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Performance-based contracting in the defence industry: Exploring triadic dynamics between government, OEMs and suppliers

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ABSTRACT

This study takes a rare longitudinal perspective to examine performance-based contracting (PBC) in the context of the development of a major capital defence project. It employs a triadic framework to examine changes in actors and their roles over time in fulfilling the project. The triads involve both contractors as suppliers and government entities. More specifically, using a historical narrative method the study suggests that over the 30 year span of the new warship's development, different parties occupy the nodes of triads where the roles or functions of the principal and agents in the contract change over time. Our use of a triadic perspective enables us to trace both the withdrawal of the government customer from a position of authority and the specific strategy of one supplier to occupy the vacated role as systems integrator. The study makes three distinct contributions: firstly, to our understanding of PBC through tracing the development of the conditions that enable PBC in largescale long-term public-private contracting such as clear role delineation. Second, it adds to understanding of principal-agent behaviour in triadic public-private projects, suggesting that customer and supplier roles need to be perceived as supply network dynamics. Third, it suggests reasons why this defence acquisition underperformed, focusing on the mediation of the customer's value requirement through powerful players seeking to extend their control. We argue PBC must be re-assessed in complex environments to include less direct financial measures such as long-term market share and adopt a more nuanced approach to contractual management than simply transferring risk.

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1. Introduction

Public procurement has garnered considerable attention from academics and practitioners over the past decade, particularly the performance of public-private capital projects (Thai, 2001; Davis & Hobday, 2005; Essig & Glas, 2014; Roehrich, Lewis & George, 2014; Jones & Hollinger, 2016). Such projects require new forms of contractual design and management that can transfer risk to the private sector whilst providing auditable public value. Selviaridis and Wynstra (2015) identify much of the surge of interest since 1989 in Performance-based Contracting (PBC) as linked to managing largescale public-private projects, such as the commissioning of defence platforms.

The same authors argue that the essence of PBC is 'the contractual approach of tying at least a portion of supplier payment to performance' (Selviaridis & Wynstra, 2015: 3505). As a contractual mechanism it works by specifying predetermined outcomes as overall service

capability, rather than discrete assets or equipment delivered on the basis of static product-based specification (Heinrich, 2002; Caldwell & Howard, 2011). Public procurement that requires substantial input from the private sector involves three key parties: the government agencies who initiate and manage the contract, the customers or users of the product or service, and the product or service suppliers (Tate, Ellram, Bals, Hartmann & van der Valk, 2010; Wynstra, Spring & Schoenherr, 2015). During an extended contract fulfillment period the specific roles of all three parties may change at different phases of the project. Furthermore, because the customers are multi-stakeholders with different priorities, the definition of performance may also change, further complicating supplier performance evaluation. This dynamic challenges agency theory when used to monitor the behaviour of suppliers, where the principal and agent are assumed to remain the same and critically, fulfill the same role throughout the contract fulfillment period (Ross, 1973; Eisenhardt, 1989).

In this study we explore the underperformance of one such project which utilized PBC in a UK maritime defence supply network, and link that failure to the changing roles of principals and agents over an extended, multi-decade period. Our aim is to explicate the agency issues in government procurement and the use of agency theory in managing

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complex government contracts. We ask, RQ1: How do the patterns of interaction and principle-agent roles evolve over time in complex defence procurement? RQ2: What does agency theory and triadic dynamics contribute to our understanding of the conditions necessary for PBC? RQ3: Why did PBC underperform in this type of extended government contract?

Our investigation focuses on a new warship commissioning project spanning 30 years. Defence procurement and supply structures in the 1980s consisted of UK government agencies including state-owned manufacturing facilities, and defence component and assembly firms. By design, a government uses dual sourcing or parallel sourcing to stimulate competition and retain supply options to protect the long-term capability of its defence industry. Yet post-cold war military cutbacks and subsequent industry consolidation particularly in the UK and USA has meant fewer firms from which government buyers in the west can make their selection (Geary & Fowler, 2014; Caldwell & Howard, 2014). Unlike most contracts in the private sector that involve two parties (i.e. buyer-supplier), defence contracts for complex new platforms can be conceived as a triadic arrangement: government agencies, general contractors (OEMs) and suppliers. During the associated extended contract fulfillment period, actual members of the triad may adapt by taking different roles over time or change completely at difference phases of the contract. Several interesting lines of enquiry are raised here on agency issues: how the government as principal manages the agents (i.e. OEMs) when the actual actors of the principal change as the project progresses, and as a consequence, the implications for PBC under such conditions.

