British Army's Rapier mobile air defense missile system. In this contract, the supplier is paid and incentivized for performance against OBC performance indicators, for which the primary outcome is to maintain a defined level of percentage *availability* of the missile system.

Since the contract is outcome-based, the customer has to commit to being responsible and abiding by the level of use stipulated in the contract, and the firm is obliged to deliver the outcome of a set number of flying hours on the fighter jet and a fixed percentage availability over a certain period of time for the missile system for the agreed usage. The delivery of these contracts serves as an exemplar for the new business model of OBC, where both firms and customers are focused on achieving collaborative outcomes of equipment.

3. Study 1: qualitative study — discovering value drivers

3.1. Methodology

A qualitative study was conducted to discover what the customer considers to be the firm's value proposition. The data was collected in four ways. First, meetings and interviews were held to provide researchers with an understanding of the service rendered under the defense contracts, which tend to be riddled with jargon. The explanations of the contracts and the jargon in itself provided invaluable sets of qualitative data, as employees used their understanding of their world to convey their interpretation of the service delivered and the role they (and the customer) played within the system. Second, further insights were gained from 32 in-depth interviews conducted over six months with employees from both sides to solicit a deeper understanding of their world and their role in the social construction of the environment. Third, we 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, the data was coded and categorized by three researchers and triangulated through discussion between the three. The coding and categorization centered on distilling and reducing the data to generic value drivers.

3.2. Findings

The research found that in the delivery of OBC, value is co-produced with the customer through three value drivers. The three value drivers are:

(a) Transform materials and equipment (i.e., manufacturing and production, store, move, repair, install, discard materials and equipment through supply chain, repairs, obsolescence management, predictive maintenance, etc.)
(b) Transform information (i.e., design, store, move, analyze, change information through knowledge management, information, communication and technological strategies, data strategies in equipment management, etc.)
(c) Transform people's behaviors (i.e., train use, change use, build trust through education, influence, build relationships, change mindsets, achieve mental states, etc.)

Our study found that the firm predominantly designed its processes around the transformation of materials/equipment, considered to be the primary value driver of equipment-based service. However, we found that in *outcome-based* equipment service, information and people transformation also became crucial in ensuring that outcomes were achieved. Although both information and behavioral transformations were initiated by the firm, they were mostly tacitly delivered through the interactions of its employees and the customer at the *management* level, rather than at the operational level. Finally, the three drivers interacted with each other. For example, the transformation of customers' perceptions and usage of equipment (behaviors) had an impact

on the supply chain (material/equipment transformation) and constantly changed the nature of how information was communicated both ways (information transformation). In other words, the three transformations are non-linear, and conducted within the system where inputs could come from both the firm and the customer.

Our qualitative study also found that value drivers from such a business model were not predominantly provided by the firm but were jointly created with the customer. In other words, value drivers could not be realized by the firm themselves. Through the coded data, we found that the conduct of the firm and customer to create value necessitated an alignment between the firm and the customer processes in achieving the value drivers. These in turn were influenced by three factors; that of congruence of expectations of the firm by both parties, congruence of expectations of the customer by both parties, and complementary competencies between the employees of the firm. In addition, two further variables could intervene in the relationship — that of perceived control and degree of empowerment of the firm's employees. These serve as the basis through which we investigate the relational assets specific to the new business model. To validate these qualitative observations, we present the hypotheses development for our quantitative study below.

4. Study 2: quantitative study

4.1. Hypothesis development for quantitative study

4.1.1. Relational assets within value-driven alignments

For the firm to be able to manage the new business model of partnered outcomes, our qualitative findings suggest that both customer and firm must invest in relational assets that exist both at individual and organizational levels to achieve the business model change that would improve contract performance. We argue that these relational assets should be embedded in the value drivers discovered previously. First, customer and firm systems should somehow align with each other to achieve value-creating activities. Alignment would then facilitate a symmetric transfer of resources, information and all that is necessary to ameliorate problems that may arise from the highly uncertain environmental factors that impact on co-creation to achieve outcomes. Such *value-driven alignments* must therefore be a relational asset for both parties to invest in. Our hypotheses suggest three types of value-driven alignments as relational assets.

In the transformation of people, the coded data revealed that both parties discussed ideas of “building relationships”, “having a good relationship” and “getting along” as essential in their business partnerships. The data also detected conversations of parties having to behave “sensibly” and “responsibly” in order for the services to be performed and rendered effectively. As such, an important relational asset to invest in is that both the firm and the customer understand that their behaviors are aligned to ensure effective and efficient co-operation. Therefore we hypothesize that:

H1. Behavioral alignment is positively related to contract performance.

The qualitative study also highlighted that interactions at the customer interface (alignment) between the customer's value-creating processes and the firm's service delivery processes are important in managing the alliance. The development of linkages and shared ways of operating between firms and customers would ensure that both parties work smoothly together. Both partners should work together towards improving processes and products, showing their commitment to shared benefits. The benefits are that the companies can mobilize their resources to increase productivity by tightening the linkages which would include information transfer between both parties (Evans & Jukes, 2000). Thus, in the context of process alignment between firms and customers, information process alignment is the *gathering, moving and storing of information* between partners. Therefore, we hypothesize that:

H2. Information process alignment is positively related to contract performance.

