

# Identifying Risk and its Impact on Contracting Through a Benefit Based-Model Framework in Business to Business contracting: Case of the defence industry

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## Abstract

Two defence contracts for availability are studied in the attempt to better understanding the provision of *service* in a maintenance, repair and overhaul environment that is contracted on the performance of the equipment, rather than merely providing equipment. The nature of the contract changes the dynamics of the delivery, bringing behavioural issues into the forefront, with both customer and firm focused on value co-creation, rather than each party's contractual obligation. Our study provides a customer focused approach that exposes gaps in the way organizations approach their service provision in MRO. We argue that customer involvement and behavioural issues in the co-creation process has to be factored into the design and delivery of traditional MRO delivery systems. This paper uncovers four areas that pose risks to performance based contracts and are crucial in the design of services under such a contractual environment and provides a research agenda for future studies in this area.

## Keywords:

Co-Creation, Performance Based-Contracts, Risks; Contract Design

## 1 INTRODUCTION

Performance based contracts (PBC) are about contracting on performance, rather than tasks or inputs by the service provider. For example, in the case of Rolls Royce, the service provided to maintain engines is being remunerated on the basis of how many hours the engine is in the air – a concept known as 'power by the hour'. Recently, it has been reported that there has been increased interests in PBC from service firms keen on witnessing significant improvements in costs, customer satisfaction and financial audits [1].

A critical element of PBC is the clear separation between the customer's expectations of service and the firm's implementation [2]. In short, the contract explicitly states the outcome of the service without specifying how it is to be achieved, e.g. consistent power by an engine. The contractor then determines how to achieve that outcome, usually will less intervention from the customer. As a result of this flexibility in the arrangement, PBC should promote new and improved ways to manage tangible and intangible resources by the firm to achieve outcomes that are of benefit to the customer. Such a radical change in the approach to contracting has caused confusion among suppliers. Nonetheless, little is still understood about the characteristics of PBC, further suggesting that academic literature offers little guidance with respect to how such contracts should be executed [3,2].

Under the service dominant logic in marketing literature, Vargo and Lusch (2004) argue that "customers are

always co-producers" and "co-creators of value". As such, marketing researchers have proposed that firms do not really provide value, but merely value propositions [4] and it is the customer that determines the value and co-creates it with the firm. Co-creating value then implies that customers' roles are moving from being isolated to being connected to the firm, passive to active and being unaware to being informed. Within PBC, where outcomes are a result of value co-creation, there is then a need to understand the role of the customer in the firm's processes and systems, and the role of the firm in customer's processes and systems [5].

The understanding of value co-creation was given greater specification in the Benefit Based Model (BBM) as proposed by Ng et al [6]. In the BBM, Ng et al argue that the principle of co-created value implies that both customers and firms provide a value proposition and the resultant co-creation during the encounter provides benefits to both (benefit to the customer and revenue to the firm). By linking benefits to co-created value, the model provides an end-to-end visualization of service contract and delivery. In this paper, we use the BBM model as a framework to qualitatively analyze two types of defence contracts for availability in the attempt to better understand the provision of service in a maintenance, repair and overhaul (MRO) environment that is contracted on the performance of the equipment, rather than merely providing equipment. In analyzing these contracts, we enquired about the differences between the traditional contracting and PBC and how it impacts on the

effectiveness and efficiency of service delivery as the nature of the contract clearly changes. Our study provides a customer focused approach that exposes gaps in the way organizations approach their service provision in MRO. We argue that customer involvement and behavioural issues in the co-creation process has to be factored into the design and delivery of performance based MRO delivery systems. The rest of the paper is organized as follows. After a brief review of related literature in section 2, we present our methodology. In section 4, we present our analysis before a general discussion in section 5.

## 2. LITERATURE REVIEW

Aircraft MRO covers an entire spectrum of line and heavy maintenance including repair, overhaul and modification of complete aircraft. It is a highly complex service involving a network of suppliers. A prime contractor for an Aircraft MRO contracts often on the basis full MRO provision, and such a contract often has a book value of over US\$100m, creating thousands of jobs and involving some of the largest organisations in the world such as Honeywell, Boeing, Rolls Royce and BAE Systems. The value of the worldwide commercial jet transport MRO market for 2006 was \$38.8 billion [7]. Conventional industry wisdom has it that for each aircraft built, the cost to service it over its lifetime is approximately three times its manufacturing cost. Furthermore, with improved design and engineering technologies that extend equipment life, manufacturers are now reporting that more than 50% of their revenues are earned from MRO service. This focus on service has brought manufacturing and engineering curiosity into what constitutes service and what research has been conducted that could assist in their understanding of it.

