TRANSFORMATION OF PROVIDER AND CUSTOMER ORGANISATIONS TO ACHIEVE CO-CAPABILITY IN OUTCOME-BASED CONTRACTS: A VIABLE SERVICE SYSTEMS APPROACH

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ABSTRACT

This paper reports on a research investigating organisational transformation of equipment-based service providers and customers which are establishing joint capabilities to achieve combined equipment and service outcomes based upon outcome-based contracts. The viable systems theory and the viable system model provide the theoretical ground for investigation of communication processes between key personnel, main activities, organisational structures and the systemic viability of both the provider and the customer to co-create activities to achieve equipment performance, as well as the transformation required by both provider and customer to achieve co-capability in terms of achieving contract performance. Initial findings confirm that contextual variety threatens the stability of the system and challenges co-creation. The findings also suggest that intervening in the customer-controlled supra-system to ensure its structural and systemic stability reduces variability in the system-in-focus. Assisting the customer organisation to transform also implies the provider's participation in supra-system activities.

Key words: outcome-based contracts, co-capability, viable service systems

1 INTRODUCTION

To remain competitive, manufacturing organisations have increasingly felt the need to provide uninterrupted availability of their equipment through services such as repair, maintenance and overhaul (Neely, McFarlane & Visnjic 2011). This is commonly referred to as servitization (Vandermerwe & Rada 1988). While much of servitization literature has focused on the transformation of the provider organisation, there is considerably less research of the effect on customer organisations who are using the equipment. The role of the customer is particularly important when the provision of service is through outcome-based equipment contracts, since achieving such outcomes often occur within the customer's space, and outside of the control of the provider firm.

Traditional equipment-based service contracts are anchored on billable time and materials, with the cost of spare parts sometimes included for the maintenance, repair or overhaul of equipment and 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 *et al.* 2007). Performance of such contracts are typically assessed based on respond time to breakdowns, speed of repairs, price and other activities where there is a measurable way to assess the provider's performance (Dehoog 1990).

Of late, there have been a growing number of contracts focusing on outcomes of equipment rather than the activities involved in its service provision. For example, some of Rolls-Royce's service contracts to maintain engines are paid 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 service levels (Bramwell 2003). We argue that such a fundamental change to the value proposition of the service provider constitutes a major change in the configuration of the service system. This is because achieving outcomes in the customer space places a requirement on the provider to have much closer cooperation and coordination with the customer. Therefore not only does the provider need to transform to achieve co-capability with the customer, but needs also to assist the customer organisation to transform to ensure a tightly coupled, well-coordinated system. This has echoes with the strategy literature where the ability to establish strong partnerships as capabilities is often recognized as a core-competence (Johnson, Christensen & Kagermann 2008).

This paper reports on an investigation into the organisational transformation of equipment-based service providers and customers which are establishing joint capabilities to achieve combined equipment and service outcomes based upon outcome-based contracts. The paper is organised as follows. We first present the theoretical basis for outcome-based contracts (hereafter OBCs) and viable systems that underpin the focus of the study. This is followed by the presentation of the research methodology. We then present the initial research findings to shed light on issues concerning organisational transformation to achieve co-capability in OBC contexts. We conclude the paper by presenting some preliminary findings derived from initial analysis.

2 THEORETICAL BASIS

2.1 Outcome-based contracts

From a servitization perspective, OBC can be seen as a manufacturer service provision underlined by complex value-creating systems of products, people and processes centred on the outcomes of equipment instead of the resources required for its provision (Ng, Ding & Yip 2012). In this form of service contract, the customer pays only when the provider has achieved outcomes, rather than merely delivering activities and tasks.