According to Guimaraes and Bond (1996), determining set-up details, tooling, scheduling, maintenance, storage, and replenishment for materials and equipment are critical factors in equipment-based service. Thus, logistics and the supply chain are particularly relevant and both the firm and the customer should achieve material/equipment process alignment as a relational asset, i.e., synchronizing both parties' processes. Synchronizing would enable the value creation and transfer process, right from the firm to the end customer, to operate as a seamless chain along which equipment and physical assets flow (Gunasekaran & Yusuf, 2002). As such, we hypothesize that:

H3. Material/equipment process alignment is positively related to contract performance.

4.1.2. Relational assets as partnership inputs

Our qualitative study found “competencies” to be an important relational specificity for co-creation. The study found broad agreements from both the firm and the customer that employing the “right people” with the right competencies and appropriate “judgment of environment state” was crucial to the day-to-day operations of the contracts and ultimately in building the business relationship. Hence, it is important to ensure that the skill sets presented in the relationship between the firm and the customer complement each other. According to Cox and Townsend (1997), where the firm competencies are not core or complementary to the customers' business processes, a weak relationship of no value exists. Yusuf, Gunasekaran, Adeleye, and Sivayoganathan (2004) propose that the resource competencies required are often difficult to mobilize and be retained by single companies. We propose that complementary competency is a partnership input (that is also a relational asset) to value-driven alignment constructs, and we hypothesize that:

H4. Complementary competency is positively associated with value-driven alignments of behavioral (A), information (B), and material/equipment (C).

The communications among supply chain members may foster inter-organizational learning that is crucially important to competitive success. As Paulraj, Lado, and Chen (2008) state, such open and frequent communications are essential to the maintenance of value-enhancing relationships as they foster greater understanding of complex competitive issues related to supply chain success, which in turn may lead to increased behavioral transparency and reduced information asymmetry (Anderson & Weitz, 1992). Our study also suggested that clear communications about rights and congruence of expectations between firms and customers help the value co-production in MRO service (Woodruff & Flint, 2006). Customers need to trust the firms not to misuse the information provided by them and similarly, firms need to actively manage customer expectations. Both parties have to be congruent in the expectations of each other's roles to achieve co-operation within the partnership. We propose that congruence of expectation is also a partnership input to the value-driven alignments, and hypothesize the following:

H5. Congruence of expectations of self (the firm) is positively associated with value-driven alignments of behavioral (A), information (B), and material/equipment (C).

H6. Congruence of expectations of other (the customer) is positively associated with value-driven alignments of behavioral (A), information (B), and material/equipment (C).

4.1.3. Intervening variables

Parts of our qualitative study found that the link between partnership inputs and value-driven alignments may not be straightforward. Two variables seemed to have played intervening roles.

First, perceived control as a psychological construct has emerged from the qualitative coded data to be an important factor. Indeed, perceived control over job-related activities is a frequently-used construct in organizational behavior and HRM (OBHRM) research (Smith, Tisak, Hahn, & Schmieder, 1997). This is because humans have an essential need to control their work environment, and the desire for control arises because it is associated with positive outcome (Rodin, Rennert, & Solomon, 1980). This is also reflected in the study where the interviews reflected the importance of perceived control in the day-to-day operations of the contract delivery. Therefore, we hypothesize that:

H7. Perceived control mediates the relationship between partnership inputs and value-driven alignments.

Our qualitative study also found that empowerment was a key issue from both the firm's and the customer's perspectives. Both parties appeared to recognize that in order for effective partnership to take place, there must be willingness and a sense of empowerment for the individual to identify and effect changes especially with the customer operating in a high variety context and environmental uncertainty with contingency effects. Most literature on "empowerment" agree that psychological empowerment in the workplace is useful for the organization in understanding the quality of their service delivery (Spreitzer, 1995). Hence, we hypothesize that:

H8. Empowerment for behavioral change mediates the relationship between partnership inputs and value-driven alignments.

4.2. Relationship between partnership inputs, value-driven alignments and contract performance

The relationships between the above theoretical variables of relational assets, intervening variables and contract performance are represented in Fig. 1. We suggest that the set of inputs (complementary competency, congruence of expectations of self (the firm), and congruence of expectations of other (the customer)) influence value-driven alignments at behavioral, information, and material/equipment levels, which in turn influence contract performance. The expected causal relationship between inputs and alignments may also be mediated by the intervening variables of perceived control and empowerment. All the hypothesized directions of causal relationships are assumed to be positive in this study. Note that the five relational asset variables depend on customer–firm engagement, and would be irrelevant should one partner breaks the contract, thus reinforcing their nature as specific relational assets.

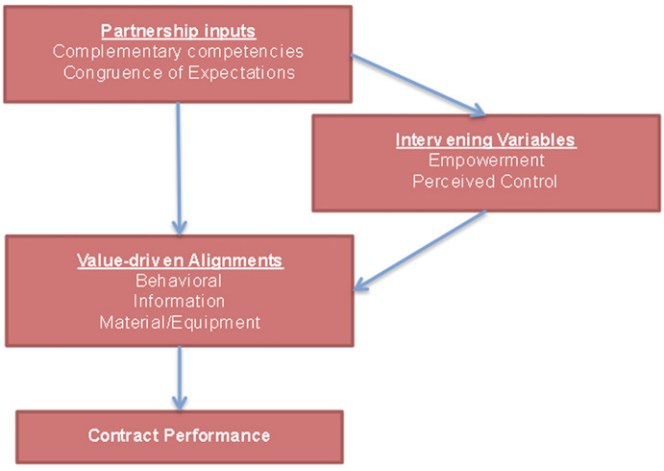

Fig. 1. A model of contract performance in an outcome-based equipment service.