### 2.1 Co-creation of Value and the Benefit-Based Model

Defining the nature of service has been a challenge to researchers and they have stressed that while there seemed to be a widespread consensus on the importance of service, precise definitions are difficult, owing to the varied nature of service industries [8,9]. Much of service research have also been contextual [10,11] and the lack of adequate service research at an abstract level has resulted in knowledge of service becoming increasingly sector driven with practitioners and researchers socialised within their own industries perpetuating more contextual and jargonised language that is less inclusive, resulting in more embedded and tacit knowledge. While academic service journals aim to be more inclusive for transfer of knowledge across industries, much of their focus is on service management, often with a focus on more intangible service provisions such as healthcare and hospitality. Currently, there is still a lack of understanding on the role of tangible products, of which “Design & Engineering” play a crucial role within a service delivery system, such as an MRO service.

The manufacturing and engineering response to a better understanding of products and service within a system of delivering value to the customer was the launch of the

Product-Service-System (PSS) initiative [12], which is tasked to enable innovative ways of transforming the “product-service mix” [13] to achieve sustainable consumption and production.

In 2004, Vargo and Lusch proposed the service-dominant logic (SDL) claiming that goods are appliances used in service provision. They suggest that economic exchange is fundamentally about service provision; in short, everything is a service. As such, they argue that customers are always co-producers and co-creators of value when compared to the traditional view where the firm and consumer are separated upon the purchase. Hence, marketing researchers have proposed that firms do not really provide value, but merely value propositions [4] and it is the customer that determines the value and co-creates it with the firm. Co-creating value then implies that customers’ roles are moving from being isolated to being connected to the firm, passive to active and being unaware to being informed. Therefore, a firm’s product offering is merely value unrealized until the customer realizes it through co-creation and gains the benefits. In this light, Ng et al (2008) proposed the Benefit-Based Model (BBM), with a symmetric model of parties in the co-creation process. Similarly, Woodruff and Flint (2006) suggest that in the bi-directionality for mutual satisfaction, as part of the co-creation of value, customers have an obligation to assess the needs of the provider and their own resources. In doing so, there is a need to understand the role of the customer in the firm’s processes and systems, and the role of the firm in customer’s processes and systems [5].

In the BBM representation (Figure 1),  $V_t$  is the convex combination of value proposed by customer and the firm. The point between A & B is dependent on the quality of the encounter between firm and customer. The BBM argues that although firms and customers have the power to co-create better value, they also have the power to influence value leading to reduced benefits. As both parties co-create value, roles may overlap implying that not all co-creation result in the highest benefits. In some cases, the overlapping may result in benefits that are lower than what was contracted on.

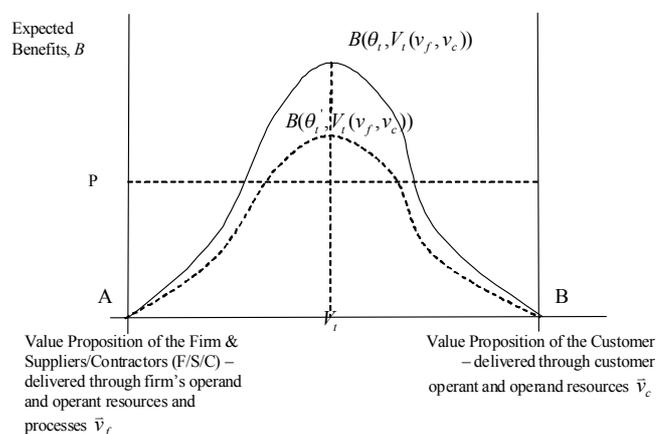


Figure 1: The Benefit-based Model for Value Co-Creation

The contention then is that bi-directional thinking, together with current thinking in relationship marketing, has to consider that the co-creation towards mutual satisfaction does not always lead to optimal benefits to the customer and the firm [6].

## **2.2 Service Contracts: Traditional vs. Performance-Based Contracts (PBC)**

Notwithstanding the interest in service, a new way of contracting in MRO has brought the issue of service to the forefront. Traditional MRO contracts are contracted under a MRO service level agreement where the cost of spares could be excluded, or where spares are included in the price [14]. The contractor could also provide a cost-plus contract provide detailed costs structures (inclusive of a schedule of cost of spares) to the customer to determine reimbursement with a profit percentage that has been pre-determined [2].