As it is often not possible to achieve an outcome without the customer co-creating or co-producing the service with the provider, OBC implementation requires both parties to mutually align resources towards value creation and value realisation by the customer (Kale, Dyer & Singh 2002). This is a direct application of the value-in-use concept proposed by Vargo and Lusch (2008) under a service dominant logic which proposes that the customer is an essential resource within an outcome-based contract (Ng, Maull & Yip 2009). In the context of OBCs, changing the focus from exchange value (i.e. billing for time, materials and information) to value co-created in context (i.e. achieving measurable outcomes) entails the development of co-capability in provider and customer systems to achieve the expected outcomes and this creates increased complexity to OBCs implementation (Ng & Nudurupati, 2010). Previous studies in the strategy domain have frequently highlighted the challenges in achieving collaborative coordination, including information sharing, cultural differences and conflict management (Das & Teng 2000; Reuer, Zollo & Singh 2002). Notwithstanding the challenges, other studies have stressed the benefits of firms being able to cooperate and combine resources (Nickerson & Zenger 2004).

Given that successful implementation of OBCs depends on co-capability of the provider and the customer, we can conclude that competitive advantage resulting from service delivery under OBC models would require the provider to effectively manage collaboration with its customers across all aspects of operation, management, governance and coordination. This implies that the dynamics of provider-customer relationships in an OBC need to be properly considered in a systemic manner. In other words, the role of the customer in the service delivery system as a whole requires holistic perspectives of analysis that also capture operational, managerial and governance functions of collaborative value-creating

systems under OBCs (Ng, Maull & Yip 2009). This study has drawn upon the viable systems theory to capture and analyse the complexity of provider-customer relationships under OBCs.

2.2 Viable systems

The emphasis on collaboration between provider and customer and the establishment of 'joint capabilities' (co-capability) to achieve combined equipment and service outcomes is ultimately a boundary question, where the boundary is extended beyond the firm to include the customer. This fundamental aspect of OBCs leads us to consider systems theory to understand and explain the OBC phenomenon in a holistic way. To analyse the relationships, activities and adaptability to variety across the operational, managerial and governance dimensions of OBC systems, we have considered the work of Beer (1985) on systems viability and, more specifically, the Viable Systems Model (VSM) as the theoretical framework of analysis for the study.

Beer (1972, 1979, 1985) introduced the VSM and the principles of viable systems to describe the necessary conditions for viability, which is generally defined as the ability of a system to maintain its existence within a specified environment. We summarise here the key conceptual aspects of viable systems that underlined the study.

A first fundamental concept we have taken into account is that contextual variations coming from the external environment of a system, as well as the multitude of events that may arise within the system itself, confront the system with 'variety'. Contextual variety as described here is a measure of complexity, for it represents the number of different states in a system caused by different contexts of use. It is when contexts begin to change differently from expected contexts of use that the degree of contextual variety increases. From the perspective of OBCs, a high degree of contextual variety is an increase in the heterogeneity of the contexts that deviate from the most likely contexts of use for which the service was originally designed.

A second important fundament considered in the study addresses the question: How do organisations cope with variety? The answer builds directly upon Ashby's (1956) law of requisite variety often stated as "only variety can absorb variety" and managing variety is the very essence of management (Beer 1985). A system has requisite variety when it has subsystems or mechanisms to attenuate and amplify variety so that variety can be met with variety. More specifically, the viability of a system fundamentally depends on the ability of its parts to attenuate or amplify variety so that the system as a whole can absorb and generate as much variety as it receives. As Holten & Rosenkranz (2011) put it, while attenuation means to decrease high variety to the number of possible states a system can handle, amplification means to enhance low variety to the number of possible states the system needs to remain fit to its environment. Both attenuation and amplification can take place between a system and its external environment as well as between the internal subsystems of the system.

A third conceptual aspect of particular relevance to the research refers to the constituent parts of a viable system as proposed by Beer or, more specifically, the VSM structure. Due to space limitations, the details of each VSM component will not be discussed here. It is important however to point out that the VSM describes the necessary organisational structure for a system to survive in a constantly changing environment (Holten & Rosenkranz 2011). Every viable organisation has five core components or systems necessary to ensure viability, namely: 1. Operations; 2. Coordination; 3. Control; 4. Intelligence and 5. Policy. These systems are connected via information channels that work as two-way communication loops of variety attenuators and amplifiers. Moreover, they recur within various instances of an organisation, comprising critical organisational functions.

