Developing capabilities in performance-based contracting: A pre-study of Swedish defence acquisition

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Förord

Forskningsprojektet *"Samverkansprogram – Integrerad försvarslogistik"* skall ses mot bakgrund av den pågående omdaningen av försvarslogistiken. Forskningen har således bland annat inriktats mot förändringar av roller och förskjutningar av ansvarsförhållanden i gränsytorna mellan Försvarsmakten (FM) och Försvarets Materielverk (FMV). Ett syfte med samverkansprogrammet är att etablera samverkan och skapa erfarenhetsutbyte med de länder, organisationer och forskare vars erfarenheter och kunskaper är högintressanta för att stödja utvecklingen av en effektiv integrerad logistik- och materielförsörjning. Som en del av detta syfte har Lunds Tekniska Högskola (LTH) uppdragits att genomföra det forskningsuppdrag som avrapporteras i föreliggande rapport.

Mot bakgrund av samverkansprogrammets syfte har forskningsuppdraget genererat erfarenheter som framgent behöver hanteras av samtliga inblandade parter för att resultaten skall kunna nyttiggöras i verksamheten på bästa sätt. Erforderliga resurser måste allokeras för planering och genomförande, liksom för omhändertagande av resultaten. Exempelvis måste konkreta frågeställningar formuleras under planeringen. Under genomförandet måste resurser finnas tillgängliga för att kunna samverka, ge förtydliganden, ta fram relevant underlag, säkerställa kunskapsöverföring, samt vid behov också säkerställa access till relevanta befattningshavare för intervjuer. Efter uppdragets genomförande måste det även finnas en beredskap för att kunna använda de resultat som tagits fram i forskningen.

I föreliggande rapport identifieras förmågebaserade teorier som erbjuder teoretiska perspektiv för att empiriskt studera utvecklingen av de förmågor och kompetenser som behövs inom FM och FMV för att, exempelvis, kunna utforma, hantera och följa upp prestationsbaserade kontrakt på ett rationellt sätt. Annorlunda uttryckt tillhandahåller rapporten verktyg för att kunna studera *"vilka förmågor som behövs internt för att kunna anskaffa förmågor externt"*. Förhoppningen är att under 2015 kunna påbörja en sådan empirisk studie.

Thomas Ekström

Acknowledgement

The author gratefully acknowledges the financial support provided by the Swedish Defence Research Agency (FOI). This pre-study was commissioned by FOI as part of the broader research program titled “Cooperation Program: Integrated Defence Logistics”.

The author would also like to express his deepest gratitude to Thomas Ekström (Licentiate Eng.) for his elaborate feedback and helpful comments on earlier versions of the manuscript, as well as for providing relevant reports produced by Swedish governmental bodies and defence authorities. Discussions with Thomas proved instrumental in gaining in-depth insights into the challenges facing the Swedish Armed Forces (FM) and the Swedish Defence Procurement Agency (FMV) with regards to the transition to a performance-based acquisition model.

The author would also like to thank Mr Joachim Reitan from the Norwegian Defence Research Establishment (FFI) for his review and constructive feedback on an earlier version of the report.

The author is solely responsible for any remaining omissions or deficiencies.

Kostas Selviaridis

Sammanfattning

Denna förstudie och rapport är resultatet av ett uppdrag inom ramen för ett bredare forskningsprogram, "Samverkansprogram – Integrerad försvarslogistik", vilket leds och genomförs av Totalförsvarets Forskningsinstitut (FOI). Förstudien är ett delprojekt inom projekt 3 ("Effektbaserad försvarslogistik) och fokuserar på utveckling av förmågor för prestationsbaserad kontraktering inom den svenska försvarsanskaffningen. Undersökningen ligger rätt i tiden och är högst relevant för de svenska försvarsmyndigheterna givet paradigmskiftet från transaktionsbaserad till prestationsbaserad försvarsanskaffning (Ekström, 2013) och den pågående omdaningen av försvarslogistiken. Omdaningen innebär förändrade roller och ansvarsförhållanden mellan Försvarsmakten och Försvarets Materielverk inom försvarsanskaffningen och försvarslogistiken.

Förstudien är konceptuell till sin natur och dess syfte är att utforska, samt att öka medvetenheten om, konceptet förmågor för prestationsbaserad kontraktering (PBC), liksom att undersöka vilka typer av förmågor den svenska försvarssektorn borde överväga för att implementera en prestationsbaserad försvarsanskaffnings- och försvarslogistikmodell. Därutöver syftar studien även till att identifiera relevanta teoretiska perspektiv för att, i nästa steg, empiriskt studera förmågeutveckling i prestationsbaserad kontraktering. Detta dubbla syfte har föranlett formulering och besvarande av tre forskningsfrågor:

Forskningsfråga 1: Vad är förmågor för prestationsbaserad kontraktering?

Inom ramen för den svenska försvarsanskaffningen betraktas förmågor för prestationsbaserad kontraktering som indirekta eller kompletterande förmågor, till skillnad från de direkta, militära förmågor som hjälper Försvarsmakten att genomföra sina strategiska uppdrag och syften, det vill säga att försvara Sverige och deltaga i internationella fredsbevarande operationer inom ramen för sitt internationella åtagande. Förmågor för PBC är en särskild klass av indirekta förmågor som är kritiska för framgångsrik kontraktering av materielsystem och därtill relaterade logistiklösningar baserade på utfall i form av "tillgänglighet" och/eller "förmåga". Följande definition av förmågor för PBC föreslås: *"Förmågor för prestationsbaserad kontraktering är det indirekta kunnande och den indirekta förmåga som möjliggör för organisationer att specificera, utvärdera och hantera efterfrågade prestationer; utforma lämpliga prestationsorienterad incitamentsystem; samt allokera och hantera finansiella och operativa risker som är relaterade till att realisera prestationer. Utveckling av dessa indirekta förmågor omfattar artikulering och kodifiering av kunskap avseende utformning, implementering och uppföljning av prestationsbaserade kontrakt, med hänsyn tagen även till det övergripande utkontrakteringsbeslutet".*

Forskningsfråga 2: Vilka typer av förmågor borde de svenska försvarsmyndigheterna överväga för att utforma och hantera prestationsbaserade kontrakt som en del av övergången mot en prestationsbaserad försvarsanskaffningsmodell?

Tre typer av förmågor för PBC har identifierats. Den första typen avser förmågor för att utforma prestationsbaserade kontrakt, huvudsakligen i "koncept-" och "utvecklingsskedena" av försvarsanskaffningsprocessen. De är relaterade till kunnande avseende hur efterfrågad prestation skall specificeras, utformning av incitamentsystem, samt identifiering och allokering av risker mellan köpande organisation och försvarsleverantören(-erna). Den andra typen avser förmågor för att leda prestationsbaserade kontrakt, huvudsakligen i "produktions-", "drift- och underhålls-", samt "avvecklingsskedena" av försvarsanskaffningsprocessen. De relaterar huvudsakligen till kunnandet avseende implementering av prestationsbaserade kontrakt; följa upp och mäta leverantörens prestationer; följa upp implementeringen av planerade uppgraderingar av materielsystem; administrera incitamentsbaserade betalningar; liksom att över tiden följa upp hanteringen av finansiella och operativa risker. Den tredje typen avser förmågor till utvärdering, vilka går över alla skedena i försvarsanskaffningsprocessen. Denna kategori avser förmåga att processa och hantera kunskap (avseende anskaffning och kontraktering), liksom förmågor till inlärning och förbättring genom utnyttjande av tidigare erfarenheter och att använda de erfarenheter som görs över tid. Dessa förmågor är viktiga under såväl utformning (*ex ante*) som under implementering och uppföljning (*ex post*) av kontrakt. *Ex ante* förmågor inkluderar identifiering och integrering av den sorts expertis som krävs för framgångsrik projektledning, utformning av krossfunktionella anskaffnings- och kontrakteringsteam, samt erfarenhetsåterföring från tidigare engagemang med samma leverantör, liknande anskaffningsprojekt och kommersiell god praxis. *Ex post* förmågor för inlärning och anpassning säkerställer lämplig utformning av PBC och korrigering av eventuella misstag och/eller utelämnanden under utformningen av kontraktet (exempelvis anpassning av nivåer för prestationer och ekonomiska belöningar/bestraffningar). De handlar även om kodifiering av erfarenhetshantering på ett strukturerat sätt så att den organisatoriska kunskapen avseende utformning, implementering och uppföljning av prestationsbaserade kontrakt ökar över tiden.

Forskningsfråga 3: Vilka teoretiska perspektiv och/eller konceptuella ramverk är användbara för att empiriskt studera utvecklingen av förmågor för prestationsbaserade kontrakt i en svensk försvarsanskaffningskontext, och varför?

Fyra teoretiska perspektiv har identifierats som potentiellt relevanta och användbara för att studera utveckling av förmågor för prestationsbaserad anskaffning och kontraktering. Dessa perspektiv är "indirekta förmågor", det "kunskapsbaserade perspektivet på företag", "dynamiska förmågor" och "organisatoriska rutiner" (för detaljer hänvisas till avsnitt 4.4). Andra teorier som det "resursbaserade perspektivet", "det utökade resursbaserade perspektivet och "alliansförmågeperspektivet" bedöms inte vara tillämpliga i kontexten försvarsanskaffning. Detta beror på att de bakomliggande antagandena för dessa perspektiv (exempelvis stor konkurrensutsättning på marknaden, betydelsen av

konkurrensfördelar och vikten av allianser mellan företag) inte passar in på försvarsanskaffning inom den offentliga sektorn.