4.3. Research methodology for study 2

In conducting the quantitative study, we operationalized the constructs into perceptual measures i.e., the constructs of which measures were developed were constructs from the perceptions of the attributes by individuals delivering on the contract, as previous research has shown that individual level relationships drive value (Bolton, Lemon, & Verhoef, 2008). Also, we chose to investigate two dyads of co-production (firm and customer), as multi-organizational networks comprise various stakeholders responsible for different components of the total value offering. We felt this was necessary as it continued to allow us to take a strategic approach in understanding the change in business model. In case there were gaps in operationalizing and measuring these constructs, we proposed modification or construction of new scales for the purpose of measuring the constructs. Due to the adaptations and modifications in item scales, one of our objectives was to perform content face validity of the items and scales with the experts in this field. To achieve this, the items were submitted to five academics and five industrialists working in the field of service research with expertise in availability-based contracts. We provided the experts with a detailed definition of each item, and asked them to either accept or reject the premise that each particular item reflected the construct (or attribute). When a majority of the experts responded that an item did not reflect the construct, we removed the item. Similarly, we included a few items based on the experts' comments (Gatignon, Tushman, Smith, & Anderson, 2002). Some measures (questions) were worded to be positively slanted while 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.

The measures were entered into a web-based survey and sent to all 1500 individuals managing, delivering, and supporting OBC in 2009. The web-based survey also prevented users from referring to the responses they had given to earlier questions, to reduce possible common variance problems that could result in inflated reliability measures (Stanton, 1998). Of the 1500, 116 responses were received for the survey. The elimination of incomplete responses resulted in 96 usable responses which were then 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 firm and at all levels from management to support (administrative) to the actual technical and physical deliveries of the service. All respondents have been involved in both contracts during the years of 2008–2009, with 52% working as professionals and 25% working as executives.

4.4. Measurement model analysis and testing

We first performed a principal component analysis with direct Oblimin rotation and a confirmatory factor analysis (CFA) to evaluate our scales (Gerbing & Anderson, 1988). We followed the two-step approach for our measurement model construction and eliminated measured variables or latent factors that did not fit well in the initial CFA model. We then performed a separate CFA for each construct to assess whether any structural model exhibited an acceptable goodness-of-fit level. As a result, we removed three measurement items; two for the control construct and one for the empowerment construct that did not load properly. We then fitted the structural model to the purified measured variables retained from the first step.

In Table 1, we display the estimates of item loadings and reliability for the investigated constructs in an unconstrained analysis. To examine the psychometric properties of the measurement model, we analyzed the indicators and constructs for reliability, convergent validity, and discriminant validity. Each investigated construct provides a Cronbach's alpha value and composite reliability greater than .7, in support of the satisfactory reliability of our scales (Fornell, 1992). We assessed the convergent validity of our scales at both item and construct levels by examining the

Table 1
Item loadings.

Construct	SL	CR	AVE	Items
Complementary Competencies (ξ_1)		.81	.61	Myself and the personnel I interact with on the customer/company side have
	.78			… complementary skill sets to get the work done
	.74			… complementary roles to get the work done
	.79			… are able to access resources necessary to get the work done
	.81			… are able to access the technology to get the work done
Congruence of expectations of self (ξ_2)		.91	.61	I believe the personnel I interact with on the company/customer side
	.68			know what I am doing under the contract
	.82			… how I am doing the job under the contract
	.78			… what I will do under the contract
	.82			… what I should do under the contract
	.83			… how I should do my job under the contract
	.75			… what I want to do under the contract
Congruence of expectations of other (ξ_3)		. 87	.54	I am clear on what the personnel I interact with on the company/customer side
	.78			… is doing under the contract
	.84			… is doing his/her job under the contract
	.83			… will do under the contract
	.63			… should do under the contract
	.67			… should do his/her job under the contract
	.62			… want to do under the contract
Behavioral alignment (η_1)		. 87	.54	Myself and the personnel I interact with on the customer/company side
	.64			… give each other a clear picture of what goes on behind the scenes in our organization that may impact our work
	.75			… give each other ample notice of planned changes that might impact our operations
	.77			… do a good job of notifying each other in advance of any schedule changes
	.63			… would discuss any plans that might change the nature of the work we are doing
	.77			… take the time needed to discuss new ideas
	.81			… co-operate in order to *apply* new idea
Information alignment (η_2)		.81	.52	The company's processes of
	.78			… gathering information is aligned with the customer's processes to enable the gathering of information
	.76			… giving information is aligned with the customer's processes to receive the information
	.61			… storing information is aligned with the customer's processes to enable the storage of information
	.73			… moving the information is aligned with the customer's processes to enable the movement of information
Material alignment (η_3)		.87	.58	The company's processes of
	.85			… collecting the material &equipment is aligned with the customer's processes
	.76			… storing the material & equipment is aligned with the customer's processes
	.86			… moving the material & equipment is aligned with the customer's processes
	.78			… repairing the material & equipment is aligned with the customer's processes
	.53			… installing the material & equipment is aligned with the customer's processes
Perceived control (η_4)		.84	.52	I feel that
	.74			… I have control over the decisions that affect my work
	.80			… I have control over the variety of methods in completing work
	.68			… I can choose among a variety of tasks to do
	.73			… I have total control over the quality of the work I'm delivering
	.63			… I can dictate how quickly or slowly I have to work
Empowerment (η_5)		.83	.52	When interacting with personnel from the customer/company side
	.74			… I am good at turning problems into opportunities
	.80			… I feel I can use personal judgment to ensure contract performance
	.68			… I feel I can use tactics that would ensure good contract performance
	.73			… I feel I can do more than job specifies to ensure performance
	.63			… I feel I have significant autonomy in that interaction
Contract performance (η_6)		. 91	.77	For the contract you are involved in, how do you think it's going so far
	.87			… The contract is performing well overall
	.90			… The contract is doing well on the company side
	.86			… The contract is doing well on the customer side