Finally, a viable system has to deliver despite changes in the environment. Hence, it must have the capacity to dynamically adjust its structure and behaviour to achieve consonance with its context and thus preserve its stability (Barile & Polese 2010). This relates to the homeostasis property of systems (von Bertalanffy 1968). There are three main collaborative homeostats in the VSM to ensure the continued viability of the system. The first is the "horizontal homeostat", which refers to an organisation's ability to stabilise its operations with its customer's markets (the "adapt and respond" capability). The second is the

"vertical homeostat", which is about stability in terms of managing the present with focus on the future (the "present and future" capability). The third homeostat is a combination of the first and second homeostats to balance the horizontal and the vertical variety of the system as a whole.

From this background, the main objective of the research was defined as to investigate the threats to the viability of OBC service systems and to identify organisational transformation aspects necessary to maintain viability when value is co-created within a system of processes combined with customer activities and under high contextual variety conditions. These issues relate directly to the research questions the study seeks to answer.

3 METHODOLOGY

In the study, two major OBCs with the UK Ministry of Defence (MoD) involving the achievement of outcomes for a bank of aircraft flying hours and related engine and missile system availability were investigated. The contracts were awarded to two prime contractors in the aviation and defence industry. One of the contracts was for the support of the UK's fleet of Tornado aircraft and the other was for the UK's new Typhoon aircraft fleet. Typical of OBCs, the service performance is rewarded on the basis of measurable outcomes in terms of the timely availability of fighter jets, spares, trained maintenance personnel, and technical advice. Moreover, such partnered support contracts generally involve a degree of co-location of customer and supplier at either the customer's or the supplier's premises, and typically involve the supplier's day-to-day use of the customer's own resources, usually termed Government Furnished resources (GFx: personnel, facilities, spares, services and data).

Under a case study approach, qualitative method was used to derive insights into the service delivery of the contracts. According to qualitative research strategies (Bryman 2012), we employed different methods such as observation, analysis of texts and documents, interviews, and recording and transcribing to extract data for the purpose of understanding and analysis. The logic behind using multiple methods is to achieve an in-depth understanding of the dynamics arising from OBCs (the phenomenon in question). The interviews were audio recorded and subsequently transcribed, coded and categorised. Participant observation on service sites was also employed to document the interactions between supplier and customer.

The viable systems theory and the VSM provided the theoretical ground for investigation of the viability of the joint outcome-achieving service system which includes the main activities, organisational structures and the systemic viability of both the provider and the customer to co-create activities to achieve equipment performance, as well as communication between key personnel from both sides. Through the application of the theory onto the outcome-based service system, we can ascertain the transformation required by both provider and customer to achieve co-capability in terms of achieving contract performance.

Based upon underlying principles and building blocks of viable systems (Badinelli *et al*. 2012), the VSM helps to depict the structure of an organisation, its main operational and managerial components or systems, and the information and communication channels between the key components of a viable system (Beer 1985). In this respect, it is fundamentally a common framework for making organisational structures visible and comparable which consequently allows us to better visualise and compare outcome-based service systems.

We investigated both the system-in-focus and the supra-system (Golinelli 2010) of the OBC service systems under study. The system-in-focus is the provider's system of equipment provision and availability and the supra-system is the system where the provider's equipment and various other equipment and resources are integrated within the customer's space for use in combination to achieve the expected outcomes. Such supra-system is controlled by the customer at a recursion level above the provider's system-in-focus. Understanding the supra-system that is controlled by the customer therefore allows an understanding of the variability faced by the system-in-focus of the equipment service providers so that co-capability and transformation of both parties could be examined holistically.