Recently, there have been a growing number of MRO contracts that focuses on outcomes rather than inputs or tasks known as PBC. This mode of contracting is starting to re-shape how MRO service contracts are being formed. In essence, PBC is about contracting on performance, rather than tasks or inputs by the service provider. For example, in the case of Rolls Royce, the service provided to maintain engines is being remunerated on the basis of how many hours the engine is in the air. As an analogy, imagine being paid to deliver English lessons to a student not in terms of the number of lessons or materials but on the basis of how many English words is used by the student after the lessons are over.

PBC focus on achieving required outcomes rather than a contract for the supply of a set of prescribed specifications [3,15]. In short, the buyer purchases the result of the product used (utilisation of service or performance outcomes) and not ownership of the product. Interestingly, the customer no longer directly manages or possibly even owns resources such as the inventory of spares. Hence, researchers argue that in the long term, suppliers may find it in their interest to invest in designing more reliable products and more efficient repair and logistics capabilities to increase profitability [16]. This implies that contracting on PBC has an ability to elicit desired behaviours arising from the incentives within the contract, thus reducing the cost of MRO over the longer term for the customer.

Nonetheless, these different types of contracting methods have different risk implications for both buyer and supplier. For example, a fixed-price contract puts all the risk on the supplier but few performance incentives. A cost-plus contract shares the risks between customer and supplier but provides few or no incentives for the supplier to reduce cost [2]. Under PBC, there are important differences in terms of risks and responsibilities between supplier and customer. For example, suppliers tend to have full responsibilities for performance, such as the transfer of the risk for investments, ownership, maintenance, utilized capability and re-sales [17].

Overall, there are more equitably aligned risks and incentives between suppliers and customers in PBC contracting than in traditional contracting [2]. As such, we are beginning to find more B2B services contracts moving towards performance-based incentives with hopes of witnessing significant improvement in costs and customer satisfaction [1]. Yet, PBC is not a new form of contracting. Literature shows in the 1960s, US government bodies have begun initiating contracts to optimise public spending. In defence contracting, questions such as addressing “incentives to produce good performance” and “incentives apart from profits to induce innovation” were subjects of discussions [18] to ensure that the roles of the parties concerned in the governance of the service contracts for the public are jointly engaged. PBC are also widely used in other public services such as health services [19] and transport services [20]. In health services, PBC has been promoted by the US Institute of Medicine as a cost-effective mechanism to manage and ensure the “effectiveness of public medical services” through funding of certain treatment outcomes. They use PBC with local health centres to monitor and evaluate their performance in order to “redirect funds, away from less efficient programs within the communities towards programs which have proven themselves. Similarly in transportation services, Hensher and Stanley (2008) argue that PBC are excellent mechanisms aimed at promoting economic effectiveness and efficiency through the life of the contract.

Recently, the Office of the US Secretary of Defence has initiated and the US Air Force has aggressively implemented a policy aimed at the widespread adoption of performance-based services acquisition (PBSA), an outcome-oriented approach in which the buyer tells the supplier what it needs rather than how to meet that need. From its successful implementation, efforts were made to define positive performance-based practices. It resulted in a study that showed that the Air Force personnel were generally pleased with the results of PBSA as well as with many of the practices it encourages [21].

From the exposition above, it is clear that firms could contract its services on a spectrum of levels between the traditional and performance-based. For each extreme of the spectrum, it would then be up to the customer's responsibility to create the rest of the value to achieve the benefits. Hence, if a firm is contracted only for a resource based contract, the customer would either manage the rest of the value within their own value proposition or contract with multiple firms, leading to the make-buy decision facing many organisations.

For MRO services, there is evidence to suggest that increasing number of contracts are moving towards performance-based type of incentives to ensure effectiveness and efficiency of both the firms' and the customers' resources [15,22]. Despite this growing interest in PBC from both the public and private sectors in terms of application, little research has been established in understanding the dynamic relationship between the firm and the customer under a PBC where value is co-

produced and created. To continue with the English lesson analogy, where previously an English teacher skills set include the expertise of the English language and the skill to teach the language, under the new PBC-driven business model where the student's ability to speak the language is the performance outcome implies that the English teacher needs new skill sets of motivation, pedagogy and even psychology to ensure that the student is able and willing to co-create value with the teacher. Hence, there is a question of risk that is borne by the contracting parties in value co-creation under a PBC if they do not have the competency to ensure that the customer is able to co-create value to achieve the outcomes. With evidence to show that the utilisation of PBC in MRO service contracts are increasing, this change of the business model from the traditional contracting poses some serious questions.