Genom att ta ovanstående teoretiska perspektiv i beaktande, i kombination med de utmaningar och möjligheter som de svenska försvarsmyndigheterna står inför för närvarande, kan fyra specifika rekommendationer för empirisk forskning om förmågeutveckling för prestationsbaserad kontraktering presenteras (för detaljer hänvisas till avsnitt 5.3): a) fokus på de inlärningsprocesser, strukturer och mekanismer genom vilka de svenska försvarsmyndigheterna utvecklar sin kunskap och sina förmågor avseende prestationsbaserad anskaffning och kontraktering, b) fokus på hur individer, specifika delar av organisationer och till och med hela organisationer (exempelvis FMV och FM) möts för att kombinera och integrera sin kunskap och utveckla de nya förmågor som är relaterade till den prestationsorienterade anskaffningsmodellen, c) fokus på betydelsen av att pröva sig fram, erfarenhetsinlärning, ackumulering av erfarenheter och kunskap inom utvecklingen av förmågor för prestationsbaserad kontraktering och evolution över tid, samt d) fokus på organisatoriska rutiner avseende uppgifter inom anskaffning och kontraktering inom relevanta försvarsmyndigheter (exempelvis FMV) och dessas effekt på inlärning och kunskapsuppbyggnad.

Nyckelord: prestationsbaserad kontraktering, förmågor, inlärning, försvarsanskaffning, Försvarsmakten

Executive Summary

This pre-study and report is commissioned as part of the broader research program titled “Cooperation Program: Integrated Defence Logistics” which is managed and executed by the Swedish Defence Research Agency (FOI). The pre-study is a sub-project within Project 3 (“Effects-based defence logistics”) and focuses on the development of performance-based contracting capabilities in the context of Swedish defence. This investigation is timely and highly relevant for the Swedish defence organizations given the paradigm shift from a transaction-based to a performance-based defence acquisition (Ekström, 2013) and the ongoing restructuring project. The latter entails changes in roles and responsibilities, mainly among the Swedish Armed Forces (FM), the Swedish Defence Procurement Agency (FMV) and the Swedish Defence Logistics Organization (FMLOG), in relation to defence acquisition and logistics activities.

The pre-study is conceptual in nature and its purpose is to explore and increase awareness of the concept of performance-based contracting (PBC) capabilities, as well as to examine what types of capabilities the Swedish defence agencies should consider for implementing a performance-based defence acquisition and logistics model. In addition, the study aims at identifying relevant theoretical perspectives for empirically studying, as a next step, capability development in performance-based contracting. In connection with this dual purpose, three specific research questions have been formulated and answered:

RQ1: What are performance-based contracting capabilities?

In the context of Swedish defence acquisition, performance-based contracting capabilities are conceived as indirect or ancillary capabilities, as opposed to the direct, military capabilities of the Swedish Armed Forces that help them fulfil their strategic missions and purposes, i.e. defend Sweden and participate in international peace keeping operations as part of their international obligations. PBC capabilities are a specific class of indirect capabilities that are critical for successfully contracting for equipment and associated support services based on “availability” and/or “capability” outcomes. In particular, the following definition of PBC capabilities is proposed: *“Performance-based contracting capabilities are the indirect know-how and capabilities that enable organizations to specify, evaluate and manage required performance, design appropriate performance-oriented incentives systems, and allocate and manage financial and operational risks associated with performance attainment. The development of these indirect capabilities entails articulation and codification of knowledge regarding performance-based contract design and management, considering also the broader context of the outsourcing decision”.*

RQ2: What types of capabilities should Swedish defence agencies consider to design and manage performance-based contracts as part of the transition towards a performance-based defence acquisition model?

Three key types of PBC capabilities are identified. First, performance-based contract design capabilities refer mainly to the "concept" and "development" stages of the defence acquisition process. They are related to know-how regarding the specification of required performance, the design of incentive systems and the identification and allocation of risks between the buying organization and the defence supplier(s). Second, performance-based contract management capabilities refer mainly to the "production", "use and maintenance" and "decommissioning" stages of the defence acquisition process. They mainly relate to know-how in implementing the performance-based contract, measuring, monitoring and managing supplier performance, monitoring the implementation of scheduled equipment refits/upgrades, administering financial incentive payments, as well as managing financial and operational risks in an ongoing fashion. Third, performance-based contract assessment capabilities cut across all the stages of the defence acquisition process. This category refers to capabilities of processing and managing knowledge (regarding acquisition and contracting) as well as capabilities of learning and improving by leveraging prior experiences and making use of lessons learned over time. These capabilities are important both during contract design (*ex-ante*) and contract management (*ex post*). *Ex-ante* capabilities include identifying and integrating the types of expertise required for successful project management, forming cross-functional acquisition and contracting teams, and (re-)using lessons learned from previous experiences with the same supplier, similar acquisition projects as well as commercial best practices. *Ex-post* learning and adaptation capabilities ensure appropriate design of PBC and rectification of any mistakes and/or omissions during the contract design phase (e.g. adapting performance and financial bonus/penalty levels). They also entail codifying any lessons learned in a structured way so that the collective know-how regarding PBC design and management increases over time.

RQ3: Which theoretical perspectives and/or conceptual frameworks are useful for empirically studying capability development in performance-based contracting in the Swedish defence context, and why?

Four theoretical perspectives have been highlighted as potentially relevant and useful for studying capability development in performance-based acquisition and contracting. These are the notion of indirect capabilities, the knowledge-based view of the firm, the dynamic capabilities perspective and the organizational routines approach (for details please refer to Section 4.4). Other theories such as the resource-based view, the extended resource based view and the alliance capability perspective are deemed as not applicable in the defence market context. This is because the assumptions underpinning those perspectives (e.g. highly competitive business environment, the centrality of sustainable competitive advantage and the leveraging of inter-firm alliances) do not fit the public sector context of defence acquisition.

Taking into consideration the above theoretical perspectives and the current challenges and opportunities facing Swedish defence authorities, four specific

recommendations for empirical research on PBC capability development are offered (for details please see Section 5.3): a) focus on the learning processes, structures and mechanisms by which Swedish defence agencies develop their know-how and capabilities in performance-based acquisition and contracting, b) focus on how individuals, specific divisions and even whole authorities (e.g. FMV and FM) come together to (re)combine and integrate their know-how and develop the new capabilities associated with the performance-oriented acquisition model, c) focus on the role of trial and error, experiential learning and experience/knowledge accumulation in PBC capability development and evolution over time, and d) focus on organizational routines regarding acquisition and contracting tasks within the relevant defence authorities (e.g. FMV), and their effects on learning and know-how building.

Keywords: performance-based contracting, capabilities, learning, defence acquisition, Swedish Armed Forces

Table of Contents

1 Introduction

1.1 Background

This section briefly describes the background to this pre-study and report. The pre-study is part of a broader research program called "Cooperation Program: Integrated Defence Logistics" managed and executed by the Swedish Defence Research Agency (Totalförsvarets Forskningsinstitut, FOI). The overall research program has been commissioned by the Swedish Armed Forces (Försvarsmakten, FM) with the aim of creating new knowledge of how logistics and materiel/equipment supply can develop in an integrated and effective way, taking into account a systemic life cycle perspective, from concept development to use and equipment renewal or disposal (FOI, 2013).

An underlying key change in the way Swedish Armed Forces acquire equipment and logistics services is the shift of emphasis towards a performance-based acquisition model. Under the new model the Swedish Defence Procurement Agency (Försvarets Materielverk, FMV) will be responsible for ordering equipment and materiel at a higher system level, taking into account also the life cycle of acquired equipment. The intention is to streamline the management and client business as such and that the orders of higher system levels create additional conditions for FMV to meet the needs of FM for cost efficient solutions (FM and FMV workgroup report, 2013). By streamlining the tasks and roles, where the Armed Forces will be responsible for the functionality of procured solutions and military capability development and FMV will have a clear responsibility for defence logistics, it is believed that increased efficiency and cost reduction in this area is possible. This also means that the defence industry's role will probably be elevated, as defence equipment suppliers may in the future be asked to offer turnkey, integrated solutions of equipment supply and service support (FOI, 2013).

This restructuring entails a change of responsibilities between authorities in accordance with government decision. In broad terms, FMV will have a much greater responsibility for groundwork preparation and decisions within the overall equipment and logistical supplies. This will also require higher interaction between the authorities that relate to the Armed Forces' capability development, overall system management as well as the joint production planning, implementation and accounting (FM and FMV workgroup report, 2013).

The implementation of a performance-based model of acquiring materiel, equipment and logistics services is supported by a reformation of Swedish defence and a transition towards a new organizational structure to support this paradigm shift. The aim of the reformation project is to reduce the cost of

support activities (defence logistics services and equipment acquisition) and to free up resources for the Swedish military to build up its organization and achieve its missions. In the context of an expanding role of the Swedish Armed Forces in accordance with requirements to be involved in international peace keeping operations in addition to defending national borders, this transfer of resources to “core activities” is crucial (Ekström, 2012).

Therefore, the key driving force underscoring the restructuring project is cost reduction in logistics and acquisition activities supporting the Swedish Armed Forces. As part of this reform a large part of the Defence Logistics Organization (Försvarsmakten Logistik, FMLOG) and its activities will be transferred to the procurement agency FMV so that a more efficient allocation of roles and responsibilities is achieved. Another key feature of this reform is the development of an internal defence market, with FM being the customer having overall responsibility for the development of military capabilities and FMV being the provider of acquisition and logistics services that support FM in accomplishing its missions. Similar initiatives for creating internal markets in public services include the merger of the Defence Logistics Organization and the Defence Procurement Agency into a new authority named as Defence Equipment and Support in the United Kingdom (Ekström, 2012).

