

Chapter 8

PERFORMANCE-BASED LOGISTICS IN GERMANY: CASE STUDIES FROM DEFENSE PROCUREMENT

Florian C. Kleemann, Andreas Glas and Michael Essig

INTRODUCTION

In the dilemma between rising service expectations and reduced budgets, public institutions increasingly rely on support from the private sector (Bartle & LaCourse Korosec, 2003). Aside from traditional contracting out (i.e. service contracts), or public-private partnerships, other concepts such as “Performance-based Contracting” (PBC, in the health or education sector) or “Performance-based Logistics” (PBL, in the defense sector) have been developed (Devries, 2004; Martin, 2007).

The key aspects of the PBC or PBL concept is a focus on outcomes (or results) and a compensation that is clearly linked to achieving this outcome. However, while major nations such as the U.S. or the U.K. are very successful in employing the concept (Doerr, Lewis & Eaton, 2005; Ng, Maull & Yip, 2009), other nations such as France or Germany still rely on public-private partnerships as the most evolved form of cooperation with the private sector (Frost & Sullivan, 2009).

PBC or PBL however are neither applied in practice nor are they broadly discussed in academic literature (Hypko, Tilebein & Gleich, 2010). The reasons for this have been analyzed for Germany (Kleemann, Glas & Essig, 2012) or the U.S. (Berkowitz, Gupta, Simpson & McWilliams, 2004; Devries, 2004). While the public

procurement legal framework sets some boundaries to applying PBL, the largest obstacles lie in the specificities of the defense procurement regime, but mostly reluctance on the public customer's side as well as the defense industry. However, in Germany a major reform of the armed forces is underway, so that the reluctance towards PBL is fading, with indications that some outcome-oriented contracts similar to PBL have already been introduced (Strukturkommission, 2010).

However, little is known about these contracts, especially where and how they were introduced. With the general reluctance of PBL in Germany, the specific circumstances that allowed an application of PBL need to be understood. Moreover, it is often said the PBL contracts are usually customized to customer needs and thus very specific (Belz & Wuensche, 2007).

Therefore, first an understanding of where the PBL contracts were used is needed. Secondly, the services covered by the PBL contracts and to what extent they drive public-private cooperation need to be identified. Moreover, if a broader application of PBL is desired, employing best practices learned from earlier experiences as well as avoiding pitfalls could be substantial in driving a change towards PBL. To allow this, the suggested contribution will address the following research questions:

RQ 1. What circumstances are supportive or obstructive for the application of PBL?

RQ 2. What types of contracts facilitate PBL?

To answer these questions, a blend of theoretical and empirical approaches is used. First, the conceptual basics of PBL and the status quo in German defense procurement are outlined in the literature review. Then, the empirical results are presented. In the course of existing research projects, several "PBL-like" contracts were identified in the German defense sector. Here, interviews with executives involved in actual contract development and performance were conducted. The resulting findings are presented and critically discussed with regard to economic theory. In summary, recommendations for future efforts in managing the change towards PBL as an innovative concept for public procurement are developed.

LITERATURE REVIEW

This chapter provides the foundations for the forthcoming analysis by introducing the state of existing research on the aspects of PBL and public procurement in Germany.

Performance-Based Logistics

While the discussion of PBL is usually seen in context with changing priorities after the end of the Cold War, the underlying ideas had been developed much earlier. Starting in the 1960s, U.S. NASA sought to develop new contracting approaches that would motivate suppliers to accelerate the pace of developing new products and systems in the course of the “space race” between the U.S. and the former Soviet Union (McCall, 1970; Meinhart & Delionback, 1968; NASA, 1967). “Performance Contracting” on the other hand was developed in a totally different setting: in the compensation of education services. The idea was to put a clearer focus on the results achieved by educational institutions, rather than to provide extensive guidance on how to achieve these results (Hamrin, 1972; Mecklenburger, 1973). Later, this principle branched to other civil public services, such as medical and social care, and has constantly drawn researchers’ attention very (Honore et al., 2004; McBeath & Meezan, 2006, 2010). Besides the research in specific areas of application of PBC or PBL, the discussion about “incentive contracts” or “outcome-based contracts” analyzes the mechanisms of such contracts (Caldwell & Settle, 2011; Ng & Nudurupati, 2010). This stream of literature provides generalizable findings, however in the German (defense) context it is still questionable if such contracts are applied at all. That requires a more exploratory methodology.

In the defense sector, the discussion on results-oriented procurement has evolved since about a decade ago, when major nations such as the U.K. and the U.S., and later Australia, developed new strategies for procuring complex (weapon) systems and respective support services. Introduced under the label “Commodity Availability Procurement Strategy” (U.K.) or “Performance-based Logistics” (U.S., Australia), they represented a massive change to traditional procurement approaches (Australian Government, 2007; U. K. Ministry of Defence, 2001; U. S. Department of Defense, 2001b).

Facing fast-paced change in requirements for the weapon systems on the one hand and increasing budgetary pressures on the other, the new approaches had to improve both efficiency and effectiveness. The intended solution was to abandon the approach of procuring systems and support services separately. Instead, the desired outcome or performance of a system was to be contracted with a view on the overall life cycle (Berkowitz et al., 2004). Suppliers were designated to take the risks for keeping their systems operable, while getting more freedom in how to deliver the customer-desired outcomes (Sols, Nowick & Verma, 2007). By aligning the compensation and the success in achieving the outcome, the suppliers could attain incentives for delivering results more efficiently.