Note: SL = standardized loadings; CR = composite reliability; AVE = average variance extracted. Items are measured on seven-point scales, where 1 represents strongly agree, 4 is the neutral point, and 7 is strongly disagree.

item loadings and average variance extracted (AVE). An individual item loading greater than .7 suggests that an indicator shares more variance with the construct it measures than with error variances (Gefen, Straub, & Boudreau, 2000). An AVE greater than .5 manifests a construct that shares more variance with its indicators than with error variances. As we show in Table 1, most items load highly on the constructs they measure with item loadings of .7 or greater, except for three indicators. Our measurement items also converge properly on their intended constructs. The items exhibit good convergent validity, as suggested by the AVE of greater than .5 for each investigated construct.

Finally, we examined discriminant validity by comparing the correlations among constructs and the AVE values. In general, the square root of the AVE for a construct should be greater than the correlations between that construct and all other constructs. As shown in Table 2, the square roots of the AVE are greater than any of the corresponding correlations. Hence, our scales exhibit appropriate discriminant validity. We sought additional support for discriminant validity by comparing item loadings and cross-loadings in Table 1. All the items load substantially higher on intended construct than on other constructs, thus further suggesting that our scales possessed adequate discriminant validity (Fornell, 1992). We also checked possible common method bias by conducting Harmon's single-factor test and by adding a latent variable that presents a common method. Both results suggest that common method bias is not a serious threat to our analysis (Calson & Perrewe, 1999).

4.5. Analysis method

To test the set of hypotheses, we applied the partial least square (PLS) method in Smart PLS to investigate the proposed relationships

Table 2
Descriptive statistics, reliability, correlations, and discriminant validity.

Construct	Construct																	
	M	S.D.	SK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	5.17	0.84	1.19	1.00															
2. Education	4.54	3.10	1.58	0.41	1.00														
3. Gender	1.50	1.67	1.06	0.27	0.39	1.00													
4. Income	1.29	0.60	1.94	0.45	0.48	0.34	1.00												
5. Marital	3.44	1.64	1.72	0.34	0.39	0.54	0.36	1.00											
6. Race	4.45	1.75	1.12	0.48	0.53	0.44	0.46	0.61	1.00										
7. Interaction	3.25	1.40	1.13	−0.18	−0.15	0.00	−0.18	−0.17	−0.17	1.00									
8. Complementary competencies	2.41	0.77	0.34	−0.11	0.00	−0.09	0.00	−0.04	−0.05	0.24	*0.61*[a]								
9. Congruency of expectation of self	2.59	0.71	0.42	−0.21	−0.05	0.06	−0.02	−0.01	−0.11	0.41	0.42	*0.61*							
10. Congruency of expectation of others	2.47	0.60	0.06	−0.13	−0.05	−0.05	−0.02	−0.08	−0.08	0.28	0.50	0.49	*0.54*						
11. Behavioral alignment	2.66	0.67	0.44	−0.19	−0.09	−0.03	−0.06	−0.05	−0.15	0.25	0.54	0.58	0.61	*0.54*					
12. Information alignment	2.95	0.60	−0.19	−0.10	−0.05	−0.15	0.06	−0.04	0.06	0.10	0.50	0.31	0.37	0.43	*0.52*				
13. Material & equipment alignment	2.65	0.64	−0.38	−0.12	−0.25	−0.16	−0.12	−0.19	−0.24	0.25	0.49	0.34	0.35	0.44	0.57	*0.58*			
14. Perceived control	2.69	0.75	0.59	−0.02	−0.11	0.05	−0.05	−0.03	−0.05	0.33	0.50	0.40	0.40	0.48	0.46	0.35	*0.52*		
15. Empowerment	2.47	0.57	0.13	−0.02	−0.04	−0.07	−0.11	−0.19	−0.05	0.30	0.50	0.43	0.44	0.54	0.44	0.40	0.66	*0.52*	
16. Contract performance	2.35	0.86	0.89	−0.14	−0.08	0.06	−0.08	−0.09	0.00	0.21	0.36	0.34	0.43	0.46	0.30	0.25	0.56	0.57	*0.77*

Notes: M = mean construct score (unweighted); SD = standard deviation; SK = skewness;
[a] Numbers on the diagonal (in *italic*) represent the square root of the AVE. Off-diagonal numbers represent the correlations among constructs.