According to a recent report from The Swedish Agency for Public Management on the progress with the reformation project (Statskontoret, 2013) the restructuring process has already started with activities that did not belong to the operational organization within FMLOG being transferred to FMV. Overall, this transfer of activities over to FMV meant that the number of employees within FMV doubled. In some cases, entire organizational units were transferred from FMLOG to FMV and in other cases only assigned activities (Statskontoret, 2013). The activities transferred to FMV have been organized as a new profit centre within FMV called "Supply, storage, service and repairs" (Förråd, Service och Verkstäder, FSV). The new unit has responsibility for providing the following services to the Swedish Armed Forces (FMV website, 2013).

- Supply, storage and transport of all materiel and supplies (e.g. guns and ammunition) as well as follow up and control of inventory to ensure availability when and where required.
- Inspection, repair, maintenance and refurbishment of military equipment such as fighting vehicles, conventional wheeled vehicles, aircrafts and battle ships.
- Supply of spare parts for equipment.
- Acquisition /purchasing of all products, equipment and services required by the Swedish Armed Forces.

- Other customer services e.g. travel, cleaning, catering, finance and accounting and postal services (offered to the Swedish Armed Forces).

The shift towards a performance-based acquisition process is delayed until 2014, but the final objective is that FM will focus on defining its capability requirements and FMV will have greater responsibilities for buying the best solutions fulfilling these capabilities. Annual savings (in the areas of acquisition and service support of equipment) of 760 million SEK are required starting from 2015. However, according to a recent report from The Swedish Agency for Public Management (Statskontoret, 2013) evaluating the progress of the reformation project, there is a high risk that the estimated savings will not materialize. More specifically, savings of 610 million SEK are estimated to materialize in the areas of service support and acquisition from 2016 onwards, but the expected purchasing cost savings are in doubt according to the Treasury report.

1.2 The assignment

The cooperative research program "Integrated Defence Logistics" has been split down into three projects. Project 1 focuses on the identification of challenges regarding integrated defence logistics and the development of an agenda of research in this area. Project 2 is concerned with the application of outcomes in the new defence logistics concept and is looking to expand knowledge into how materiel requirements can be clarified already in the concept phase of the acquisition process. Finally, Project 3 focuses on effects-based defence logistics and, more specifically, examines how performance-based acquisition and contracting models can be applied to defence logistics to deliver better results.

This pre-study report is part of Project 3 and focuses on the development of performance-based contracting capabilities in the context of Swedish Defence. This investigation is timely and highly relevant for the Swedish defence organizations given the paradigm shift from a transaction-based to a performance-based defence acquisition (Ekström, 2013) and the ongoing restructuring project outlined above.

At this initial phase, the study is conceptual in nature and its purpose is to explore and increase awareness of the concept of "performance-based contracting capabilities", as well as to examine what types of capabilities the Swedish defence agencies should consider for implementing a performance-based defence acquisition and logistics model. Following Dosi et al. (2000), a capability is defined in this study as the reliable capacity to do something as a result of intended action (for further details see Section 3.1).

In addition, the study aims at identifying relevant theoretical perspectives and conceptual frameworks for empirically studying, as a next step, capability

development in performance-based contracting. In line with this dual purpose of the pre-study, three distinct research questions have been formulated:

- *RQ1: What are performance-based contracting capabilities?*
- *RQ2: What types of capabilities should Swedish defence agencies consider to design and manage performance-based contracts as part of the transition towards performance-based defence acquisition?*
- *RQ3: Which theoretical perspectives and/or conceptual frameworks are useful for empirically studying capability development in performance-based contracting in the Swedish defence context, and why?*

1.3 Method and implementation

The pre-study is conceptual in nature, although discussions and meetings with a key contact within the Swedish Defence Research Agency (Thomas Ekström) also contributed to a better understanding of the empirical background and the challenges facing the Swedish defence organization in light of the ongoing restructuring project and the transition towards a performance-oriented acquisition model.

The bulk of the work for this pre-study was conducted during September-December 2013. To pursue the above-defined research questions, the research was structured around the following activities:

Literature review and state of the art mapping

The pre-study is largely based on a systematic review and synthesis of the academic literature (Tranfield et al., 2003) in the areas of performance-based contracting, performance-based logistics, product-service systems and servitization of manufacturing and related business models. In addition, a comprehensive review and analysis of theoretical perspectives on capabilities (see Section 3) was conducted. The aim of the literature review was to map the state of the art (with emphasis on academic state of the art), to conceptually explore the concept of performance-based contracting (PBC) capabilities and to identify potentially useful theoretical perspectives and conceptual frameworks for studying capability development in PBC in the context of the Swedish defence acquisition. The overall study framework and the research focus are depicted in Figure 1.

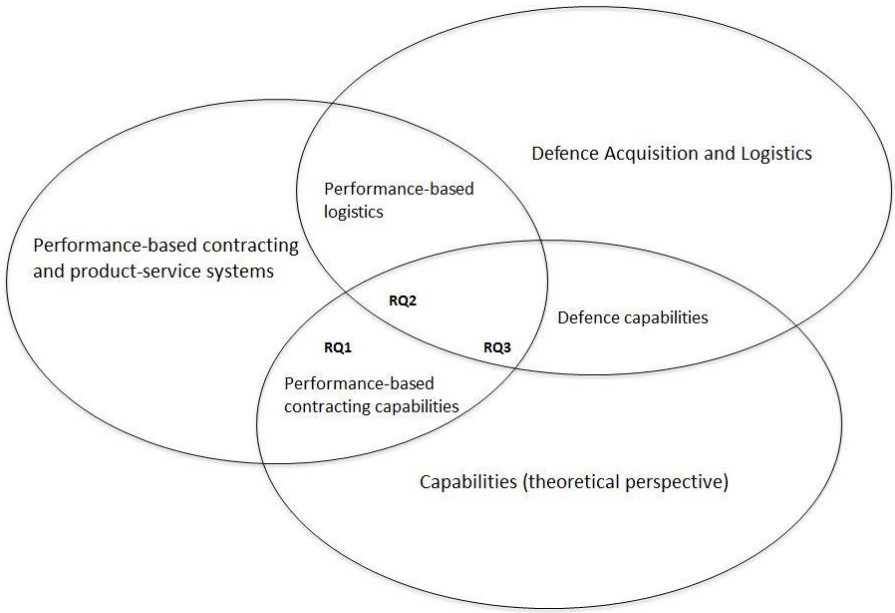

Figure 1: The overall study framework

Secondary data analysis

Several secondary data sources were consulted to complement the systematic literature review activity and improve the understanding of the research problem from a practical viewpoint. More specifically, several reports authored by the Swedish Government, the Swedish Agency for Public Management, as well as FOI, FM and FMV were taken into account to build up background knowledge and ensure relevance of the study. In addition to practitioner reports, website search and analysis of relevant academic projects and memos was conducted.

Informal discussions with peer academics and practitioners

Extensive discussions with peer academics as well as practitioners within the Swedish defence industry were also useful in providing background information and understanding the context of defence market. More specifically, discussions with Thomas Ekström from FOI proved instrumental in understanding the key challenges associated with the reformation project within the Swedish defence authorities. Discussions that the author of this report has had with defence suppliers such as Kockums and GKN (formerly Volvo Aero) also helped in putting the research efforts into perspective, particularly with regards to the shift towards a performance-based defence acquisition paradigm and the challenges facing defence equipment suppliers in this respect.

In addition to this report, the results of the pre-study were disseminated to all relevant stakeholders from Swedish defence authorities (particularly representatives from FM, FOI and FMV as well as other relevant defence authorities) by Mr Thomas Ekström through a workshop that was held in Stockholm in March 2014. In addition, the results were disseminated through publications in academic and defence practitioner conferences which were produced jointly by Thomas Ekström and the author of this report. It is also hoped that this report will also form the basis for developing further empirical studies in the areas of performance-based contracting capabilities within Swedish defence acquisition.

1.4 Delimitations

The focus of the pre-study is on performance-based contracting capabilities and capability development from the buying organization's perspective (i.e. Swedish defence authorities). The perspective of the defence supplier's and how they develop capabilities in relation to designing and selling integrated product-service solutions is not addressed in this report.

In addition, this report treats the buying organization as a collective entity, rather than examining capability development in performance-based contracting within each of the relevant defence authorities (e.g. FMV, FM, FSV and FMLOG). However, as a next step of conducting an empirical study it would be interesting and relevant to draw a distinction between the requisite capabilities of each defence authority, in light of the ongoing restructuring and change in allocation of roles and tasks within Swedish defence.

Finally, the pre-study and report focuses on performance-based acquisition and contracting capabilities and pays much less attention to other types of capabilities that may be important. For instance, logistics and equipment support capabilities retained by the Swedish defence authorities (e.g. FMLOG) as well as technological capabilities, and their interactions with externally procured resources and capabilities of defence suppliers, are not addressed in this report.

1.5 Target group

This report targets two main audiences. First, the pre-study results are highly relevant for practitioners within Swedish defence authorities such as FM, FMV and FOI. In light of the ongoing restructuring exercise and the ensuing transition to a performance-based defence acquisition paradigm, capability development in performance-based contracting is a relevant and timely topic to explore and study further. It is hoped that the results of this report will form the basis for pursuing pressing issues and challenges facing the Swedish defence authorities. More specifically, it is hoped that this conceptual study and its outputs (e.g. typology

of required contracting capabilities at different stages of the performance-based acquisition process) will inform decisions on capability development within the relevant Swedish defence authorities. It is also envisaged that this report will set the stage for conducting an empirical study on performance-based contracting capabilities. The focus and objectives of such a study will be jointly decided with FOI and all relevant defence agencies. In the end, any such ensuing research will have to be commissioned by FM or FMV.