First, are the processes, systems, behaviours and activities designed under the traditional business model just as efficient in the new business model? Inefficiencies could arise from a combination of two local optimums rather than from optimising globally across two systems. This then results in an increase in overall system costs which would make the contract more expensive than it has to be. Second, are the processes, systems, behaviours and activities designed in the traditional business model just as effective in the new business model? Ineffectiveness could arise from the combination as well as from both parties' inability to explicitly build a combined system. And as both parties focus on their individual system efficiencies, the transaction cost increases from the interactions. In other words, as both parties build more efficient individual systems, the overall effectiveness of the contract may suffer leading to sub-optimal outcomes.

Although there has been research on PBC within the construction industry [3], there are not many studies that examine fundamental delivery issues arising from the service concept particularly from the perspective of identifying potential risks and delivering benefits to the customer. Also, literature opens up the debate on balancing formal contract and relational governance, the proportion of goods and services to offer a proper value for the customer. Hence, using the aircraft maintenance industry as a context for MRO services, this paper attempts to answer the questions on identifying the potential risks that arise from a PBC under a co-located MRO service environment given that both the firm and the customer are co-creators of value in the relationship.

### 3. METHODOLOGY

This study represents a qualitative study. There are a number of different methods to be used in qualitative research and it can be distinguished between four major methods: observation, analysis of texts and documents, interviews, and recording and transcribing. The logic behind using multiple methods is to secure an in-depth understanding of the phenomenon in question.

In our study, we analysed two defence contracts between a defence contractor and the UK government (in this case the Ministry of Defence or MoD) which were based on a type of performance based contract that delivers the aircraft as a performance outcome of the contract availability. We conducted in-depth interviews with stakeholders from the firm and the customer and these included technical managers, executives, commercial managers, directors, army officers and commanding officers. In order to capture an in-depth understanding of the relevant stakeholders' perception of the two defence contracts, the questions asked were mainly open-ended and aimed at establishing the interviewee's perception of the benefits derived from the contracts. The interviews were recorded and subsequently transcribed, coded and categorised. Participant observation on the MRO sites was also employed to document the interactions between customer and firm.

The two contracts analysed were awarded to 2 different organisations. Both were awarded for the MRO of the equipment's 'through life'. The performance-based nature of the contracts is expected to bring a total of USD1.2b savings to the customer (MoD) over their combined serviceable life. Unlike conventional outsourcing solutions, the contracts were unique in the sense that the companies had to use people and assets that 'belonged' to the MoD in delivering the service, and also be co-located physically at the customer's site. While the MRO service is outsourced, the MoD's had a big role in the partnership which is to provide Government Furnished Materials (GFX) including supplying physical facilities, material, IT and manpower to facilitate the company in achieving its outcomes. The cost of GFX is generally not included in the contract price.

The first contract was the MRO service for a fleet of aircraft used by the Royal Air Force, including spares provision, technical support and maintenance training. The contract is broadly based on a fixed annual price with the performance of the MRO service assessed principally through the outcome provision of the availability of a bank of flying hours of the aircraft. In addition, there was a non-contractual KPI that measured the performance of GFX which measured the MoD's performance in delivering the necessary assets and manpower for the programme. Previously, the MoD's Integrated Project Team (IPT) was responsible for the overall MRO service of the aircrafts. With the programme in place, the scope of work for the IPT reduced significantly and together with a downsizing of manpower, the role of the IPT shifted from being the 'provider' to an intelligent 'decider' that enabled what support was required from the company to achieve the performance. Consequently, the company's responsibility was to ensure the required aircraft (at an agreed capability) was provided to the RAF front line when they were needed. The business risk was thus transferred from the MoD to the industry.

The second contract was a broadly agreed annual fixed price MRO service with its performance assessed through the availability of a weapon system for the British Army.

The solution for the weapon's readiness and availability included a company and customer IPT support centre co-located at an army base with on-site maintainers training aids, fleet management, and a joint delivery team. The programme also employed civilians who would support the equipment both in barracks as well as in operation (wartime) availability of equipment. The measurement of performance output differed between the availability in barracks and the availability in the operating theatre (e.g. in Afghanistan) with a higher availability in barracks than in the operating theatre.