The recent emergence of the prime contractor as a distinctive third player in major civil and defence projects, otherwise termed as a systems integrator or contract manufacturer, creates a new supply contracting arrangement with significant implications for PBC (Davies, Brady & Hobday, 2007). We use agency theory supported by a triadic framework to illuminate a series of critical stages during a major warship construction programme (Obstfeld, 2005; Choi & Wu, 2009; Wu, Choi & Rungtusanatham, 2010), including capturing the changes over time to the principal-agent's role and position in the supply network. By analyzing these arrangements, we are able to gain insight into firm strategy and inter-organizational relationships in the context of how supply networks evolve to complete a complex contract. We argue that to understand PBC in such projects it is necessary to consider agency in the context of the maneuverings by all parties as the roles of principal-agent change over the contractual timeframe. Applying the consequences of behaviour such as covert control-seeking (e.g. Tate et al., 2010) improves our understanding of the efficacy of PBC in managing complex government contracts.

Our key findings offer some challenges to the theoretical answers provided by buyer-supplier relationship informed agency theory. Although PBC appears to include mechanisms to transfer risk to suppliers, complex procurements such as our study suggest suppliers or contractors are not necessarily the inert recipients of risk transfer, and will actively exploit structural gaps left by public agencies. Such dynamics create tensions and new connections in the network, which in turn affects performance. Hence PBC needs to take a more nuanced and iterative approach to risk transfer, capable of adapting and responding to iterations of opportunist supplier behaviour over extended periods of time.

In the next section we examine the literature on PBC, agency theory and triadic dynamics. Then we present our methodology in section 3, and the findings of the study in section 4. Finally we present our discussion & analysis in section 5, before concluding with theoretical contributions.

2. Performance-based contracting, agency theory and triadic dynamics

The literature review contains two sections. First, general assumptions regarding performance-based contracting are examined, including

the temporal dimensions and agency issues in complex contractual arrangements. Second, the role of principal-agent in triadic dynamics is used to highlight the challenges and efficacy of PBC in supply networks.

2.1. General assumptions and dimensions of PBC

Agency or 'principal-agent' (P-A) theory helps our understanding of the purchase of complex products and services because of the inherent assumption that the interests of principals and agents diverge (Eisenhardt, 1989). Principal agents can limit divergence by establishing appropriate incentives for the agent and by implementing *ex ante* measures such as monitoring which limit opportunistic actions by the agent (Hill & Jones, 1992). In PBC, particularly the procurement of defence equipment and services, the extended nature of commissioning which often spans decades and the complexities of sub-contracting constituent parts means there is considerable opportunity for divergence from the original objectives (Caldwell & Howard, 2011, 2014). The concept of PBC emphasizes the specific payment mechanisms for capital goods and services that are to be delivered (Ng, Maull & Yip, 2009), and the strategic evaluation of the suppliers' potential revenue generation from such investments (Sols, Nowick & Verma, 2007). The main goal of PBC, derived from the theoretical assumptions of the principal-agent dilemma, is to align the suppliers' performance to the customers' requirements (Kim, Cohen & Netessine, 2007). Increasingly customers or buyers tend to purchase the utilization or performance outcomes of products, rather than the ownership of the products themselves as capital goods (Ng et al., 2009). Such transactions determine the payment structure and risk allocation associated with these products and services. Hence the risk allocation between suppliers and buyers is very closely linked to the development of payment schemes in the form of penalties and bonuses (Hooper, 2008; Selviaridis & Norrman, 2014). For example, instead of dumping risk on contractors during the construction of Terminal 5 at Heathrow airport as per traditional arm-length contracting, client British Airways Authority decided to bear the overall project risk itself, reimbursing incurred costs and creating an integrated project team approach with a system of positive rewards for results (Brady & Davies, 2011). In this context, procuring complex performance recognises the challenges posed by largescale projects, where *'the bundling of product and infrastructure with long-term, often multi decade service support requirements, a combination which produces a number of significant operational and supply decisions, namely through-life management...risk modelling [and] new forms of contractual control'* (Howard & Caldwell, 2014: 146).

The contracting relationships literature addresses buying products or services with the intention to add value to either the producers, customers or the government, depending on the supply chain position where the purchasing activity takes place. Service contracts are usually based on the cost structure of the input materials or services for a desired production process or service (Lindberg & Nordin, 2008). Such a conventional approach, where contractual agreements are based on value-adding potential, is essentially static and does not address dynamics in changing customer requirements. This may be problematic in PBC scenarios involving long-term projects where it is likely that performance requirements will change over time. The trend towards bundling strategies which combine products and services (Stremersch, Wuyts & Frambach, 2001, Davies et al., 2007) introduces contracting which may become overly complex because of the number of suppliers involved. Tate et al., (2010: 813–814) argue that with the rise of procuring increasingly complex business services, supply management professionals are getting involved with marketing specialists to facilitate relationships with suppliers. Identifying these relationships as triadic, they claim complex purchases require *'a hybrid contract type that combines elements of both behaviour-based and outcome-based contracts...to reduce conflict'* and acknowledge the importance of identifying hidden or covert supplier behaviour during support phases.

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