In addition to practitioners, this pre-study (and its next steps where empirical research will be conducted) targets academics involved in research projects in the area of performance-based contracting and product-service systems. The study can potentially contribute to this literature streams by taking a capability perspective of performance-based contracting and focusing on the buying organization's capability development needs. The author of this report has already established links with scholars studying performance-based contracting in other European Universities such as Rotterdam School of Management and Tilburg University School of Management (Netherlands), Bath School of Management (UK), and the Defence University in Munich (Germany). This international research network can be used to amplify the research efforts and to organize joint researcher-practitioner workshops for exchanging ideas and developing a common research agenda. This is also in line with the intentions of Project 3, which is outlined in section 1.2.

1.6 Disposition of the report

The rest of this report is structured as follows. Section 2 provides an overview of the academic state of the art in the research areas of performance-based contracting, product-service systems and pinpoints a few research gaps that are potentially relevant for the present study, especially with regards to capabilities required for designing and implementing performance-based contracting.

Section 3 outlines a number of theoretical perspectives which can collectively be labelled as the capability-based theoretical perspectives. More specifically the resource-based view of the firm (RBV), the extended resource-based view (ERBV), the knowledge-based view, as well as the notions of dynamic capabilities and indirect capabilities, are reviewed as potentially useful perspectives to study capability development in performance-based contracting.

Section 4 conceptually explores and defines the notion of performance-based contracting capabilities and the types of capabilities that Swedish defence agencies might need to consider in order to successfully implementing the transition to the performance-based acquisition paradigm; i.e. performance-based contract design, management and assessment capabilities. In addition, this section discusses four potentially useful theoretical lenses to study capability development in performance-based contracting, notably the notion of indirect

capabilities, the knowledge-based theory, the dynamic capabilities as well as the organizational routines perspective.

Finally, Section 5 revisits the posed research questions and states the contributions and insights provided by this pre-study. The report concludes by making specific suggestions for empirical research within the Swedish defence acquisition context in the near future by connecting back to the potentially useful theoretical frameworks identified.

2 Performance-based contracting: Research state of the art

This chapter provides an overview of the academic state of the art in the area of performance-based contracting. Building on a systematic literature review, analysis and synthesis of existing research conducted by Selviaridis (2011), the concept is defined, and discussed. A conceptual framework of performance-based contracting is also offered, based on the identification of three key building blocks of the concept, namely performance, incentives and risk. The framework provides the basis for discussing and analysing the requisite capabilities for designing and managing performance-based contracts. This section also partly builds on Ekström's (2013) review of the concepts of performance-based logistics and performance-based contracting.

2.1 Background

Performance based contracting (PBC) has emerged as a promising strategy for effective and cost-efficient (out)sourcing of goods, business services as well as integrated product-service offerings (Datta and Roy 2011; Kim et al. 2007). It is closely associated with the shifting emphasis towards buying/selling "performance", "results", or "outcomes" in both manufacturing and service industries and across private and public sector settings (Hypko et al. 2010a; Hooper 2008). The underlying logic of PBC is an emphasis on the specification and evaluation of outputs or outcomes (what is to be achieved) rather than inputs, activities or processes required to achieve that performance (what is needed and how to do it) (Martin 2007).

An early and oft-cited example is Roll Royce's "Power by the Hour" business model (which has evolved into the TotalCare® concept) where the company is paid for providing aero engine maintenance services based on availability of the engine in terms of flight hours rather than based on the cost of labour and spare parts (Neely 2008). Outcome-based pricing schemes are also emerging in business service markets such as logistics where service provider compensation is linked to supply chain cost savings or revenue increases by the customer.

Performance oriented contracting has long been prominent in public sector settings. Within the context of the New Public Management and the public services privatization rhetoric (Greiling 2006), government agencies and local authorities in developed and developing countries are increasingly urged to implement performance-oriented contracts to improve accountability for public spending. Business-to-government (B2G) services operating under outcome-based contracts include, amongst others, healthcare, social care, employment services, offender management, defence, and public transportation services. In

the context of the U.S. and UK healthcare systems, for instance, “pay for performance” (P4P) programs provide financial incentives to healthcare providers to improve the quality of care (Christianson et al. 2008). PBC is of high relevance also to defence markets where contracts for availability and capability has been adopted by the U.S. and European defence agencies as a performance-oriented acquisition strategy (Ng et al. 2009; Sols et al., 2007).

Advances regarding PBC in management practice are reflected in the growing numbers of academic literature published on the topic (Selviaridis, 2011). PBC is gaining academic attention insofar as it is linked with research on the servitization of manufacturing and incentives for implementation of result-oriented product-service systems (Baines et al. 2009). However, the literature appears to be highly fragmented. Unconnected pockets of PBC research tend to focus on specific disciplines or contexts, e.g. healthcare, social welfare, transport, and defence (e.g. Meterko et al. 2006; Martin 2007; Hooper 2008; Ng et al. 2009).

To address this deficiency, Selviaridis and Wynstra (2014) have conducted a systematic review of the literature across disciplines and industry contexts with the aim of integrating and holistically evaluating existing research on PBC. The research has resulted in the development of an integrative framework of performance-based contract design and management. This framework is also useful for practitioners insofar as it highlights key competence areas PBC design and implementation.

In what follows the concept of PBC is defined and the conceptual framework is presented and discussed in detail.

2.2 Definitions of performance-based contracting

There is a rich PBC terminology depending also on discipline and industry application. Multiple terms, including, amongst others, “performance based contracting”, “outcome based contracting”, “pay for performance”, and “performance based logistics” are mostly used interchangeably to emphasize in broad terms the shifting emphasis towards buying/selling results and outcomes (Selviaridis and Wynstra, 2014; Martin 2007). Table 1 presents PBC definitions employed across the main application domains.

Table 1: Definitions of Performance-Based Contracting (Source: Selviaridis and Wynstra, 2014).

Authors	Definition	Application context	Emphasis
Brucker and Stewart, 2011	Performance based contracting offers direct financial incentives to health and human service providers, contingent upon the achievement of pre-determined levels of performance on defined indicators. While there are many variations, most often government purchasers provide a funding base that can be supplemented with financial incentives that are tied to performance.	Healthcare	Financial incentives tied to specified performance levels
Towse and Garrison, 2010	Performance based agreement is between a payer and a pharmaceutical, device or diagnostics manufacturer where the price level and/or revenue is related to the future performance of the product in either a research or a real-world environment… …this is comparable to a "risk sharing" contract where one of the contracting parties has sufficient confidence in its claims to accept a reward or penalty depending on the observed performance.	Pharma	Risk regarding payment linked to future performance
Randall et al., 2010	Performance based logistics shifts responsibility for system performance from the end-user to the upstream supplier network. The supplier network is compensated based on the ability to deliver a performance-based outcome...instead of being paid to overhaul parts or provide replacement components.	Defence	Risk transfer to the supplier network
Kim et al., 2010	Under PBC, compensation to a supplier is based on realized service outcomes such as equipment uptime or response time that are directly related to the value created by the customer through the operation of the system.	Defence	Customer outcomes form the basis for supplier compensation
Hypko et al., 2010	PBC defined in a stricter sense where the machinery/equipment manufacturer acts as performance provider himself. His responsibility generally includes financing and retaining of the ownership of the machinery as the selling of performance in manufacturing industries is at no point supposed to transfer the ownership to the customer. We also distinguish between performance providers that take over only maintenance tasks and others that additionally take over the operation tasks and provide the equipment's output.	Manufacturing	Servitized offerings, asset ownership and performance-based payment schemes
Straub, 2009	The performance approach is, first and foremost, the practice of thinking and working in terms of ends rather than means. It is concerned with what a building is required to do and not with prescribing how it is to be constructed.... PBC clearly alters the nature of risk and its allocation, shifting increased risks on to the contractor and away from the client.	Construction	Specification of outcomes and risk transfer to contractors
Martin, 1999	A performance-based contract is one that focuses on the outputs, quality and outcomes of service provision and may tie at least a portion of contractor's payment as well as any contract extension or renewal to their achievement.	Social care services	Payment linked to achievement of specified outcomes, outputs or quality

The first observation about this data is that the literature largely treats "performance based contracting" and "outcome based contracting" as synonymous and does not explicitly distinguish between outputs and outcomes (for exceptions see Ng and Nudurupati 2010; Martin 1999).

Based on Axelsson and Wynstra (2002), "performance" is defined in this paper in terms of outputs and/or outcomes. "Outputs" are seen as the results of the service activity or production process itself, whereas "outcomes" are seen as the customer value derived from a given service or product. For example, an output of an outsourced call center service could be "% of calls answered within the specified time window", whereas an outcome could be "new sales leads generated". This example also helps to illustrate that customer value need not be quantifiable in monetary terms (Axelsson and Wynstra 2002), but may well include 'soft' elements that are hard to quantify, e.g. citizen welfare outcomes (Heinrich and Choi 2007). The notion of outcome, as defined here, include also Ekström's (2012) efficiency dimension in terms of value for money.

A second point is that the definitions employed tend to refer to different analytical levels. As an example, "performance based financing" focuses on budget allocation in public agencies, and "output-based subsidies" concerns the macro-level financing of countries by international donors (Tineo 2007). However, the term "pay for performance" in healthcare includes incentives directed both to individual professionals and private care organizations.

Analysis of PBC definitions suggests that, despite their particularities, the definitions appear to emphasize certain features (see Table 1) on which any performance based contract should be based:

- Specifying performance in terms of required outputs and/or outcomes.
- Designing incentives to link supplier payment and/or non-financial rewards to the achievement of specified outputs and/or outcomes.
- Transferring risk to the supplier side since its reward is contingent upon output and/or outcome.