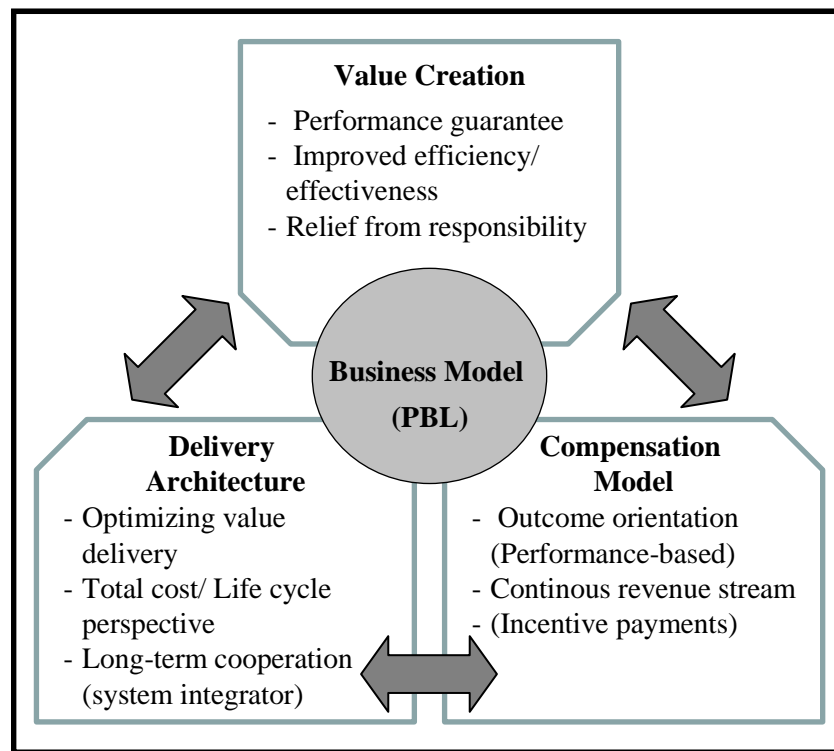
The intended advantages can be seen from Figure 1, which illustrates the major pillars of the PBL business model. For the customers, the value creation aspects are most relevant, predominantly that PBL reduces their own involvement in keeping systems operable, while ensuring successful service provision by linking outcomes and supplier compensation (Randall, Pohlen & Hanna, 2010). For the suppliers, the advantages are a long-term contract, with the opportunity to recover investments in systems improvement and also, to stabilize revenues into a more consistent stream instead of high revenues at initial procurement, and occasional orders during the life cycle (Ng & Nudurupati, 2010).

Compared to “traditional” input oriented contracts, PBL does not determine how a specific requirement is fulfilled in detail. Rather it gives leeway to the contractor to promote new and improved ways to deliver the demanded performance (Kim, Cohen & Netessine, 2007). Compared to public private partnerships (PPP), which are in most cases used to build, renovate, and/or operate public buildings, PBL is a contract instrument, which enforces long-term cooperation aside public construction contracts even for demands like complex service solutions e.g. for operating models, fleet management, maintenance, repair and overhaul, spare part and obsolescence management or logistics.

Yet, this paper does not intend to provide a full analysis of the proclaimed or actual advantages of PBL. Examples of PBL success however seem to suggest that the promising ideas of the concept do live up to the expectations: a first in-depth PBL case analysis was provided by Berkowitz et al. (2004) who examined 15 of 30 PBL pilot

projects of the U.S. Department of Defense. They identified seven key drivers of PBL and analyzed cultural change requirements. Mahon (2007) delivered an analysis of the U.S. C17 Globemaster program and distinguished 14 different roles in a PBL-team, identifying six barriers and three key enablers of PBL. Devries (2004) conducted a

FIGURE 1
A Business Model Perspective on PBL



Source: Kleemann, Glas & Essig, 2012.

study with 26 PBL managers from different industries and identified seven barriers and enablers of PBL implementation. That such implementation can be successful is underlined by several studies on PBL potentials and successes (e.g. Berkson, 2005; Geary & Vitasek, 2008; Leeson, 2010).

However, it does not seem appropriate to transfer those results to the German context, because some supportive circumstances are different from nation to nation. Most striking are the mentioned barriers of PBL: public law (Mahon, 2007) or funding regulations (Devries, 2004).

This gives way to another aspect of PBL research: the challenges of implementing PBL (Kim, Cohen & Netessine, 2009; McBeath & Meezan, 2006). Even some explicit criticism can be found, claiming for example that PBL contracts induce a lack of transparency, increase dependency on suppliers and/ or are difficult (and costly) to develop (Behn & Kant, 1999; Claiborne, 2004; Geary & Vitasek, 2008; U.S. General Accounting Office, 2003). Whether this criticism is also the reason why PBL has been applied so rarely in Germany is reviewed in the next section.