## 4. ANALYSIS AND FINDINGS

### 4.1 Analysis

The data obtained was subjected to grounded-theory analysis to identify data that was salient, recurring and themes that could emerge from the interview data representing the categories that had some meaning to the respondents. Researchers re-examined the transcripts to evaluate the plausibility of the categories identified for their informational adequacy, credibility, usefulness and centrality. The interaction between the categories was discussed extensively and the initial coding categories were refined with another round of interview data being coded based on the categories found. Data from the same categories were then grouped to assist the final evaluation of the categories. We then apply the benefit based model into the findings for a more complete value-based understanding of MRO service.

### 4.2 Findings

In analysing the two MRO contracts through a value-based approach, we apply the BBM framework presented in Figure 1. Our analysis show the difference between the traditional business model and the new business model based on outcomes. In a traditional MRO or logistics environment, contracts are not usually based on outcomes but rather fixed inputs. Revenues were based on  $V_f$  in the traditional contract (i.e. only the value proposition of the firm), which implies that the firm has no incentive to be pre-emptive in maintenance, to invest in reliability for spares or to be innovative in solutions.

Under this new business model, by contracting for availability at a fixed sum, the contract is now on the basis of outcome ( $V_t$  in Figure 1) where the value is co-produced and co-created by the both the firm and the customer. By applying the BBM perspective, the firm alone cannot deliver on the outcomes without the cooperation of the customer. Our findings found six challenges under the new business model. They differ in terms of degree and intensity across the two contracts, but would exist in some form in both contracts.

#### *Six Challenges in MRO Service Delivery under PBC*

**1. Complexity and Unpredictability in Costs** - There is real difficulty in calculating costs when the team is being reactive to changes, where predictions are difficult, and when the service provision aims to be innovative and pre-emptive. Being innovative and pre-emptive would reduce

the spares used and in turn reduce the overall costs of the contract as well as achieve higher level of satisfaction. Yet, this implies that there is less predictability in the system and the lack of predictability would make cost estimation and forecasting difficult. Our findings found this tension to be challenging to the employees delivering the service. On one hand, there is a need for predictability to report to headquarters and to forecast costs so that the service can be delivered economically and below the price contracted and on the other, there is also the need to manage and change usage and provide more innovative solutions so that overall acquisition of spares would be reduced. This constant negotiation is clearly not sustainable over the longer term and caused tension within the firm when compared to the traditional business model.

**2. Cultural change from traditional contracting** - The new business model is adopted differently by different people. Our findings showed that many of the firm's employees negotiated within themselves what their value is within the company as the company moved towards delivering value under a PBC. Identity issues abound as company personnel try to grapple with their own place within the organisation. In addition, the concept of delivering value to the customer has changed from being a design and manufacture organisation to that of a service organisation and our findings showed that people struggled to reconcile the changes.

**3. Loss of perceived control by customer** - The changes caused by the outsourcing the contract came amid other changes within the customer. Findings show that the customer faced a loss of perceived control. Where they were previously in charge, the role change caused discomfort and disruptions

**4. Loss of perceived control by the firm** - The complexity and lack of predictability manifested itself through the organisation from strategic to the operational and tactical. This resulted in an increase in a lack of control and security, manifesting itself in higher monitoring and transactions.

**5. Lack of Boundaries (Rigidities and Fluidities)** - With both the firm and the customer co-producing the service to ensure availability and benefits for the end-user, the outcome driven nature of the service and the co-production resulted in a lack of boundaries as to what is 'acceptable' under the contract. Our findings suggested that there have been instances where boundaries were held rigidly ("this is their problem") and where boundaries have been fluid with out of contract requests being accommodated so as to build better relationships. This was clearly viewed differently by different people within the organisation. For those who were more understanding and accommodating of the customer, others within the organisation viewed them as having 'gone native'.

**6. Coordination with suppliers** - A big challenge to availability based contracting was how to reconcile and align contracts with sub-contractors. Where previously an

order from a customer could be sub-contracted out and the orders join up in terms of costs, resources and delivery, it now wasn't clear what the role of subcontractors are and how they fit into the value co-produced by the firm with the customer. In a PBC contractual environment, 85% availability of the equipment did not translate easily to 85% of its component spares.

#### *Four key findings on Value Co-Creation*

Based on the challenges that surfaced, we re-analysed the data using the Benefit-Based Model (BBM) and categorised our findings on four aspects of BBM: understanding value-in-use, service behaviours and service skills, capacity in service value proposition and value co-creation & co-production. For each of these findings, we find potential risks at the design stage of the contracting.