Through the homeostasis principle of complex adaptive systems (Wiener 1948; Ashby 1956) we will analyse the stability of the OBC systems under study by investigating aspects related to the three collaborative homeostats presented in the previous section. To analyse horizontal homeostats, we will look at stability in terms of the provider's ability to adapt and respond to varying circumstances of the customer's environment. To analyse vertical homeostats, we will look at processes to manage the present and the future concerning the achievement of equipment outcomes and the potential conflicts and tensions involved. Finally, to analyse the third homeostat, we will look at the total adaptability and agility (combined vertical and horizontal) of the system to adapt to varying conditions of the environment.

4 PRELIMINARY FINDINGS AND CONCLUSION

The analysis of the data obtained in the study is still a work-in-progress. At this stage, we are able to report initial findings and to point out some preliminary conclusions derived from the groundwork analysis conducted thus far.

Examination of OBCs origins and background in the subject context revealed that the MoD reached towards 'partnering' with its major industry suppliers as a contractual philosophy through intuition and an extension of practice and precedent rather than from any robust theoretical foundation. The logic was simply that traditional maintenance, repair and overhaul contract models were demonstrably wasteful and leading inexorably towards an unaffordable future. Moreover, at least for the Tornado that has been in operation for a number of years, there would be a reliance on both customer manpower and equipment resources i.e. GFx that was best managed jointly. Indeed, in terms of manpower, there were severe doubts that the industry could resource all of the necessary trained maintenance technicians from the local economy at a reasonable price.

Investigation of contextual variety of operations subsystems showed that modern warfare is expeditionary in nature, requiring aircrafts to be deployed to locations where they and their supporting cast of aircrew and ground-crew may be put in harm's way. Also, fast jet aircrafts are complex engineering systems, densely packed with mechanical, electro-mechanical, electric, hydraulic, and electronic equipment that are required to operate at the top of their performance range in a far from benign environment in terms of temperature and vibration. In consequence, they develop faults far more frequently than their civilian equivalents operated in far more sedate environments. Moreover, to ease the maintainability of so densely packed products a philosophy of repair by replacement of "line replaceable items" (LRIs) has evolved i.e. items consisting of a cluster of parts that can be taken out when each part was faulty. This approach creates a modular boundary for changing systemic components that was a trade-off between what is efficient for the maintainer and effective, in terms of time, for the customer. This also resolved the tension between squadron operations and off-aircraft repair sites and a potential cost resulting from 'information hiding' regarding the LRI's usage and its fault history. For example, it is not uncommon for an LRI to be removed from an aircraft only to be diagnosed as 'no fault found' when tested in the repair bay. It is not unreasonable for this LRI to be returned to service in this case as it has been removed in error through erroneous front-line diagnosis. However, from a customer perspective, it would be unreasonable for the same LRI to cycle back and forth to the repair bay without some alternative intervention. A contractor paid a fixed amount per 'repair' may see it otherwise.

These findings confirm that contextual variety threatens the stability of the system and challenges co-creation for outcome performances. This calls for re-evaluation of operational elements and homeostatic processes to keep the viability of the system. Furthermore, safeguarding generalisations to the scope of the subject context, the study confirms that OBCs operate under complex relationships between customers and service providers and they rely heavily on tangible (equipment) and intangible (knowledge and experiences) resources as well as information-based relationship assets to achieve the outcome of the contract. Our findings suggest that intervening in the customer-controlled supra-system to ensure its structural and systemic stability reduces variability in the system-in-focus. Assisting the customer organisation to transform also implies the provider's participation in supra-system activities.

It seems plausible that a systemic transformation aligned towards equipment use by the customer could achieve greater viability and stability for long term equipment outcomes. We propose a viable systems approach to analysing the inclusion of customer activities within the provider's boundaries of management and operations for value co-creation. This analysis will be carried out in the next phase of the current study.

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