Public (Defense) Procurement in Germany

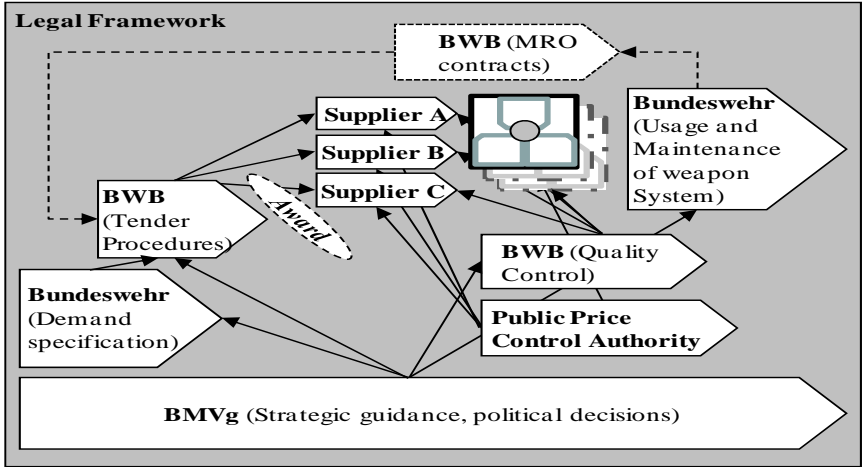
As for many Western countries, the field of public procurement in Germany is largely dominated by a legal perspective (Erridge & McIlroy, 2002; Glas, 2010). This perspective impacts the cooperation between the public and the private sector (i.e. suppliers). While the benefits of cooperative partnerships have been vastly outlined in research on private buyer-supplier relationships, it seems that the aim of achieving value in the public sector is still mostly followed by driving competition among suppliers in transactional relationship (Arrowsmith, 1998; Ogden et al., 2005; Terpend, Krause & Handfield, 2008). While the objectives of public procurement have been identified as being multidimensional, it seems that in Germany, legal certainty and transparency are more highly valued than are the economic potentials of closer relationships with suppliers – although this is criticized regularly (Bernardes & Zsidisin, 2008; Essig et al., 2009; Thai, 2001). Not surprisingly, the concept of PBL has rarely been applied in Germany (Kleemann, Glas & Essig, 2012).

The notable exception, as also suggested by Frost & Sullivan (2009), is a relatively broad use of PPPs. They are similar to PBL in some ways, for example due to the long-term orientation or the relatively strong integration of the public customer and the private “partners” (Essig & Batran, 2005). Many examples of PPP’s exist in Germany, even some in the defense area, with the German army being involved. Yet, these are usually limited to civil applications,

such as the management of IT systems or the civil car fleet (Gause, 2004).

In the procurement of complex goods, i.e. aircrafts, weapon systems or tanks, a clearly transactional contracting approach is used, with several stakeholders in the process. The following description is a summarized extract from Kleemann, Glas and Essig (2012). Contracts are closed on a short-term basis, with cost-plus prices and clear technical specifications. The user, namely the *Bundeswehr*, is only marginally involved in the procurement of complex goods, mainly for formulating the initial requirements. The most dominant role is carried out by the *BWB*, the defense procurement office that is not subordinated to the *Bundeswehr*. It is responsible for the entire procurement process, including ex ante- (e.g. tender development, supplier award) and ex post activities (e.g. quality checks, contract management). Both the *BWB* and the *Bundeswehr* report to the German Department of Defense (*BMVg*) that currently has a rather “laissez faire”-style towards influencing the procurement process. While the *BWB* was identified by Kleemann, Glas and Essig as being most reluctant towards using PBL, and the *Bundeswehr* was described as relatively open, the *BMVg* could use its strategic role to “push” towards PBL, but so far has not. Figure 2,

FIGURE 2
Status quo of German Defense Procurement



Source: Kleemann, Glas and Essig (2012).

which summarizes the procurement process, provides a picture of a rather transactional approach.

Yet, the latest suggestions on how to reform the German Bundeswehr clearly suggest a more integrated approach towards defense procurement and even demand increased consideration of “internationally established procurement concepts” (Strukturkommission, 2010). To explore to what extent this has been followed since the reform suggestions – and even before that – is the focus of the next chapter.

PBL CASES FROM THE GERMAN DEFENSE SECTOR

We consider the organizational barriers and the hitherto refusal of internationally established procurement methods like PBL by the procurement agency as we aim in this research to analyze PBL-like contracts already in place and the circumstances that led to using PBL. This chapter first discusses methodological considerations and then presents the findings obtained.

Case Study Objectives and Methodology

The literature review indicates that although some literature is available on the implementation of PBL, most of it is relatively specific to the countries with broad experience in applying PBL. The specific context of introducing PBL in Germany has been addressed with a focus on what currently blocks PBL and how to implement PBL in a specific situation (Glas, Hofmann & Essig, 2012). Qualitative research is recommended for such areas where little prior knowledge exists (Voss, Tsikrikis & Frohlich, 2002). Therefore, case studies as the most dominant method for qualitative research were selected.

The cases were selected in the course of a research project. This is permissible for case studies, as the priority aim is not generalization of findings, but identification of little known phenomena (Eisenhardt, 1989). While the results of the overall research project have been presented elsewhere (Kleemann, Glas & Essig, 2012), several contacts with public buyers as well as private-sector suppliers developed from the project that were followed-up after concluding the initial stage. The advantage of using established contacts is that the probability of obtaining detailed data is much higher than if no prior relationship existed (Stuart et al., 2002). This is

especially valid for the defense sector, where confidentiality is much more critical than in other fields. (Graham, Hardaker & Sharp, 2001). As a result, five cases of PBL contracts could be identified. This is in line with suggestions of covering at least four cases in case study research and ensures some degree of validity (Yin, 1994). Table 1 provides an overview of the cases studied. Anonymity was maintained to respect confidentiality issues.

TABLE 1
Overview of Case Studies Conducted

Case Tag	Case Description
Fighter Jet	Service support contract for a major fighter jet weapon system
Marine Jet	Logistical service support for a small fleet of naval reconnaissance aircrafts
Marine Avionics	Service support for a major subsystem for a small fleet of naval reconnaissance aircrafts
Chopper Training	Full operational support for a small fleet of aerial vehicles used for training purposes
Front Drone	Full operational support of a small fleet of aerial vehicles for training purposes

At the institutions participating in the research, semi-structured interviews were conducted, using an interview outline that was built around the research questions (Kvale, 2008). Interviews lasted from 60 to 120 minutes and were usually conducted by two researchers to improve the reliability of data and results (Eisenhardt, 1989). In total, more around twenty interviews were conducted in the period between September 2010 and March 2011. Their findings were enhanced – or “triangulated” – by also considering contract documents or news publications as a data source (Denzin, 1989).