**Key Finding 1** - The need to understand value-in-use (i.e. multi-state benefits) in availability based contracting is crucial because of the way value-in-use impacts on customer satisfaction, costs and delivery of the service. MRO service requires a good set of historical data on how often the equipment and its spares broke down. Historical use ascertained through data obtained before the signing of contracts was used to inform the way the contracts were priced and cost estimated. However, our study shows that the past may not be a good reflection of the future. Understanding usage, and more specifically, "changing usage" could bring about a more efficient and effective support solutions that would result in benefits to customer and firm. Our data showed numerous examples of these types of "usage-change" that impact on customer satisfaction, costs and the delivery of the service.

For example, a pilot that is more careful about the use of the equipment such as "taking care when removing the communication plug" instead of carelessly and unknowingly flinging it, and hitting the windscreen can save the firm £18,000 per piece of glass. Similarly, there is evidence in the data to suggest that when "rudders" are broken, they are simply "thrown into the sand and lost in the desert forever" rather than brought back to base. As one personnel observed; "the rudder could probably be repaired for £1,000 rather than buying a new one for £22,000". In both cases, the costs savings translate to benefits for both parties and therefore

We also found that an understanding of usage has an impact on how the service is being delivered. Due to the state-contingent nature of value-in-use, the usage of equipment would vary, as would the service delivered to ensure the most effective usage would vary as well. For example, it was noted that pilots were using "cables as a foot rest". Rather than moving the cable away, it was reported that the firm "put a guard over it and sort it that way", hence ensuring that understanding the usage of the customer resulted in better service delivery leading to higher customer satisfaction. Similarly, the example of solving the problem of "water getting into the windscreen causing it to delaminate" by putting a "rubber compound

outside the windscreen to prevent water getting in" saved the customer (and the firm) "thousands of pounds". In the past, the firm would have taken care of the repairs which would cost thousands whereas the rubber compound only cost around £10-£20.

In essence, if the firm's activities, design and systems do not join up towards value-in-use and both the organisation's and the customer's role in co-creating value towards the benefits is not made explicitly clear, the organisation may not realise the conflicts that may occur due to different people delivering to different perceived value. This is particularly acute when having to negotiate the tension between the predictability of costs and the need to reduce costs of service delivery. Predictability is based on historical data whilst costs reduction is based on understanding, managing and changing value-in-use, and it's clear that the skills, resources and processes towards the two are quite different. This poses a risk to effective service delivery and cost of delivery.

**Key Finding 2** - The study finds that the firm do not sufficiently emphasise the role of people in delivering value. There is a high dependency on processes and activities that are equipment focused, without much attention on the behaviours required to achieve them. For example, an employee of the firm noted that "if you've had a supplier that's going to deliver something to your house you wouldn't disown the responsibility of managing that supplier to make sure that he delivers what you need". However, if we "sit back and do nothing and don't get involved with the customer (GFX, who is also the supplier), they will just carry on the way and not deliver any of it because at the moment, they probably haven't got their head around that they are also a key supplier". It appears then, that behaviours of the firm and customer are important for co-creating value in the relationship.

The BBM model also suggest that there are skills involved in coordinating people, leading different situations, developing relationships, thinking as a team, reducing misinformation, establishing trust and projecting a good image of the company. However, much of these skills seem to be attributed to individuals and personalities and while individuals will always be important, they would need systematic support within the design of the system so that the service delivered could be better replicated. Nonetheless, we found that there seem to be inadequate provision to capture the learning into the organisation. As noted by an employee of the firm; "*it's no good waiting for things to go wrong before we do something about it, we've got to be knowing, we've got to know what's going on all the time so that we can be ahead of the game in making sure that the user's always got, available to do the job that he needs to do and we have readiness and availability criteria set out in the contract which are very clear about what we need to achieve*". This observation implies that efforts to instil suitable attitudes and behaviours depended very much on the individual and team initiatives, rather than being explicitly and systematically designed into the system and structured in concert with other activities. It does not mean, however,

that human factors and behaviours are ignored within the organisations. Indeed, for both the firm and the customer, such factors are recognised and individual managers go through considerable effort to ensure that people do have the right attitudes and behaviours.

Hence, service delivery requires high fixed costs that could have a major human component. Capacity and capability of human resources are paramount in service delivery and a lack of focus on human resources may result in lower or inconsistent service quality and an increased cost due to higher transaction, monitoring, scrutiny and mistakes. By not designing and systematically structuring behaviours into the system, the service delivery system runs the risk of not capturing potential conflicts between processes/activities and behaviours in delivering the service.