2.3 A conceptual framework of performance-based contracting

This section presents a framework (see Figure 2) for mapping out and synthesizing PBC research. The analysis of PBC definitions suggests that existing definitions emphasize the themes of performance specification, incentives design, and transfer of risk to the supplier. Building upon such initial insights, PBC can be conceptualized in terms of three key dimensions (Selviaridis and Wynstra, 2014).

- **Performance**: focuses on the processes and practices of specifying, measuring, evaluating, and reporting performance
- **Incentives**: addresses the structure of incentives as well as their impact on supplier behaviour. The design of the payment mechanism is a key to the success of PBC.
- **Risk**: focuses on allocation of financial and operational risks depending also on the risk preferences of contracting parties. A key feature of PBC is risk transfer to the supplier.

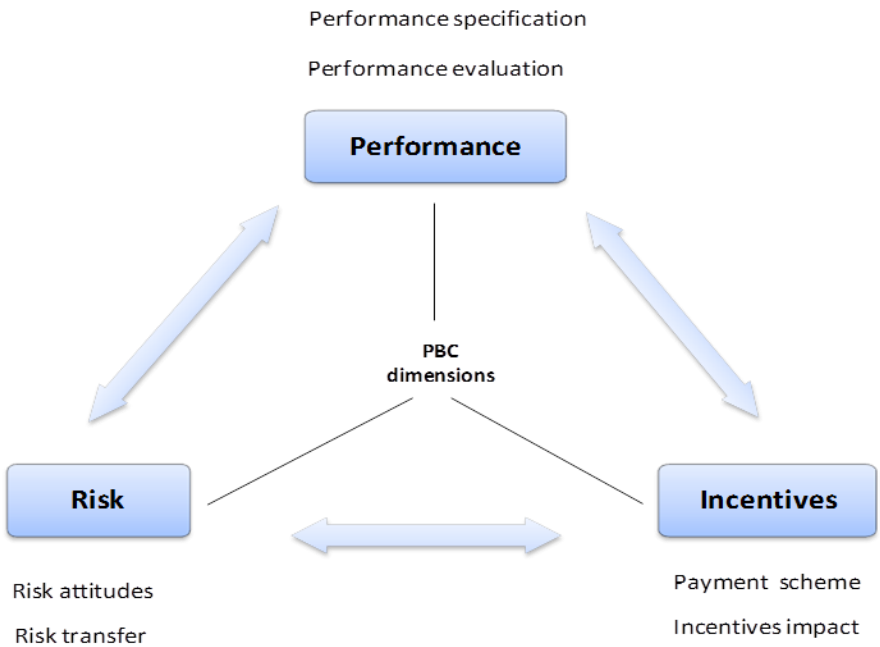

Figure 2: A stylized conceptual model of performance-based contracting (Source: Selviaridis and Wynstra, 2014).

These three PBC dimensions are closely interrelated. Relevant outputs and/or outcomes need to be specified and linked to supplier payment to offer incentives for achieving desired performance and to foster incentive alignment (e.g. Martin 2007). This also presupposes the development of reliable systems of collecting and analysing related data, and measuring and reporting performance. PBC also entails transferring risk to the supplier side to the extent that payment is linked to achievement of output and/or outcome specifications.

It is acknowledged that allocation and transfer of financial and operational risk is certainly not unique to PBC and it applies also to other types of outsourcing and defence procurement models (see Ekström, 2013; 2012 for excellent reviews of

public private business models and related contract types applicable to defence acquisition settings). However, a characteristic differentiating PBC from other types of contracts is the explicit link that establishes between performance and risk via the design of performance-based incentives and, crucially enough, the potential responses of suppliers to such incentives (Selviaridis and Norrman, 2014). In particular, the extent to which suppliers are willing to bear increased risk depends partly on how performance is specified (e.g. in terms of clarity and intensity of specified output or outcome targets), whether or not performance is measurable, verifiable, and attributable to supplier input and behaviour (e.g. McLellan et al 2008; Kim et al 2007; Else et al. 1992), and whether the financial risk associated with performance-based incentives is transferable to sub-contractors or other parties in the supply chain (Selviaridis and Norrman, 2014).

The structure and intensity of contractual incentives may also influence the suppliers' risk perceptions and preferences depending, for example, on the extent to which buyers are willing to balance increased risk against proportionate rewards (e.g. Hooper 2008; Heinrich and Choi 2007). The structure of incentives clearly impacts supplier behaviour, either positively by enabling incentive alignment and performance improvement or negatively by directing supplier effort away from the assigned key objectives (e.g. Christianson et al. 2008; Lu and Donaldson 2000; Behn and Kant 1999).

Based on the above stylised model, Selviaridis and Wynstra (2014) have recently proposed a framework for classifying and mapping out PBC research (see Table 2). In addition to the emphasis on performance specification and evaluation, payment scheme design and its impact on supplier behaviour as well as risk allocation and attitudes, the framework stresses additional themes such as PBC design influencing factors as well as PBC benefits, pitfalls and implementation success factors. With consideration also to the theoretical perspectives employed to study PBC (e.g. agency theory, management control theory, transaction cost economics and the service-dominant logic), the literature is classified in terms of two key phases of the contracting process i.e. *contract design* and *contract management* (see Selviaridis and Wynstra, 2014).

2.3.1 Performance

Specification of outputs/outcomes and metrics design

Performance contracting entails specification of outputs and outcomes rather than inputs and processes of the required service (Straub 2007). However, performance specification and the design of associated measures are dependent on the extent of performance measurability and verifiability during the contract period (Heinrich and Choi 2007). Simply put, the harder it becomes to measure outcomes, the higher the chance that performance is specified based on 'hybrid'

specifications based on surrogate outputs, processes, or even inputs (e.g., McNamara 2005; Martin 2002).

Table 2: A Proposed Classification Framework of PBC Research (Source: Selviaridis and Wynstra, 2014).

	Contract Design	**Contract Management**
Performance	Specification of outputs/outcomes and design of metrics	Performance measurement and reporting systems
Incentives	Payment scheme design Positive/negative incentives	Incentives impact on supplier behaviour
Risk	Risk transfer to supplier Risk attitudes/preferences	Risk management capacity
PBC antecedents and outcomes	PBC design influencing factors	PBC benefits, pitfalls and implementation success factors

A potential specification challenge is a gap between the strategic mission of the buying firm, its objectives, and the performance metrics designed (Behn and Kant 1999). For instance, measures such as "capacity utilization" are more of a means to achieve service outcomes (Smith 2010). In this sense, it is crucial that the needs of end-users are reflected in performance indicators since the aim is to develop service systems that satisfy those needs (Falisse et al. 2012; Enquist et al. 2011). Performance indicators can include both qualitative and quantitative elements (Jacosbon and Neuman 2009; McLellan et al. 2008) and can also be adjusted over time to take into account supplier learning effects and to ensure appropriate reward levels (Ozbek and de la Garza 2011).

Performance measurement and reporting systems

Performance-based specifications entail significant investments in developing sound data collection and analysis, performance monitoring, and reporting systems to increase supplier accountability (Faith et al. 2010; Morse et al. 2008; Panet et al. 1998). Performance evaluation can be conducted at different levels: a) at the supplier level service the financial performance against specific indicators is assessed b) at the end-user level the service impact on beneficiaries is assessed (Gates et al. 2004). In cases of information asymmetry, the relative performance of suppliers is reported and evaluated in a way that introduces competition (Petersen et al. 2006). Measurement methodologies should be developed (Ozbek et al. 2010; Byrnes et al. 1997) and these often require technological capabilities in order to capture and analyse data (e.g., Saeideh et al. 2012; Anastasopoulos et al. 2009). Glaser and Tolman (2008), for instance, propose the use of sensor technology to validate and monitor performance and to facilitate maintenance planning, and Stenbeck (2009) discusses how data

collection technologies enable measuring the effect of winter severity with regards to highway maintenance contractor compensation.

However, performance evaluation can be problematic in terms of selection of measures, data collection, reporting and evaluation routines (Meezan and McBeath 2011; Sikka 2007; Curtin et al. 2005). Performance measurement systems entail high transaction and administrative costs and stress budgets (Doerr et al. 2005; Lane 2005). Participation in performance-based contracts may be discouraged if the costs of collecting data and setting up reporting and monitoring systems outweigh the buyer and supplier benefits (Straub 2009). Overall, it is suggested that the development of performance management and reporting systems is an evolutionary process with measures and methods of evaluation adjusted accordingly as experience and learning accumulates (Jacobson and Neuman 2009).

2.3.2 Incentives

Payment scheme design

Financial rewards and/or penalties are tied to specified outputs or outcomes, thus providing incentives to suppliers to focus their efforts in performance achievement (Hünerberg and Hüttmann 2003). One literature stream focuses on matching contract payment types to buyer- and supplier-related incentives (e.g., Dey et al. 2010). Information asymmetry, risk attitudes and renegotiation expectations of contracting parties (Hypko et al. 2010b; Hooper 2008) influences payment scheme design. The literature compares PBC with other contract types such as fixed-price and cost-plus (and its variants), (Kim et al. 2007). It should be noted however, that performance-based payment schemes include fixed price and even cost-plus elements in combination with incentive fees. PBC-oriented charging appears to be more appropriate in complex and knowledge-intensive contexts when it is hard to *ex ante* evaluate quality and when supplier expertise input is required (Roels et al. 2010).

Service outputs/outcomes may be non-verifiable and providers are too often reluctant to agree to contracts where payment is totally linked to such measures due to the ensuing financial risks (McLellan et al. 2008). Instead, payment models may reflect hybrid specifications and tie provider compensation to a mix of input, process, and outcome targets (Martin 2005). This model is also known as “milestones contracting” where emphasis is on rewarding progress towards the achievement of primary outcomes (Gates et al. 2004) to address the supplier’s cash flow-related risks (Gruneberg et al. 2007). Milestone contracting, however, does not seem to provide performance improvement incentives in the case of non-verifiable outcomes. An alternative approach is to tie performance to non-financial incentives such as professional reputation, supplier recognition through performance publication, contract renewal, and favourable treatment in future

tenders (Gonzalez-Diaz and Sanchez 2011; Custers et al. 2008). Reputational effects negate provider incentives to decrease costs and compromise performance (Hensher and Stanley 2008).