Data analysis was started with data reduction, i.e. extraction of the relevant information from the interview transcripts (Auerbach & Silverstein, 2003). The remaining data items were then coded and clustered into main themes, such as “customer requirements”, “environmental factors” or “supplier relationship” (Boyatzis, 1998; Strauss & Corbin, 1990). A graphical analysis (meta matrix) was then added to allow a visually-aided, cross-case comparison and recognize patterns in the data (Miles & Huberman, 1994).

Presentation of the Cases

The findings from each of the cases are framed by a brief description of the case companies. The case company in **Fighter Jet** is a major player in the global market for military jets; its main customers are based in Europe. The company is active in the final assembly and system integration for a limited portfolio of military air vehicles. It also provides a broad range of support services for its own and also for non-proprietary products. The core product is a fighter jet that has been developed recently in cooperation with defense companies from across Europe. However, even the delivery architecture of the support services is organized on a pan-European level (4 countries/armed forces), setting up a joint pool for critical repair parts in order to reduce overall stock levels and thus inventory costs for the customer. Thus, a common agreement had to be reached between the four customer nations, although the frame contract was legally negotiated by a trans-national defense procurement agency. Where some nations in the consortium clearly opted for using a PBL-like contract for the support services, the German representatives initially showed a high resistance towards using PBL, mainly due to reservations concerning public pricing and budgeting law. Despite the initial resistance towards this contracting approach, the German BWB ultimately participated in it. The value creation for the customer is in returning defective parts within a specific period of time: once a customer handed over such a part to the contractors (which had basic “front office” facilities on the customers’ premises), they were guaranteed to receive a functioning part within 8 hours. The suppliers, including Fighter Jet, were responsible for managing a timely repair of the part and at the same time ensure that the repair parts pool always carried sufficient inventory to replace parts within 8 hours, whereas repairs in this specific field often had taken several months. The performance indicator was the rate (percentage) of the parts exchanges that were conducted in the 8-hour time limit. To balance fluctuations and risks along the contract life cycle, a monetary risk fund was established as a compensation model which suppliers could use when required. The remaining funds at the end of the contract duration (here: two years) would be distributed between the customers and the suppliers. The basis of the split ratio was the performance exchange rate within 8 hours as the key performance indicator (KPI). The higher this rate is,

the higher the share of the funds that would eventually be paid to the suppliers (including Fighter Jet Company).

In the next case, **Marine Jet**, a subsidiary of a major European aerospace corporation was contacted by the customer (i.e. BWB) to see if the latter would be willing to provide logistical support services for a recently acquired small fleet of specialized reconnaissance aircrafts. The system itself has been in operation in other countries for several decades, and has not been manufactured by the Marine Jet Company itself; thus Marine Jet would function as a mere service provider. Therefore, the *delivery architecture* is relatively simple. Marine Jet would be operating a supply depot, responsible for the spare parts supply for the aircraft cell as well as for most subsystems. The contract term was agreed to be five years. The main activities were to manage a central stock of spare parts and to organize the transport of parts from this depot to the military base where the aircraft fleet was centralized. There was relatively open communication from the Bundeswehr that it neither had the resources nor the know-how to manage this in-house. Also the customer demanded that the contract contain a range of performance indicators as the requirement – instead of prescribing which items to carry and how many of them. As *value creation model* the Bundeswehr and Marine Jet agreed to the following KPIs: 85% of their parts would be available to the customer within 24 hours, 97% within 3 days and 99% within thirty days. To illustrate this, Marine Jet gave the following example: for transports carried out by the Bundeswehr from one depot to another, it can take already weeks to schedule such a transport. In the new model, it would be much shorter. Moreover, the availability rates agreed upon were much higher than is common in the Bundeswehr. The *compensation model* is based on a cost-plus contract with a fixed percentage of mark-up paid to the supplier as their profit margin.

For the same flight system, yet on a subsystem level, **Marine Avionics** was identified as a PBL contract. It covers the avionic system parts for the naval aircraft described in Marine Jet. Yet the contracting approach is quite different. However, at first, the customer-sided BWB, aiming for a traditional “time and material” supply contract, was strictly opposed to the idea of this contract. Marine Avionics is a subsidiary of a large U.S.-based corporation that currently manages a fleet of several hundred of the subsystems in

this specific naval aircraft; in this setting, BWB got an offer to participate in the same contract arrangement as that of the U.S. Navy, gaining benefit from the economies of scale between the large U.S. fleet as opposed to the very small one in Germany. Despite these obvious advantages, the BWB representatives nonetheless had to be convinced in months-long negotiations to join the contract. Unlike Marine Jet, the *delivery architecture* is laid out for twice as long as the Marine Jet contract (ten years) and the *value creation model* does not only cover logistical support: besides the responsibility for maintaining the avionics subsystem (including repairs, spare parts etc.), Marine Avionics is also allowed to modify its product in order to improve durability, reliability, and so forth. This is as long as Marine Avionics retains the original “form, fit and function”, i.e. the company does not change the functionality or appliances as well as the physical dimensions. All of this is reimbursed by a compensation model based on a fixed price that is even reduced during the life cycle of the contract to reflect and let the customer participate in expected efficiency gains. Moreover, the fixed price agreed on in the end is also subject to an official “price check” (See Figure 2).