**Key Finding 3** - Our study finds that the firm does not have a clear understanding of where and how value is created within the service contracts and the contribution of components and resources to value. There needs to be equitable focus on both equipment capability as well as embedded human capability in understanding the capacity for delivering the service. For instance, the firm has a fixed set of resources, both tangible and intangible to deliver on its service offerings to the customer.

If the firm is to design and structure its capacity to deliver the service, the firm would have to understand which component of its costs deliver how much of value to the customer and the degree of importance of all resources within that system. Hence, the service capacity of the contract becomes important to the firm. Our findings show that such a systematic analysis is lacking. Additionally, from our understanding of the existing system and processes within the firm and customer, there is inadequate understanding of the degree of importance of human and equipment factors within the system when delivering the service.

For example, from the interview, there was an observation that revealed the firm was unable to *“carry out the inspection and repair because there are various loopholes in military documentation or military procedures that don’t allow them to actually carry out the inspection or repair, there’s anomalies within the military system that people don’t understand”*. These comments suggests that it is important to understand the resources and components of human and equipment capability as well as the links between resources, costs and service attributes to employ the optimal service capacity in delivering the service under the contract. By not analyzing service capacity, the firm would not be able to determine the supply availability for service offerings and the lowest costs to deliver the same service if it needs to be scaled up, or if the service is to be transferred or repeated in another contract and this poses a potential risk to the organisation.

**Key Finding 4** - Our study finds that the firm is more focused on its value proposition and less focused on the

co-produced value proposition. This is to be expected as traditional contracting allows the firm to concentrate on its value proposition to the customer. However, availability based contracts are contracted on the basis of co-creation between the firm and the customer. Under the BBM, this is illustrated as  $V_t (V_f, V_c)$ . This then implies, to a large extent, that the business model of the firm has changed. Where traditional business model was fulfilled upon delivery of  $V_f$  (value proposition of the firm), contracting for availability demands that the firm fulfils its obligation to deliver to  $V_t (V_f, V_c)$ . Hence, the customer’s value proposition in the value co-production of the contracts  $V_c$  becomes the responsibility of the firm. Interestingly, under the MRO contracts that we examined, the customer’s responsibility to deliver certain aspects of the assets under the contract, allowed the firm to abdicate some of its responsibilities. However, that does not change the fact that the firm has chosen to contract on availability, and with that choice comes the responsibility of understanding their customer’s value proposition to co-produce value. As such, there is a need for both the firm’s and the customer’s value proposition to be understood well by both parties in order to deliver the maximum benefit.

However, our data saw very little evidence of this being an important factor in the firm’s systems and processes. In fact, we found on many instances, inconsistencies in the interactions between the people (firm) involved in the co-production and the customer. Where demands of the customers are unreasonable, they are sometimes met with the objectives of building relationships whereas less unreasonable demands are tolerated as a one-off exercise. For example, in the interviews, while one respondent commented that there is a view that “if you can get that amount of passion, one team, one goal delivering the end product, the fall out will be that it will come cheaper and it will come quicker”, another customer commented “what’s it got to do with you and the shutters would just go straight up you know there was just no interaction”. Yet, there was another comment by an employee who noted that “my engineering people have still got a little way to go because they are not that close to the customer” and the “contract is a service which is, I am trying to think of the word (which) it’s a bit of a contradiction with engineering”, also the engineers have the attitude of “what else can I do for you sir and a curtsey and scope creep again”. These comments appear to suggest that the firm is still focused on its own value proposition without the need to incorporate the customer’s value proposition in delivering the service.

Under these circumstances, the risks for the firm is in the danger of focusing on  $V_f$  instead of  $V_t$  is that the optimal system for  $V_f$  may not be that of  $V_t$ . Without understanding what is required to optimise resources under  $V_t$  (i.e. a thorough understanding of both firm and customer proposition) to deliver better service at a lower system cost, the combination of 2 optimums (the customer  $V_c$  and the organisation  $V_f$ ) may result in higher system costs due to transaction costs and misalignment issues such as seen from the data.

## 5. DISCUSSION

Our research indicates that services contract (MRO) that move from traditional based contracting to PBC poses serious issues that impact on both the firm and customer in terms of risks. It appears that the processes, systems, behaviours and activities which were associated with traditional contracting are not as efficient or effective under the performance-based environment. Also, our investigation opens up the debate on balancing the proportion of goods and services to offer a proper value for the customer.