Positive and negative incentives

Payment scheme design entails the definition of bonus and penalty payments as well as "dead zones" representing acceptable levels of performance within which suppliers are neither penalized nor extra-rewarded (Brown and Burke 2000). In cases of using multiple metrics to evaluate performance, "proportionality zones" can be used to reflect acceptable performance and supplier compensation levels among metrics when there is over-performance for some and under-performance for others (Sols et al. 2008). The mix and intensity of financial bonuses and penalties are linked to minimum and maximum performance standards (e.g., Sols et al. 2007) and often reflect suppliers' financial risks by delimiting penalty payments to reasonable levels or excluding penalties for specific measures altogether. This is a crucial issue since suppliers are often reluctant to bear risks for outcomes/outputs influenced by external, uncontrollable factors (Buchanan and Klinger 2007; Fearnley et al. 2004).

Incentives impact

The structure and intensity of financial and non-financial incentives impact supplier behaviour (Nicholas et al. 2011; Huntington et al. 2010). Performance based bonuses and penalties result in incentive alignment and performance improvement (Kim et al. 2007). Incentive fees can be tied to specific effectiveness and efficiency targets in a way that meet broader social and environmental goals. Considering the example of passenger transport services, bus operators are offered financial incentives for service improvement which in turn entails reduced use of private cars and less traffic and pollution in cities (Hensher and Stanley 2003).

Performance based incentives may also create several unintended consequences (Dellarocas 2012; Grinblatt and Titman 1989). Badly designed incentives may direct provider effort away from performance achievement according to all customer segments or service aspects. In the context of public transport, for instance, Fearnley et al. (2004) discuss how a punctuality-related penalty undermined transport safety since operators shifted their emphasis towards on-time services. Suppliers may either target easy-to-serve service user populations or discriminate against difficult-to-serve customers ("creaming" effect) to maximize bonus payment or avoid financial penalties respectively (Shen 2003). They may also intentionally misreport their performance ("gaming" effect) to receive full payment (Lu and Ma 2006; Lu 1999). Performance improvement may also be undermined when the supplier is incentivized to consider the cost trade-off between incremental service improvements and imposed financial penalties for under-performance (Crew 1997). Successful incentive systems

should reflect a good balance between rewards and the increased risks borne by suppliers in connection to PBC design (Nowicki et al. 2008).

2.3.3 Risk

Risk transfer to the supplier

PBC entails financial risk transfer to suppliers insofar as their compensation is tied to the achievement of performance (Straub 2007; Brown and Burke 2000). Under performance-based payment, suppliers assume extended responsibilities in designing appropriate service systems to meet specified outputs or outcomes (Randall et al. 2010; Hünerberg and Hüttman 2003). Performance-based contracts appear to be suitable in the cases of buyer risk aversion and willingness to transfer financial risk to the supplier side (e.g., Hypko et al. 2010a; Caldwell et al. 2009). The amount of risk transferred to the supplier increases as we move towards purely outcome-based contracts (Martin 2007). Despite the fact that transfer of financial risk under PBC is regarded as something beneficial for buyers, in many contexts such transfer is, by default, restricted. This is because the buyer (public sector agency) in such settings is still held accountable for operational failures. For instance, in the defence setting it is questionable whether operational risks can really be transferred to private sector contractors (Doerr et al. 2005).

Attitudes towards risk and risk management capacity

The underlying assumption of the above discussion is that suppliers will be willing to assume the increased risk passed onto them by the customer organization. The supplier's willingness to accept increased risks, though, is influenced by factors such as the clarity, measurability, and level of specified performance (Towse and Garrison 2010; Billinton and Feng 2007; Else et al. 1992). In line with agency theory predictions, provider risk aversion might be an inhibiting factor in the implementation of PBC (Hypko et al. 2010b; Floricel and Lampel 1998). Providers can be risk-averse especially when they perceive themselves as having limited capacity to manage increased financial risks associated with performance-oriented agreements (Kanakoudis and Tsitsifli 2012). Supplier attitudes towards bearing operational and financial risks affect choices of outsourcing models and contract design strategies (Buchanan and Klingner 2007; Doerr et al. 2005). That is, the less risk the provider is willing to accept, the lower the intensity of positive incentives (for instance in terms of contract length) should be (Doerr et al. 2005). Provider risk aversion may also lead to payment and incentive schemes that link a limited portion of performance targets to financial rewards and penalties (Buchanan and Klingner 2007). However, risk premium payments and rewards against pre-defined milestones can incentivize suppliers to accept increased risk levels (McInerney 2010; Kim et al. 2007).

2.3.4 PBC antecedents and outcomes

PBC design influencing factors

The design of PBC schemes can often be inhibited by a lack of contracting capabilities in terms of defining measurable and attributable outcomes to avoid "free-riding", designing win-win incentives, and imposing financial penalties to suppliers (Roels et al. 2010; Jacobson and Neuman 2009). Since performance incentives should be sustainable over long service periods, PBC projects are not appropriate for short-term planning horizons i.e. one-year contracts (Lane 2005). It is suggested that certain contractual flexibility is necessary to allow for adjusting performance measures and financial incentives as PBC-related competence accumulates (Sikka 2007; Behn and Kant 1999).

PBC in the context of B2G service provision may be compromised by the competitive tendering ethos of public procurement since extensive collaboration with private contractors is restricted. The literature examines how this contradiction affects the design of PBC: while some authors suggest that PBC can complement competitive tendering (Fearnley et al. 2004), others suggest that competitive approaches to PBC do not result in performance and as a result claim that truly collaborative relations among stakeholders are needed (Behn and Kant 1999; Lindkvist 1996). Other authors suggest that a negotiated approach results in lower transaction costs when re-tendering for services (Hensher and Stanley 2003). Successful PBC design also depends on a supporting governance structure integrating contractual and relational exchange mechanisms (Lewis and Roehrich 2009).

Benefits, pitfalls and success factors

There seems to be disagreement in the literature regarding the effects of PBC initiatives. Several authors report that PBC has positive effects in terms of service delivery and cost efficiency (e.g., Rodriguez et al. 2009; Rusa et al. 2009). Others emphasize pitfalls of performance-based contracting approaches (e.g., Ssengooba et al. 2012). A third group of studies suggests that the realization of accrued PBC benefits is contingent on how incentives are designed and managed (e.g., Johnson and Dinakar 2010; Guthrie and Neumann 2007).

Key benefits identified in the literature include increased efficiency, alignment of buyer-supplier incentives, improved public spending accountability, service/product and process innovation, budget flexibility for negotiating payment levels in line with service levels, and inclusion of social objectives into specified outcomes without linking them to additional rewards (Arur et al. 2010; Anastasopoulos et al. 2010; Soeters and Griffith 2003). Tying performance to financial compensation levels tends to achieve a more efficient allocation of resources and better customer-supplier matching as compared to fixed-price contracting (Lu and Donaldson 2000). In the context of B2G services, PBC is

more effective in terms of maximizing value for money and social surplus insofar as social and environmental objectives are aligned with economic goals. In the context of public transport for instance, provider payment can be partly dependent on reduction of congestion and CO2 emissions (Hensher and Wallis 2005).

However, PBC also carries its own pitfalls such as incurring high costs of setting up measurement systems and monitoring performance, failing to translate strategic outcomes to operational metrics, inhibiting experimentation and innovation in case of high uncertainty, and restraining continuous improvement mentality. With regard to the latter, it is argued that despite its emphasis on ongoing performance monitoring, PBC tends to undermine continuous improvement mentality since performance exceeding upper targets is rarely rewarded (Behn and Kant 1999; Else et al. 2002). PBC may also instigate its own, particular "creaming" and "gaming" effects as discussed previously (Lu and Ma 2006; Shen 2003).

The literature also stresses several success factors of PBC implementation. Operational factors such as information integration and sharing between buyers and suppliers, service demands, product or service usage, service technologies, and access to customer resources are often discussed (Randall et al. 2010; Kim et al. 2010; Ng and Nudurupati 2010; McBeath and Meezan 2010). PBC also entails a number of behaviour changes within and between organizations. Internally, factors such as establishing a performance-oriented and customer-centric mind-set, developing a service culture, and securing political support and necessary funding have been stressed (Randall et al. 2011; Datta and Roy 2011). Inter-organizational relationships based on collaboration and teamwork, trust, and information integration are also emphasized as key to success (Guo and Ng 2011; Hensher and Stanley 2003).

2.4 PBC and product-service systems

Performance-based contracting is closely associated with concepts such as "product-service systems" and "servitization of manufacturing" (Baines et al., 2009; Neely, 2008). The term product-service systems (PSS) is used to describe the general trend in many industrial sectors towards offering combinations of products and services as integrated solutions to customer problems (Davies et al., 2007; Oliva and Kallenberg, 2003). In a similar vein, Baines et al. (2009) define servitization as the "the innovation of an organization's capabilities and processes to better create mutual value through a shift from selling product to selling PSS". Tukker (2004) classifies PSS in terms of product-oriented, use-oriented and results-oriented services (see Figure 3). Neely (2008) expands on Tukker's (2004) classification and discusses five distinct types of PSS:

a) **Integration oriented PSS** (products plus services): these involve going downstream by adding services through vertical integration. Ownership of the tangible product is still transferred to the customer, but the supplier seeks vertical integration, e.g. by moving to financial, consulting and logistics services.

b) **Product oriented PSS** (products plus services that are integral to the product): the ownership of the tangible product is transferred to the customer, but additional services directly related to the product are provided, e.g. design and development, installation, maintenance and support services.

c) **Service oriented PSS (**coupled product and service): incorporate services into the product itself. Ownership of the tangible product is still transferred to the customer, but additional value added services are offered as an integral part of the offering, e.g. engine health monitoring services.

d) **Use oriented PSS**: focus is shifted to the service delivered through the product. The ownership of the tangible product may be retained by the service provider, who sells the functions of the product. These business models require alternative distribution and payment systems, such as sharing, pooling and leasing.

e) **Result oriented PSS**: they seek to replace the product with a service. There is no need to have or own the product is and the focus is on selling functions and outcomes.