The next case example, **Chopper Training**, was named as one of the earliest known “Full System Support”-contracts for the Bundeswehr. The *delivery architecture* is an operating model with a contract duration of five years. Chopper Training provides a small fleet of aerial vehicles operable and available for training flights conducted in two military bases. Chopper Training explicitly emphasized the high degree of cooperation between them and the Bundeswehr (as the user): “We clearly go the ‘extra mile’ every now and then, and they (the Bundeswehr staff) really appreciate this”, said one of the interviewees. Therefore the *value creation model* for the customer is clearly to have the vehicles available as required on very short notice (although some joint rolling forecast is performed in several scenarios). However, it was also said that this did not come overnight and that a long period of “back and forth” negotiations had to be managed before an agreement was reached. The issue was that the BWB was for example reluctant to accept the contract duration of five years (which was seen as the minimum time frame for Chopper Training to recover its investments). Moreover, the *compensation model* is based on a fixed price for the flight hour. The customer clearly had its issues, thinking they might be overcharged. Yet, after having checked the price and all its elements in detail (a lengthy

process), the BWB accepted the proposed price scheme. Last but not least, transferring the full system operation seemed to be too far reaching, which can be understood to some degree, as especially in the military sector, giving away responsibilities to civil partners is clearly not habitual. Nonetheless, despite a period of more than two years before reaching an agreement, the first contract is running out soon, and both parties are willing to join forces for another term.

The last case example, **Front Drone**, is one of very few leasing contracts for military weapon systems in Germany. The acquisition process was relatively brief. In only six months, the manufacturer of Front Drone, a German defense corporation, managed to deliver initial capabilities of an unmanned aerial vehicle (UAV), which the Bundeswehr urgently required for its front-line operations. The *delivery architecture* was a leasing contract for three UAV. The contract term initially was agreed to be three years, including an option for two additional years. The *value creation model* for the customer is not only that Front Drone provides the logistical and technical support for its UAV, but the company also operates the UAV fleet and delivers the Bundeswehr “flight hours.” One UAV crashed in an accident and another one was destroyed after an emergency landing, Front Drone replaced these two UAV, which is also one important aspect of the value creation model for the customer in a leasing contract of a very small fleet size. The *compensation model* based on the agreed flight hour schedule per month provides flexibility for the Bundeswehr (maximum, minimum flight hours) as well as aligned incentives (operability of the UAV) for the supplier.

The key aspects of each of the selected cases being described, Table 2 now provides a summary of the findings in each. The structure is hereby aligned with the analytical framework set out in the beginning of this paper.

TABLE 2
Summarized Findings of Case Studies

Case	Contract Duration	Performance Indicator	Compensation Mechanism	Acquisition Process Specifics
Fighter Jet	5	Service-response time ratios	Monetary risk fund	Multi-national contract
Marine Jet	5	Service response time ratios	Cost-plus contract	Small fleet

TABLE 2 (Continued)

Case	Contract Duration	Performance Indicator	Compensation Mechanism	Acquisition Process Specifics
Marine Avionics	10	Mean time between unscheduled repairs	Fixed price decreasing over contract life cycle	Three years of negotiations over existing (U.S.) contract
Chopper Training	5	Flight hours	Fixed price per flight hour	Operating model, two years of negotiations
Front Drone	3+2	Flight hour	Fixed price per flight hour	Quick process (urgent demand for operations)

The previous chapter provided findings from PBL cases identified in Germany. The intention was to provide a summary of the interview results; the critical reflection on these follows.

FINDINGS AND DISCUSSION

The previous chapter introduced five military acquisition projects in Germany which could be labeled as PBL-approaches. These cases are some of the very few PBL examples at the Bundeswehr, according to our interviews. Thus, it can be said with some confidence that there is only very limited experience on the PBL subject in Germany. Because there is no official database that identifies contract types, this is an indication, but not a definite fact. Nonetheless, this scarcity of PBL examples is in sharp contrast to the PBL-development in the U.S. or U.K., where about 100 acquisition programs were supported by PBL until October 2005 (Phillips, 2005) and this number increased to more than 200 PBL contracts by July 2006 (Geary, 2006; Mirzahosseini & Piplani, 2011).

Therefore we use the presented five cases to answer the research questions about the supportive or obstructive circumstances and the type of contract which might facilitate PBL in Germany. Firstly in every case there were some specifics in the acquisition process such as multinational demands (Fighter Jet), existing support contracts for the same material for other countries (Marine Jet, Marine Avionics), or urgent demand for operations in Afghanistan (Front Drone). Only in one case (Chopper Training) was there no specific “extra pressure” to choose a PBL arrangement. As a conclusion, the lack of a “PBL champion” as the driving force towards PBL can be seen as the main

barrier for its implementation in Germany. This is also in line with existing claims for such a “champion” (Geary & Vitasek, 2008).

This further clarified the issue that legal constraints about funding and price law were the main arguments against the PBL solution of the Bundeswehr and its procurement agency in every case. This however should be seen as an opinion or a statement rather than a fact, as previous analysis of the PBL issues in Germany proved (Kleemann, Glas & Essig, 2012). The cases clearly support this as at the end of often lengthy negotiations, those five contracts were eventually implemented - despite the initial legal concerns. Today the Bundeswehr is quite satisfied with the contracts and the delivered performance, especially in the cases of Chopper Training and Front Drone. Also, the MarineJet contract is currently approaching its extension. Thus, it is not the legal concerns but other circumstances which obstruct a broader use of PBL in Germany. Following the experiences in the U.S., these behavioral barriers may very well be culture, PBL-training and experience (Devries, 2004; Mahon, 2007).