among co-production inputs, co-production alignments, intervening variables, and contract performance. Based on component construct concept, PLS is ideally suited to the early stage of theory building and testing and especially appropriate when the researcher is primarily concerned with prediction of the dependent variable (Fornell, 1992). Compared with two-stage least squares, PLS considers all path coefficients simultaneously and allow direct, indirect, and spurious relationships and estimates the individual item weightings in the context of the theoretical model rather than in isolation (Birkinshaw, Morrison, & Hulland, 1995). In addition, the PLS procedure has been increasingly used in business research because of its ability to model latent constructs under conditions of non-normality and small-to-medium sample sizes (Chin, Marcolin, & Newsted, 2003). The structural equations in PLS are specified as follows:

$$E(\eta|\eta,\xi) = \beta^* \times \eta + \Gamma \times \xi$$

$\eta = \eta(\eta_1,\eta_2,\ldots,\eta_m)$ and $\xi = (\xi_1,\xi_2,\ldots,\xi_m)$ are vectors of unobserved criterion and explanatory latent variables, respectively. $\beta^*(m \times m)$ is a matrix of coefficient parameters (with zeros in the diagonal) for η; and $\Gamma(m \times m)$ is a matrix of coefficient parameters for ξ.

PLS estimation proceeds in two stages. First, the latent variables are estimated in an iterative manner by finding successive approximations. The PLS algorithm involves alternations between the measurement and structural model where parameter estimates in either part of the model are treated as fixed as the parameters in the other part are estimated. Second, upon convergence, the measurement and structural relations are estimated by OLS regressions using the latent variables estimated in the first stage. Alternatively, the latent variables PLS model is essentially a path analytic model with latent variables.

We applied the standardized bootstrapping method by randomly selecting 96 cases with replacement and re-estimating our structural model for 200 times. We estimated the p values or the significance level of path coefficients based on the reported t values. The PLS estimates and associated p values of the structural model are reported in Table 3. The sequence of reported results follows the discussion of the model developed earlier and is represented in Fig. 2. The overall fit of the structural model can be evaluated by the incidence of significant relationships among the constructs on the one hand, and by the explained variance of the endogenous latent variables on the other. Table 3 shows that several individual relationships do not pass the .05 significance hurdle. Further, the R squares of behavioral alignment, information alignment, material and equipment alignment, and contract performance are .55, .35 .29, and .22 respectively. Given that alignments and contract performance are the central focuses of the model, it can be concluded that a satisfactory fit is obtained. Empirical results are reported below. The 'direct' relations among constructs are discussed first. Thereafter, 'mediating' effects will be considered and contrasted with the 'direct' effects.

4.6. Direct effect

4.6.1. Value-driven alignments and contract performance

It was hypothesized that the value-driven alignments between customer and firm systems facilitate a symmetric transfer of resources, information and all that is necessary to deliver outcomes. The results in Table 3 and Fig. 2 suggest that both behavioral and information alignments provide significant explanatory power on contract performance,

Table 3
Partial least square (PLS) estimation results for direct effects.

Structural paths	Hypothesis	PLS estimate	Standard deviation
Behavioral alignment → contract performance	H1	0.40***	0.11
Information alignment → contract performance	H2	0.13*	0.09
Material & equipment alignment → contract performance	H3	−0.00**	0.07
Complementary competencies → behavioral alignment	H4a	0.23***	0.09
Complementary competencies → information alignment	H4b	0.42***	0.10
Complementary competencies → material & equipment alignment	H4c	0.39***	0.10
Congruency of expectation of self → behavioral alignment	H5a	0.32***	0.09
Congruency of expectation of elf → information alignment	H5b	0.10	0.09
Congruency of expectation of self → material & equipment alignment	H5c	0.14*	0.10
Congruency of expectation of other → behavioral alignment	H6a	0.34***	0.09
Congruency of expectation of other → information alignment	H6b	0.14*	0.09
Congruency of expectation of other → material & equipment alignment	H6c	0.09	0.10

*** Significant at .001 significance level (two-tailed).
** Significant at .01 significance level (two-tailed).
* Significant at .05 significance level (two-tailed).