Using the aircraft maintenance industry as a context for MRO services to support our research, this paper answers the questions on identifying the potential risks that arise from a PBC under a co-located MRO service environment given that both the firm and the customer are co-creators of value in the relationship. In our study, we find four key-findings underpinning the contracts.

First, we found that the firm has an unclear understanding of "value-in-use". The need to understand value-in-use (i.e. multi-state benefits) in availability based contracting is crucial because of the way value-in-use impacts on customer satisfaction, costs and delivery of the service. When the customer uses the service, how they use the service and understanding the manner in which they use the service is vital to bringing efficiency and effective support solutions that result in benefits to both the firm and the customer.

Second, the study found that the firm do not sufficiently emphasise the role of people and their behaviours in delivering value. There is a high dependency on processes and activities that are equipment focused, without much attention on the behaviours required to achieve them. For example, within the value proposition of the firm, lies an array of attributes performed by the firm that consume the firm's resources in order to deliver services for the customer. These attributes include transporting the spares, storing and managing equipment and diagnostics. In essence, this implies that the successful delivery on these attributes (which effects the achievement of measured availability of the contract) in co-production with the customer requires resources from the firm, including human resources. Furthermore, the delivery of many attributes requires suitable behaviours within the organisation as well as within the customer organisation. However, our findings suggest that the firm does not explicitly and systematically focus on human factors within the attributes e.g. cultivating the right behaviours within the organisation towards co-production.

Third, the study finds that the firm does not have a clear understanding of where and how value is created within the service contracts and the contribution of components and resources to value. As mentioned earlier in the second key finding, within the value proposition of the firm lies an array of attributes performed by the firm using both the firm's tangible and intangible resources in delivering services for its customer. If the firm is to design and structure its capacity to deliver the service, it would have

to understand which component of its costs (resources) deliver how much of value to the customer and the degree of importance of all resources within that system. The service capacity of the contract then becomes important. Our analysis show that such a systematic analysis is lacking. Additionally, we found that there is inadequate understanding of the degree of importance of human and equipment factors within the system when delivering the service. In other words, there needs to be equitable focus on both equipment capability as well as embedded human capability in understanding the capacity for delivering the service

Finally, based on our BBM analysis, the firm has to contract on  $V_t$  which is combination of the firms' ( $V_f$ ) and the customers' value proposition ( $V_c$ ). This directly brings the customer's value proposition into the firm's delivery of the service. Hence, an understanding of co-production and co-creation of value is required on the part the firm. However, we found in our data that the firm is less focused on the value co-production and co-creation. In fact, this change from the traditional way of doing business (i.e. charging for MRO activities) to availability-type contract has caused discomfort in terms of understanding the activities involved within the scope of the contract. Boundaries of what should be delivered under the contract are no longer obvious. While clear performance indicators relate to availability, many in the firm are unaware that the performance is unachievable without the cooperation of the customer ( $V_c$ ). As such, our study of these MRO performance based contracts demonstrates that there exist potential risks associated with moving from a traditional based contracting platform to performance-based contracting.

## 6. CONCLUSION

On the basis of our research, it is clear that with performance-based contracts, firms may find themselves exposed to customer-focused risks that threaten their capability towards delivering service value that is replicable, consistent and scalable across future service projects. If the performance depends on the co-creation between the customer and the firm, both parties would need to understand their own value proposition fully before contracting to avoid the risk of lowered benefits with the contract performing at a different value  $V_t$ . Furthermore, if the contract is renegotiated over time, consistent reduction in benefits for whatever reason may result in a re-negotiated price that is lower than the optimal benefits, even if the firm is highly efficient in its own value proposition. This implies that both parties need to come together to achieve an effective value co-creation/co-production model and in turn the appropriate contractual mechanisms to achieve a consistently high benefits that are financially viable.

In addition, inefficiencies can arise from a combination of two local optimums rather than optimising globally across the two systems. This then results in an increase in overall system costs which would make the contract more expensive than it has to be. Additionally, ineffectiveness

could arise from the combination as well as from both parties' inability to explicitly build a combined system. As both parties focus on their individual system's efficiencies, the transaction cost increases from the interactions. In other words, as both parties build more efficient individual systems, the overall effectiveness of the contract may suffer (due to more altercations and transactions), leading to sub-optimal outcomes.

As such, our qualitative study provides an insight into the co-creation process between the firm and the customer under a performance-based contract. We identify areas of potential risks from four key findings. For further research into this area, we intend look at some aspects of quantitative analysis to validate some of these findings.

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