According to the interviews, once the decision towards PBL was made and the value delivery had to be implemented, the main enablers in the cases were aspects of successful supply chain and performance management. In its core, the performance agreed to in the contract had to be clearly measured and reported throughout the organization with clear designations of how to improve efficiency or effectiveness. This aspect is supported by similar PBL studies (Doerr, Lewis & Eaton, 2005). Measuring and managing performance is one thing, but partnering and close cooperation on the operational level between the Bundeswehr and the industry suppliers helped to develop the (new) PBL relationship. This is in line with the mentioned supportive circumstances from U.S. experience, such as the use of (best commercial) supply chain management practices, clear performance metrics, and a total life cycle systems management in a partnership atmosphere (Devries, 2004).

Considering the contract types which were used in the cases, there is no single “one” contract form specifically facilitating PBL in Germany. Rather there are many forms of contracts that were to be used for implementing PBL. The cost-share fund was used for a stable supply system in order to reduce the total costs of ownership (Fighter Jet). Besides the use of a cost-plus contract in combination with performance metrics (Marine Avionics), three cases use fixed

price contracts linked with usage or operability measures (Marine Avionics, Chopper Training, Front Drone). Such variety of contractual agreements is rather typical for PBL (Glas, Hofmann & Essig, 2012; Martin, 2003). However, with three out of five cases, “payment per usage” (respectively operability and availability of the contracted equipment) therefore can be seen as the preferred solution, whereas additional incentives are not distinctively sought.

What is specific to Germany in view of the results was that every case presented in this paper was subject to some “special” or “urgent” circumstances – and no general support or “PBL champion” is currently clearly driving the implementation of PBL. In the U.S. this was done by making PBL the preferred acquisition strategy for the Department of Defense by implementing a distinct procedural guideline (U. S. Department of Defense, 2001a).

SUMMARY AND OUTLOOK

The aim of this paper was to analyze whether PBL contracts exist in German public (defense) procurement, and if so, what enabled their introduction, given the low state of implementation compared to other major economies such as the U.S. or U.K.

A review of the relevant literature on PBL as well as public procurement in Germany shows that there actually is a relatively broad basis of empirical analysis of PBL from the U.S. (and some from the U.K.), all discussing actual PBL cases. For Germany however, none such research could be found, reinforcing the identified research gap.

The research gap was addressed employing a case study methodology, involving five examples of PBL-like contracts from the defense procurement area, but with diverse contract contents. First of all, this indicates that PBL is not only possible in Germany but that it had already been implemented, although not on a broad basis. Answering RQ1, one could say that specific demand requirements (e.g. urgency, international acquisition settings) are currently the major enabler of PBL. Barriers on the other hand are not specifically legal concerns (although they keep being mentioned). Rather the barriers seem to be the lack of experience, cultural issues and, last but not least, the lack of a dedicated “promoting force” as a “PBL champion.”

Concerning the research question on facilitating contract types (RQ2), it seems that many alternatives exist to implement PBL, however the fixed price for a unit of use (e.g. flight hour for a jet or helicopter) is currently the preferred method. For management practice, these observations lead to the following implications:

- Public buyers and users willing to apply PBL in their contracts should be aware of the actual barriers of PBL – legal concerns may only be used as a “knock-out”-answer to block the request. Instead, argumentative support should be developed for the specific case. As not all procurement projects fulfill urgent needs or are part of international defense cooperation, support could be found by involving top management, developing a convincing “business case” – i.e. establishing economic arguments for PBL and so forth.
- Leadership of the organizations in the defense procurement process as well as surrounding regulatory bodies is required to push or at least back initiatives for applying PBL. Official guidelines as in the U.S. would clearly be a major enabler, however PBL is, as shown, possible without such a distinct regulation.
- Defense industry managers striving to introduce PBL concepts should use the awareness of key enablers and barriers to customize their marketing approach. This could be initiated by using relationships with the customers’ leadership, encouraging them to support PBL in a more official way. However, this could also be driven at the individual contract level by jointly, together with the customer, identifying procurement projects where PBL simply makes sense. Once such contracts are in place, there should be strong management attention towards these “lighthouse projects” as their failure will clearly erode any trust between the contractual parties, but also towards PBL as a potential procurement strategy.

However, both the summarized results as well as the managerial implications developed from them need to be seen in light of some limitations. First of all, while the number of cases ensures, according to the methodological literature, some validity of the results, it also needs to be clear that a mere generalization of the findings is not possible. This is even more relevant, as although the cases represent the majority of the PBL cases that are known, it cannot be said for

sure that no other cases exist. There is no central contract database nor are contracts individually marked as being PBL. However, the interviews conducted involved all relevant stakeholders of defense procurement and representatives from many hierarchical levels. Therefore it can be confidently judged that if at all, very few other PBL contracts exist in German defense procurement.

Referring to our research questions, this paper is exploratory in nature and we used methods which are applicable to such a problem. Case studies are appropriate, if the object of analysis is (still) not clearly defined. PBL in Germany is a very innovative and new contract and supplier relationship approach. Given that, the next step is to embed PBL in Germany with cases in a wider theoretical model, which analyzes the roles, motivation and behavior of each involved party, e.g. using game theory.

Further research could also expand the focus beyond defense into “civil” public procurement – although major specificities surely hinder a mere transfer from one field to the other. Another area where research is still scarce is the question whether PBL is suitable in all contracting situations. Although some comments can be found in the literature, no dedicated research has been conducted on potential disadvantages and risks. Last but not least, research could also contribute to solving practical issues of PBL application, e.g. identification of potential projects, evaluation of costs and benefits and so forth

All in all, PBL is an interesting topic for public procurement in general and defense procurement in particular. Whether its popularity in the U.S., U.K. or Australia will be matched in other nations however remains to be seen.