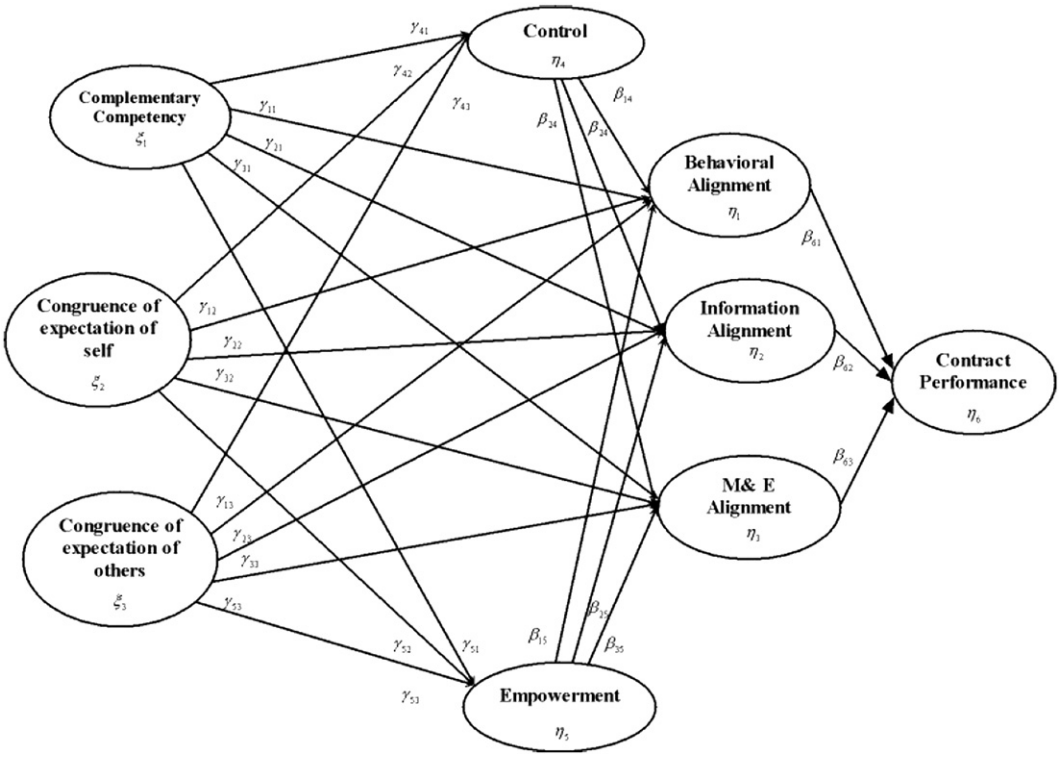

Fig. 2. Structural model of contract performance in outcome-based equipment service.

yet the material and equipment alignment does not have a significant effect on contract performance ($\beta_{61} = .40^{***}$, $\beta_{62} = .13^{*}$, $\beta_{63} = .00$). Judging from the size of the path-coefficients, one can conclude that in the context of the OBC, the direct effect of behavioral alignment and information alignment are quite important to achieve desired outcomes. However, material and equipment alignment does not have a significant effect on contract performance. Therefore, while H1 and H2 are supported, H3 is not.

4.6.2. Partnership inputs and value-driven alignments

The results from hypotheses H4 through H6 in Table 3 shed light on the relationship between partnership inputs and value-driven alignments. It was hypothesized that partnership inputs serve as a driver to facilitate value-driven alignments. Our data suggests that the complementary skills and competencies between the firm and customers greatly contribute to the symmetric transfer of resources including behavior ($\gamma_{11} = .23^{***}$), information ($\gamma_{21} = .42^{***}$), and materials and equipment ($\gamma_{31} = .39^{***}$) during the co-production of the service. In addition, the positive relation between congruencies of expectation and value-driven alignments add further insights to the question of whether pre-existing expectations drive the alignments in co-production. Congruencies of expectations for both self and other positively affect behavioral alignment at $\gamma_{12} = .32^{***}$ and $\gamma_{13} = .34^{***}$, respectively. Yet, the congruency of expectation of self has a direct effect on material and equipment alignment ($\gamma_{32} = .14^{*}$) while the congruency of expectation of other has a direct effect on information alignment ($\gamma_{23} = .14^{*}$). Therefore, H4 is supported while H5 and H6 are partially supported.

Table 4
Partial least square (PLS) estimation results for mediating effects of control and empowerment.

Variable	Behavioral alignment				Information alignment				Material & equipment alignment			
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.
Complementary competencies	0.26***	0.09	0.16**	0.10	0.40***	0.10	0.27***	0.11	0.41***	0.09	0.37***	0.12
Congruency of expectation 1	0.31***	0.09	0.25***	0.11	0.14**	0.09	0.05	0.07	0.10*	0.08	0.08	0.09
Congruency of expectation 2	0.34***	0.10	0.30***	0.11	0.13**	0.09	0.08	0.10	0.07	0.08	0.05	0.09
Age	−0.03	0.06	−0.07	0.07	−0.09*	0.07	−0.15*	0.09	0.13*	0.09	0.11*	0.09
Education	−0.03	0.05	−0.02	0.05	−0.10	0.08	−0.07	0.06	−0.22**	0.09	−0.20**	0.10
Gender	0.03	0.05	0.01	0.05	−0.18**	0.10	−0.21**	0.10	0.00	0.06	−0.02	0.08
Income	−0.03	0.05	0.02	0.06	0.11	0.09	0.14*	0.09	0.02	0.07	0.02	0.07
Marital status	0.05	0.07	0.11	0.09	−0.04	0.08	−0.01	0.08	−0.05	0.07	−0.05	0.09
Race	−0.09	0.09	−0.12	0.11	0.24**	0.10	0.22**	0.10	−0.10	0.10	−0.10	0.11
Interaction	−0.06	0.06	−0.07	0.06	−0.09*	0.09	−0.11*	0.08	0.12*	0.10	0.11*	0.10
Control			0.06	0.07			0.24**	0.10			0.13*	0.11
Empowerment			0.22**	0.09			0.13*	0.14			−0.03	0.12
R^2	0.52		0.57		0.34		0.41		0.35		0.37	
ΔR^2			0.05				0.07				0.02	

*** Significant at .001 significance level (two-tailed).
** Significant at .01 significance level (two-tailed).
* Significant at .05 significance level (two-tailed).