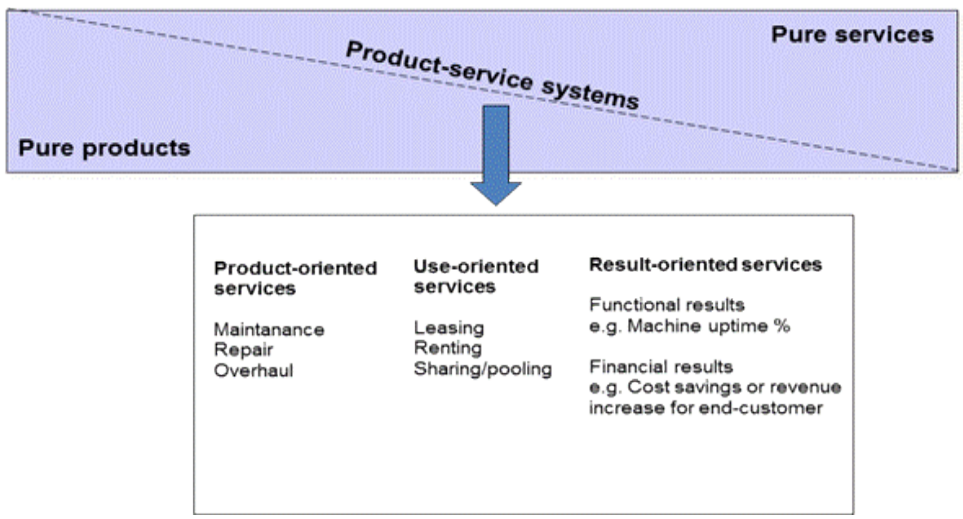

Figure 3: Tukker's (2004) classification of PSS (adapted from Baines et al, p. 499).

Despite the apparent close association between PSS, servitization and PBC, the existing academic literature has failed to clarify how, and in which specific ways, these concepts interrelate.

Only a few studies explicitly address how performance based contracts function in the context of servitized business models. More specifically, Datta and Roy (2011) argue that the servitization of manufacturing has led to application of performance-based contracts (interpreted by the authors as results-oriented product-service systems) which in turn requires reformulation of the operations strategy. A framework is developed to guide the development of operations strategy for result-oriented PSS taking into account contractual aspects. In particular, the authors stress contract definition, customer and provider operations strategy and service delivery strategy as key elements of result-oriented PSS.

Hypko et al, (2010a) discuss PBC design and implementation in manufacturing industries in terms of performance provider background, asset ownership during and after the contract, responsibility for personnel, payment models, and location and exclusiveness of operations. They identify four potential payment mechanisms such as pay-on-availability (independent of equipment utilization), pay per unit of machine output (linked to machine utilization), pay-per-use of equipment and payment based on customer economic results (savings, revenues). In a similar vein, Hünerberg and Hüttmann (2003) examine the application of performance-based pricing strategies to the capital goods industry. Three main pricing approaches discussed:

a) **Input-based** (e.g. times used, time machine used)

b) **Output based relating to performance** (e.g. uptime, max output of machine/hour)

c) **Output-based in relation to economic results of the customer** (cost savings, revenues generated, and contribution to margins).

PBC is mostly related to risk-sharing and financing methods of pricing with supplier responsibility and risk levels increasing. However, the results of the study show little use of output-based pricing relating to economic results exactly because they are perceived as riskier by suppliers of product-service offerings (Hünerberg and Hüttmann, 2003).

Hypko et al. (2010b) discuss PBC in terms of two types of product-related services offered in manufacturing industries: maintenance (availability of machine) and operation (availability plus responsibility for the machine's output, which increases the provider's risk). Factors affecting PBC design include customer risk aversion, high-powered incentives, alignment of manufacturer-customer preferences to performance effectiveness, outcome uncertainty, customer loyalty, productivity increase and cost decrease.

Despite the above, we need a much better understanding of how performance-based contract design and management fits within servitization strategies and the associated capability development requirements. The existing servitization literature appears to focus on the operational and service design- and delivery-related capabilities that suppliers of product-service systems need to develop (e.g. Davies et al., 2007; Oliva and Kallengberg, 2003). These capabilities are either available within the firm or they need to be acquired externally through relationships with suppliers, customers and business partners (Bastl et al., 2012; Spring and Araujo, 2009; Windhal and Lakemond, 2006). However, the servitization/PSS literature offers limited insights with regards to: a) the role of contracting capabilities for implementing product-service business models across extended supply networks (Bastl et al. 2012), and b) the capabilities required by the buying organizations to design, manage and control performance-oriented contracts and inter-organizational performance management systems. It is suggested that future empirical research on PBC should direct attention to these areas. Much work remains to be done to gain in-depth insights regarding:

a) What capabilities does the buying organization need to acquire product-service solutions and make the shift towards a performance-based acquisition paradigm?

b) What types of contracting capabilities are required to design and manage performance-based, product-service offerings?

c) What challenges and potential changes in terms of organizational structure, allocation of responsibilities, tasks, resources and capabilities among different functions internally (users vs. buyers) the buying organization faces? How should those challenges and changes be managed to enable capability development in PBC design and implementation?

3 The capability view of organizations

This chapter outlines a number of theoretical perspectives which can collectively be labelled as "capability-based perspectives". These are the following: the organizational routines perspective, the resource-based view of the firm, the extended resource-based view of the firm, the knowledge-based view of the firm, the dynamic capabilities perspective and, the literature on indirect capabilities. The aim with this review is to identify capability-based theories that would offer potentially useful lenses for studying the development of performance-based contracting capabilities. Rather than providing an exhaustive account of these perspectives, the focus here is on key conceptual elements that are relevant for the study and its objectives.

3.1 A note on definitions

There is an abundance of terms and definitions used in the academic literature, such as "resources", "routines", "capabilities", "skills", and "competences" which often create conceptual confusion. For the purposes of this study a capability can be generally understood as "the reliable capacity to do something as a result of intended action. Capabilities fill the gap between intention and outcome, and they fill it in such a way that the outcome bears a definite resemblance to what was intended" (Dosi et al., 2000, p. 2).

Capabilities are associated also with the notion of organizational routines (Nelson and Winter, 1982). Routines differ from capabilities at least in terms of: a) scale of application and analytical unit, and b) conscious choice and purpose. While capabilities refer to a large-scale unit of analysis (what organizations do to earn a living) and clearly defined outcomes that are supposed to enable, routines may also be associated with lower levels of organized activity (e.g. what functions within an organization do) and may entail no deliberate action or conscious choice (Salvato and Rerup, 2011; Becker, 2004; Dosi et al., 2000). Some routines can be equated with capabilities (Barney, 2001), but not all routines are capabilities.

Capabilities, similarly to routines, are collective entities and thus differ from the skills and competence sets of individual managers. Furthermore, capabilities should not be equated with resources and the literature tends to draw a clear distinction between the two concepts. According to Amit and Schoemaker (1993, p. 35) resources are "stocks of available factors that are owned or controlled by the firm," whereas capabilities "refer to a firm's capacity to deploy resources, usually in combination, using organizational processes, to effect a desired end". In addition, capabilities encapsulate both explicit processes and those tacit elements (e.g. know-how and leadership) embedded in the processes. Hence,

capabilities are often firm-specific and are developed over time through complex interactions between the firm's resources (Amit and Schoemaker 1993).

Taking a hierarchical approach, resources can be conceived as the zero-level order factors forming the basis for sustainable competitive advantages, whereas capabilities are first-order constructs reflecting the firm's ability to deploy resources to attain its goals (Wang and Ahmed, 2007). Capabilities also encapsulate routines; more specifically, capabilities are often conceived as firm-level assemblages of lower-level routines that are developed and deployed to achieve specific outcomes (Salvato and Rerup, 2011; Dosi et al., 2000).

3.2 Organizational routines

The notion of routines originates in the field of evolutionary economics and refers to the idea that organizations collectively develop repetitive patterns of actions and cognitive regularities to do things (Salvato and Rerup, 2011; Becker, 2004). Routines are useful for understanding economic and organizational changes by observing incremental changes in routines (Becker, 2004). The notion of routines is most often associated with the work of Nelson and Winter (1982), who studied evolutionary change in organizations and the economy at large by focusing on the mechanisms through which routines are varied, selected and retained with the aim of creating sustainable competitive advantages. Their main argument is that organizations vary in the routines they have developed to conduct their business. In a highly competitive landscape, some of these routines are selected and retained as being more efficient and effective than others. The least efficient and effective routines are discarded or adjusted to fit the environmental context within which organizations compete (Nelson and Winter, 1982).