REFERENCES

- Arrowsmith, S. (1998). “National and International Perspectives on the Regulation of Public Procurement. Harmony or Conflict?” In S. Arrowsmith and A. Davies (Eds.), *Public procurement: Global Revolution*. London: Kluwer Law International, pp. 3–26.
- Auerbach, C. F., & Silverstein, L. B. (2003). *Qualitative Data: An Introduction to Coding and Analysis*. New York: NYU Press.

- Australian Department of Defense (2007). *Performance-Based Contracting Handbook*. Canberra, Australia: Author.
- Bartle, J. R., & LaCourse Korosec, R. (2003). "A Review of State Procurement and Contracting." *Journal of Public Procurement*, 3 (2): 192-214.
- Behn, R. D., & Kant, P. A. (1999). "Strategies for Avoiding the Pitfalls of Performance Contracting." *Public Productivity & Management Review*, 22 (4): 470-489.
- Belz, C., & Wuensche, K. (2007), "Classification of Performance Contracting Solutions: A Managerial Typology." Paper Presented at the 2nd International Conference on Business Market Management. Delft, NL, 25 March 2007 - 27 March 2007.
- Berkowitz, D., Gupta, J. N. D., Simpson, J. T., & McWilliams, J. B. (2004). "Defining and Implementing Performance-based Logistics in government." *Defense Acquisition Review Journal*, 11 (3): 255-267.
- Berkson, B. (2005). *Management Initiative Decision (Mid) 917 'Performance Based Logistics' – Interim Review*. Washington, DC: U.S. Department of Defense
- Bernardes, E. S., & Zsidisin, G. A. (2008). "An Examination of Strategic Supply Management Benefits and Performance Implications." *Journal of Purchasing and Supply Management*, 14 (4): 209-219.
- Boyatzis, R. E. (1998), *Transforming Qualitative Information: Thematic Analysis and Code Development*. Thousand Oaks, CA: Sage.
- Caldwell, N.D., Settle, V. (2011). "Incentives and Contracting for Availability: Procuring Complex Performance." In I. Ng (Ed.), *Complex Engineering Service Systems: Concepts and Research* (pp. 149-162). London, UK: Springer.
- Claiborne, B. L. (2004). *Performance-Based Logistics*. Carlisle, PA: U.S. Army War College.
- Denzin, N. K. (1989). *The Research Act: A Theoretical Introduction to Sociological Methods* (3rd ed.). New York: Englewood Cliffs.

- Devries, H. J. (2004). "Performance-Based Logistics: Barriers and Enablers to Effective Implementation." *Defense Acquisition Review Journal*, 11 (3): 243–254.
- Doerr, K., Lewis, I. A., & Eaton, D. R. (2005). "Measurement Issues in Performance Based Logistics." *Journal of Public Procurement*, 5 (2): 164–186.
- Eisenhardt, K. M. (1989). "Building Theories from Case Study Research." *The Academy of Management Review*, 14 (4): 532–550.
- Erridge, A., & McIlroy, J. (2002). "Public Procurement and Supply Management Strategies." *Public Policy and Administration*, 17 (1): 52–71.
- Essig, M., & Batran, A. (2005). "Public–Private Partnership: Development of Long-term Relationships in Public Procurement in Germany." *Journal of Purchasing and Supply Management*, 11 (5–6): 221–231.
- Essig, M., Dorobek, S., Glas, A., & Leuger, S. (2009). "Public Procurement in Germany." In K. V. Thai (Ed.), *International Handbook of Public Procurement* (pp. 307–322). Boca Raton, FL: CRC Press.
- Frost & Sullivan (2009). "Performance Based Logistics: A Global Trend in the Aerospace & Defence Sector." Oxford, UK: Frost & Sullivan.
- Gause, C. (2004). *Die Ökonomisierung der Bundeswehr. Strategische Neuausrichtung und organisationskulturelle Rahmenbedingungen*. Wiesbaden, Germany: Gabler.
- Geary, S. (2006). "Ready for Combat." *DC Velocity*, 4 (7): 75–80.
- Geary, S., & Vitasek, K. (2008). *Performance-Based Logistics: A Contractor's Guide to Life Cycle Product Support Management*. Stoneham, MA: Supply Chain Visions.
- Glas, A. (2010). "Public Performance Based Contracting." (Working Paper). Munich, Germany: Universität der Bundeswehr.
- Glas, A., Hofmann, E., & Essig, M. (2012, Forthcoming). "Performance-Based Logistics: A Portfolio for Contracting Military

Supply." *International Journal of Physical Distribution & Logistics Management*, 42.

- Graham, G., Hardaker, G., & Sharp, J. (2001). "International Collaboration and Bidding through the High Technology Defence Industry: A Technical Note." *Logistics Information Management*, 14 (4): 250-255.
- Hamrin, R. D. (1972). *Performance Contracting in Education: An Economic Analysis of the 1970-71 Office of Economic Opportunity Experiment*. Madison, WI: University of Wisconsin.
- Honore, P. A., Simoes, E. J., Moonesinghe, R., Kirbey, H. C., & Renner, M. (2004). "Applying Principles for Outcomes-Based Contracting in a Public Health Program." *Journal of Public Health Management and Practice*, 10 (5): 451-457.
- Hypko, P., Tilebein, M., & Gleich, R. (2010). "Clarifying the Concept of Performance-Based Contracting in Manufacturing Industries. A Research Synthesis." *Journal of Service Management*, 21 (5): 625-655.
- Kim, S. H., Cohen, M. A., & Netessine, S. (2009). *Reliability or Inventory? Analysis of Product Support Contracts in the Defense Industry*. Philadelphia, PA: University of Pennsylvania.
- Kleemann, F. C., Glas, A., & Essig, M. (2012). "Public Procurement through Performance Based Logistics: Conceptual Underpinnings and Empirical Insights." *Journal of Public Procurement*, 12 (2): 151-188.
- Kvale, S. (2008). *Doing Interviews* (2nd ed.). Los Angeles, CA: Sage Publications.
- Leeson, K. (2010), *Procurement & Support Transformation in the RAF*. London, UK: Royal Air Force.
- Mahon, D. (2007). "Performance-Based Logistics: Transforming Sustainment." *Journal of Contract Management*, 5 (1): 53-71.
- Martin, L. L. (2003). "Making Performance-Based Contracting Perform. What the Federal Government Can Learn from State and Local Governments." In M. A. Abramson and R. L. Harris, III, (Eds.), *The Procurement Revolution* (pp. 87-125). Lanham, MD: Rowman & Littlefield Publishers.