Table 5
Effects of co-production inputs on control and empowerment.

Variable	Behavioral alignment				Information alignment				Material & equipment alignment			
	Control		Empowerment		Control		Empowerment		Control		Empowerment	
	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.
Complementary competencies	0.35***	0.09	0.33***	0.12	0.35***	0.10	0.32***	0.12	0.35***	0.09	0.31***	0.12
Congruency of expectation of self	0.19**	0.09	0.20**	0.11	0.19**	0.09	0.22***	0.10	0.19**	0.09	0.22**	0.12
Congruency of expectation of other	0.14*	0.09	0.18**	0.10	0.14*	0.09	0.17**	0.11	0.15*	0.10	0.18**	0.11

*** Significant at 0.001 significance level.
** Significant at 0.01 significance level.
* Significant at 0.05 significance level.

4.7. Mediating effect

4.7.1. Perceived control and empowerment as the mediators of value-driven alignments

Building on organizational behavior research (Smith et al., 1997), we hypothesize that partnership inputs affect value-driven alignments through their effects on perceived control and empowerment (H7 and H8). The mediation hypotheses require the test of the following equations: (1) the effects of partnership inputs on value-driven alignments; (2) the combined effects of perceived control and empowerment and partnership inputs on value-driven alignments; and (3) the effects of partnership inputs on perceived control and empowerment. As suggested by Baron and Kenny (1986), all of these effects must be significant, but the significance of the associations between partnership inputs and value-driven alignments must be reduced by adding control and empowerment to the model.

The positive effects of partnership inputs on corresponding alignments are shown in Table 4 (Models 1, 3, and 5). The direct effects of partnership inputs on value-driven alignments have been confirmed in H4–H6, which suggest that complementary competencies and congruency of expectations significantly improve alignments. When control and empowerment are added into each model for corresponding alignment, the effects of co-production inputs on alignments are reduced. While empowerment is associated with a significant improvement of behavioral alignment (0.22, $p < .01$) and information alignment (0.13, $p < .05$), control is associated with significant improvements of information alignment (0.24, $p < .01$) and material and equipment alignment (0.13, $p < .05$).

To complete the mediation hypotheses, it is important to show that partnership inputs are associated with increased levels of control and empowerment for each of the alignment context. As shown in Table 5, complementary competencies and congruency of expectations are associated with a higher level of control and empowerment across all three value-driven alignments. To further test the mediation effects, we used the Sobel test or the product-of-coefficients approach to compute the ratio of ab (a: path coefficient between the independent variable and the mediator; b: path coefficient between the mediator and the dependent variable) and its estimated standard error (Sobel, 1986). We computed the p value for this ratio in reference to the standard normal distribution, and use the significance level to test the hypotheses of mediation. The Sobel test suggests that empowerment positively and significantly mediates the relationship between partnership inputs and behavioral alignment at $z = 2.07$, $p < .05$ level, while perceived control positively and significantly mediates the relationship between partnership inputs and information alignment at $z = 2.04$, $p < .05$ level. Based on the above tests, H7 and H8 are partially supported.

5. Discussion

Our qualitative findings discovered that in outcome-based equipment service contracts, the value drivers are three forms of transformation of information, material and behaviors. We propose, through our hypotheses, that achieving contract performance requires the firm and the customer to invest in five relational assets specific to the contracts on the basis of these value drivers. We operationalize them in the form of partnership inputs (complementary competency and congruence of expectations) and value-driven process alignments (information, material and people) and hypothesize their impact on contract performance. We also suggest that the relationship between partnership inputs and value-driven alignments could be mediated by intervening variables (perceived control and empowerment) set out in OBHRM literature. Our quantitative findings provide an insight into the challenge of delivering the new business model of OBC. Hypotheses H1 and H2 show that contract performance is dependent upon both behavioral and information alignments. This is expected, as outcome performance should be dependent on how seamless the collaborative work is between the firm and the customer. That material and equipment alignment is not related to contractual performance is at first surprising for an equipment-based service but upon reflection, this is intuitively plausible since outcome-based equipment essentially puts the entire supply chain and its installation of parts and equipment into the hands of the firm to achieve the outcome of *use* of the equipment by the customer. Thus, alignment of material/equipment processes (i.e., the supply chain) with the customer's processes may not be as relevant to contract performance, which is an interesting result for supply chain literature. Current literature in this area has proposed several joint supply chain mechanisms (Li & Wang, 2007). Our study shows that the OBC business model renders firm–customer joint supply chain irrelevant.

Hypothesis H4 shows that complementary competencies drive all value-driven alignments as we have proposed, emphasizing the importance of the complementarity of resources such as skills, assets and knowledge in the new business model. In the case of Hypotheses H5 and H6, congruence of expectations drives behavioral alignment but congruency of expectations of self is not related to information alignment, while congruency of expectations of other is not related to material/equipment alignment. The latter point is consistent with the unsupported Hypothesis H3, since if material/equipment alignment is inconsequential to contract performance, expectations of the other by self may then not be deemed to be essential to material/equipment alignment. With regard to congruency of expectations of the self by the other being unrelated to information alignment, we can only surmise that sharing of information transcends the customer's knowledge of his/her counterpart, throwing light on the heterogeneity of co-production dynamics.