- Martin, L. L. (2007). "Performance-Based Contracting for Human Services: A Proposed Model." *Public Administration Quarterly*, 31 (2): 130-158.
- McBeath, B., & Meezan, W. (2006). "Nonprofit Adaptation to Performance-Based, Managed Care Contracting in Michigan's Foster Care System." *Administration in Social Work*, 30 (2): 39-70.
- McBeath, B., & Meezan, W. (2010). "Governance in Motion: Service Provision and Child Welfare Outcomes in a Performance-Based, Managed Care Contracting Environment." *Journal of Public Administration Research and Theory*, 20 (1): 101-123.
- McCall, J. J. (1970). "The Simple Economics of Incentive Contracting." *American Economic Review*, 60 (5): 837-846.
- Mecklenburger, J. (1973). *Performance Contracting*. Worthington, DC: C. A. Jones.
- Meinhart, W. A., & Delionback, L. M. (1968). "Project Management: An Incentive Contracting Decision Model." *Academy of Management Journal*, 11 (4): 427-434.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks, CA: Sage Publications.
- Mirzahosseini, H., & Piplani, R. (2011). "A Study of Repairable Parts Inventory System Operating under Performance-Based Contract." *European Journal of Operational Research*, 214 (2): 256-261.
- NASA (1967). "NASA Incentive Contracting Guide." Washington, DC: Author.
- Ng, I., Maull, R., & Yip, N. (2009). "Outcome-Based Contracts as a Driver for Systems Thinking and Service-Dominant Logic in Service Science: Evidence from the Defence Industry." *European Management Journal*, 27 (6): 377-387.
- Ng, I., & Nudurupati, S. S. (2010). "Outcome-Based Service Contracts in the Defence Industry: Mitigating the Challenges." *Journal of Service Management*, 21 (5): 656-674.

- Ogden, J. A., Petersen, K. J., Carter, J. R., & Monczka, R. M. (2005). "Supply Management Strategies for the Future: A Delphi Study." *Journal of Supply Chain Management*, 41 (3), 29-47.
- Phillips, E. H. (2005). "A Whole New Approach." *Aviation Week & Space Technology*, 163 (17): 52-55.
- Randall, W. S., Pohlen, T. L., & Hanna, J. B. (2010). "Evolving a Theory of Performance-Based Logistics Using Insights from Service Dominant Logic." *Journal of Business Logistics*, 31 (2): 35-61.
- Sols, A., Nowick, D., & Verma, D. (2007). "Defining the Fundamental Framework of an Effective Performance-Based Logistics (PBL) Contract." *Engineering Management Journal*, 19 (2): 40-50.
- Strauss, A. L., & Corbin, J. M. (1990). *Basics of Qualitative Research. Techniques and Procedures for Developing Grounded Theory*. Los Angeles, CA: Sage Publications.
- Strukturkommission (2010). *Bericht der Strukturkommission. Vom Einsatz her Denken*. Berlin, Germany: Bundesministerium der Verteidigung.
- Stuart, F. I., McCutcheon, D., Handfield, R. B., McLachlin, R., & Samson, D. (2002). "Effective Case Research in Operations Management: A Process Perspective." *Journal of Operations Management*, 20 (5): 419-433.
- Terpend, R., Krause, D. R., & Handfield, R. B. (2008). "Buyer-Supplier Relationships: Derived Value over two Decades." *Journal of Supply Chain Management*, 44 (2): 28-55.
- Thai, K. V. (2001). "Public Procurement Re-examined." *Journal of Public Procurement*, 1 (1): 9-50.
- U. K. Ministry of Defence (2001). "Defence Acquisition. Ministry of Defence Policy Papers." [Online]. Available at <http://www.mod.uk/DefenceInternet/AboutDefence/CorporatePublications/PolicyStrategyandPlanning/PolicyPapers/PolicyPaperNo4DefenceAcquisition.htm>. (Accessed January 28, 2012).
- U. S. Department of Defense (2001a), *Performance-Based Service Acquisition*. Fort Belvoir, VA: Defence Acquisition University Press.
- U. S. Department of Defense (2001b). *Product Support for the 21st Century: A Program Manager's Guide to Logistics*. [Online].

Available at <https://acquisition.navy.mil/content/download/376/1164/file/perfbasedguide.pdf>. (Accessed January 28, 2012).

U.S. General Accounting Office (2003). *Federal Procurement Spending and Workforce Trends*. Washington, DC: Author.

Voss, C., Tsikrikis, N., & Frohlich, M. (2002). "Case Research in Operations Management." *International Journal of Operations & Production Management*, 22 (2): 195-219.

Yin, R. K. (1994). *Case Study Research*. Newbury Park, CA: Sage Publications.