The mediating effects in Hypotheses H7 and H8 add a further level of insight. Control and empowerment clearly mediate the relationship between all the partnership inputs with behavioral alignment, which is expected since these variables embody strong human resource issues. Yet, control and empowerment also mediate the relationship between the complementary competencies, expectations of self by other, and value-driven alignments of material/equipment and information suggesting that for OBC, HR and relational issues have a wider and bigger impact on co-production, affecting operational

processes and supply chains as well. Even if there are complementary competencies and congruence of expectations between the firm and its customer, a lack of perceived control and empowerment of employees would result in less effective alignments, causing reduced contract performance. This may be due to the complexity and variety of working together in a non-linear manner where both the firm's and customer's role towards achieving outcomes may not be systematically articulated or understood. Thus, control and empowerment could drive behaviors needed to make the relationship work, given the contingencies expected from the complexity of the equipment use system. This suggests that operations, management, strategy and relationships are all considered value-creating activities with impact on contract performance.

Our study contributes to existing marketing literature in a few ways.

First, we demonstrate how business model themes such as value-driven focus and partnership orientation manifest themselves in the context of the OBC business model, with a focus on the value-creating system as the unit of analysis. We present the relationships as relational assets within an empirical context and suggest that the dynamics of the business model concepts in general may not be homogeneous as it seems; future business models could recognize the diversity of new business models and the way performance is achieved for different types of business models.

Second, from a theoretical perspective, we have taken a more systematic approach to incorporating not only marketing theories but also operations, OBHRM and strategy literature, achieving a more concrete specification of how the delivery of the new business model of OBC that is mapped onto theoretical foundations is achieved. Such a trans-disciplinary approach provides a greater understanding of the firm's holistic capability to deliver on OBC that is rooted on existing fundamental concepts of the disciplines, describing not only their distinction in their manifestation within the business model, but also their connections to one another. The result is a richer model that can serve as a starting point for future research concerning the new business model of OBC.

Third, our study contributes to the nature of the relational assets in achieving performance in OBC that are partnership-focused and value-driven. Specifically, we show that relational assets are investments that should be made on the essential links not only between individuals, but between firms' systems and processes. For decision makers, our findings reinforce the need to take a more holistic view of people, processes, behaviors, competencies and infrastructures. Our study shows that people and equipment interact to create collaborative value with interactions between what is seen as traditional management roles and traditional operational roles. Within such a system for outcomes, value-creating activities include joint management roles, joint strategy roles, as well as joint operational roles within the transformations.

In terms of disciplinary literature, our study raises an uncomfortable issue as traditional boundaries of operations, management, marketing and strategy seem to collapse under the OBC business model. For example, with use-outcomes as the new boundaries for the OBC joint-supply chain, it is no longer relevant to be discussing linear or sequential joint-supply chains (Li & Wang, 2007). Supply chain activities within OBC are also interacting with joint behaviors and information flows, suggesting that a holistic approach may be more relevant. Similarly in terms of relationship marketing and service, our study finds that relationship management within an OBC business model is embedded in joint work between the firm and the customer. In other words, relationship management (marketing) is embedded within delivery (operations) and one has to consider the building of relationships as part of the delivery processes and not separated from it. Hence, while our study improves the understanding of how collaboration occurs, it reveals a stark inadequacy of current management literature that compartmentalizes the knowledge into existing disciplinary silos. Business disciplines may need to think of new ways of organizing knowledge about firms in new business models rather than stay with traditional disciplines of strategy, marketing, OBHRM and operations, since boundaries between them may no longer be relevant. Similarly, from a practice perspective, the new business model of OBC suggests that traditional understanding of how firms should organize themselves into functions may no longer be effective in new business models such as OBC. There is an urgent need to research into new ways of organizing the firm as well as its relationship with its partners and markets, if the firm intends to co-create value more effectively with its customers.

As an empirical study, this paper exhibits several limitations. First, the customer in the chosen OBC is primarily a government body. Such a context may be more unique and could limit the external validity, which we sacrificed in the interest of internal validity in understanding the workings of the new business model of outcome-based equipment contracts. Future research could take on other domains of such contracts. In addition, our study looks within the delivery system of these contracts, and not across the market. Further research could investigate if the constructs and conclusions drawn could be more widely held. Next, the study may seem to have addressed broad constructs, leaving little insights for deeper appreciation for the individual phenomenon. Finally, we chose to investigate two dyads of co-production. Modern supply chains are often multi-organizational networks with various stakeholders responsible for different components of the total value offering. Further research should extend the current study towards network co-production and alignments to achieve the value drivers.

6. Conclusion

The study of new business models is often complex and constitutes a ‘messy’ problem, with several interacting components across disciplines and functions. Our study illustrates a systematic view of how various theoretical streams in marketing, OBHRM, operations and strategy connect and overlap in complex practice and proposes that future research in new business models could apply a similar approach.

Through such integration, we also provide a systematic understanding of the OBC delivery, contributing to continuing scholarly work on managing and delivering OBC, and the challenge in acquiring such a capability.

Finally, our study is important for both researchers and practitioners to understand the role of OBC in adopting a sustainability agenda. The capability to manage the new business model of continuous equipment use through a different sort of collaboration could lead to OBC being an enduring and viable alternative for equipment manufacturers and customers in achieving long-term use of equipment rather than continuing on the path of producing, consuming and discarding equipment.

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