Becker (2004) has provided a systematic review of the routines literature, focusing on the characteristics of routines and their effects on organizations. Key characteristics of routines include:

a) Activity patterns and cognitive regularities (rules),

b) Recurrence of activity patterns,

c) Collectivity and the distributed across space and organizations nature of routines (skills are applied to the level of individual whereas routines at the organizational level, see Dosi et al., 2000),

d) The extent to which routines are performed subconsciously. Empirical studies suggest that they are not performed sub-consciously, and hence they are open to change to variation,

e) Routines have a processual nature which allows studying organizational change by observing incremental changes in routines,

f) Routines are embedded in an organization and its structures, and are specific to a context (and hence general rules need to be specified in an incomplete way when transferred to other contexts), g) routines are specific; specificity relates to historic evolution of the firm and its routines, local specificity and relationship specificity and entails that it is difficult to replicate routines outside the firm,

g) Routines change in a path-dependent manner taking into account previous states. In other words, previous and current organization choices and developed patterns of actions and activities influence and often restrict future development of routines. This implies an incremental evolution of routines, and

h) Routines are triggered by actors based also on their performance aspiration levels, and by external cues such as links between sequential routines.

Becker (2004) also identifies the key effects of routines:

a) Routines are coordination and control mechanisms through e.g. their support of doing things in parallel, or their regularity to practices of a group,

b) Routines entail truce among organization members giving and receiving orders,

c) Routines help economize on cognitive resources,

d) Routines reduce uncertainty,

e) Routines entail stability as they recur without much change, but they also contribute to change since they change incrementally over time,

f) Routines are repositories of knowledge, including tacit knowledge in the organization since they capture the knowledge of individuals at its application to perform a task or activity.

Routines have been commonly studied as “black boxes”, and as a functional whole (e.g. hiring employees). However, more recent studies suggest that routines have internal structure and dynamics which it is worth exploring (Salvato and Rerup, 2011; Pentland and Feldman, 2005). Routines can be defined both as cognitive regularities which are quite abstract and help guide actions within organizations (e.g. formal procedure of how to hire employees), and as behavioural patterns of action through which the rules are enacted by specific individuals, in specific contexts, places and times (Salvato and Rerup, 2011). In other words, a distinction is drawn between the ostensive (cognitive regularities) and performative (behavioural patterns of action) aspects of organizational routines. In addition, artefacts such as written rules and standard operating procedures play an important role as indicators of the ostensive aspects of

routines, or as efforts to codify the ostensive aspect (Pentland and Feldman, 2005).

However, the performativity of routines entails that actual actions might diverge from how the routine is codified by the rules, standard procedures or other artefacts. Since abstract cognitive regularities are almost always open-ended and allow for interpretation and discretion by individuals enacting the routines, divergence between the rules and how things are actually done may exist (Pentland and Feldman, 2005). Such divergence is theoretically interesting insofar as it helps to understand how organizations reflect upon what they do (within the bounds of a specific routine), as well as how they learn and evolve their routines and capabilities (Salvato and Rerup, 2011). Variation from the rules and guidelines during routine enactment may also result in lessons learned which can in turn be fed back to re-frame what organizations do and adjust the rules and guidelines accordingly e.g. allowing interviews with job candidates to be done online as part of the hiring routine (Feldman and Pentland, 2003).

The routines perspective shares a lot of common ground with the resource-based view of the firm particularly with regards to its assumptions of firm heterogeneity resulting from path dependencies or initial firm endowments, market competition and the role of competitive advantage (Barney, 2001). In what follows the key resource and capability-based theories are outlined and discussed.

3.3 The resource based view of the firm

The resource based view (RBV) of the firm is one of the dominant theoretical frameworks within strategy literature to date (Kim and Mahoney, 2005; Peteraf, 1993). The RBV developed as a complement to the industrial organization (I/O) view focusing on the structure–conduct–performance paradigm and suggesting that the industry's structure has a significant bearing on firm performance. Being positioned against this view (Barney, 2001), the RBV explicitly focuses on how the resources within the firm can be used to create sustainable competitive advantages. The aim is to explain why firms in the same industry might achieve different levels of performance (Kraaijenbrink et al., 2010).

The RBV is a theory about the nature of firms, as opposed to theories such as transaction cost economics (TCE) which seeks to explain why firms exist (Lockett et al., 2009). With that being said, knowledge-based theories of the firm, which are underpinned by RBV framework, provide an alternative explanation to the definition of firm boundaries (this is revisited later in this chapter).

Broadly speaking, the RBV stands on the heterogeneity and immobility of competitive capability-producing and rent-earning (i.e. profit-generating)

resources (Barney, 1991). It advocates a resource perspective into how organizations can achieve diversification. Its underlying assumption is that resources are leveraged by diversification, rather than by rentals or sales (Wernerfelt, 1984). RBV focuses on the firm's internal resources as the primary unit of analysis and suggests that organizations that possess resources that are valuable, rare, inimitable and/or non-substitutable (famously summarized by the acronym VRIN) are bound to develop and sustain an edge over competitors (Lockett et al., 2009; Barney, 1991).

a) **Valuable** resources can be used to exploit opportunities and/or neutralize threats in a firm's environment.

b) **Rare** resources are those that are limited in supply and not equally distributed across a firm's current and potential competition.

c) **Inimitable** resources are difficult to replicate by other firms. The extent of inimitability also determines how sustainable competitive advantages are.

d) **Non-substitutable** resources are those resources which cannot be simply replaced (or substituted) by another one (Barney, 1991).

The RBV assumes that resources and capabilities are heterogeneously distributed across firms and that such heterogeneity may persist over time. Firms' bundles of resources and capabilities provide a competitive advantage as long as they are valuable and rare, and for such advantage to be sustainable over time, they must also be costly to imitate and non-substitutable (Barney, 1991; Peteraf, 1993). Firms that build their strategies on path dependent, causally ambiguous, socially complex, and intangible assets outperform firms that build their strategies only on tangible assets (Peteraf, 1993; Dierickx and Cool, 1989; Barney, 1991). Makadok (2001) distinguishes this perspective focusing on how firms exploit their valuable, rare, and costly to imitate resources and capabilities to generate economic profits (which he calls "resource-picking theories") from a perspective (the so- called "capability building theories") drawing on evolutionary approaches and emphasizing how firm capabilities change over time and what the competitive implications of such change are (Barney, 2001). This latter variation of the resource-based logic formed the basis for the development of the notion of "dynamic capabilities" (see Section 3.6).

The RBV also stresses the role of managers and their perceptions with regards to resource functionality, recombination and creation (Lockett et al., 2009). Managers, as entrepreneurs, play a crucial role in sensing and seizing productive opportunities and deploying and using resources to realize those. They have significant input in obtaining information (which is asymmetrically distributed) and predicting ex ante (i.e. in advance) the future value of a particular resource which can form the basis for developing competitive advantages. Such advantages can be sustained by developing mechanisms for avoiding resource

imitation by competing firms (Rumelt, 1984). Also, managers should identify potential combinations of resources that are complementary and can create value as well as take into account the path dependent nature of resource creation when making decisions about the growth of the firm (Lockett et al., 2009).

It is important to note that the theoretical underpinnings of the RBV theory can be traced back to the seminal work of Edith Penrose (1959) on the growth of the firm. Penrose (1959) was the first to conceptualize the firm as a collection of productive resources which can be used in potentially different ways and with different productive outcomes. By emphasizing the use and creation of new knowledge over time, Penrose (1959) argued that the productive resources controlled by the firm should not be seen as a fixed set of attributes, available as public knowledge, but as a bundle of possible productive services that the collection of firm resources can deliver.

Richardson (1972), taking a capability-based perspective to explain the organization of economic systems and the boundaries of the firm, extended Penrose's (1959) analysis and replaced the notions of "resources" and "productive services" with the concepts of "capabilities" and "activities" respectively. The key argument made by Richardson (1972) is that organizations tend to focus their efforts, and specialize in, productive activities for which their capabilities offer some sort of comparative advantage.

The relationship between capabilities and the productive activities they entail have been subject to scrutiny and it appears that two contrasting views exist in the literature. Some authors suggest that organizational capabilities are tightly linked to productive activities. For instance, Ulaga and Reinartz (2011) discuss capabilities for selling integrated product-service solutions in terms of sales, service-related data and interpretation and risk management activities. In the same vein, Yang et al. (2009) and Brown and Potoski (2003) equate contracting capacities with the activities that public buyers have to perform during the contracting process.

An alternative approach, however, argues that that there is no one-to-one relationship between capabilities and the productive activities associated with them (Araujo, Dubois and Gadde, 2003). Drawing on Penrose's definition of resources as a bundle of possible services, Spring and Araujo (2013) study how manufacturing firms develop and market service offerings. Because capabilities evolve over time and can be creatively combined, integrated or adapted, they entail a number of *potential* activities. Resources and capabilities such as production knowledge, methods and technologies are treated as future potentialities i.e. giving rise to a number of potential product-related services (Spring and Araujo, 2013).

3.4 The extended resource based view of the firm

RBV theory has been criticized for its over-emphasis on resources residing within the firm and the fact that it sidesteps profit-making opportunities through inter-firm resource integration (Barney, Ketchen and Wright, 2011). This deficiency has recently been addressed by studies extending their analysis into resource development and sharing among organizations in economic and industrial systems (e.g. Lavie, 2006). Such studies can be collectively referred to as the **extended resource based view of the firm (ERBV)**.

Taking an extended approach, Mathews (2003) proposes a resource economy framework within which resources and know-how are configured and shared among economic actors. He adopts a dynamic view of resource development and use for productive purposes and identifies five distinct processes, namely resource propagation, diffusion, imitation, replication and recombination. These processes are evolutionary in nature and entail variation, selection and retention of resources. Entrepreneurial action entails resource recombination taking into account the dynamics of industrial development. This extended resource based view suggests that resource complementarities with firms in the broader network can be leveraged to create competitive advantage. Lavie (2006) draws on the notion of network resources to develop the argument that the value of resources is determined by their complementarities with other resources spanning the firm boundaries. It follows that relational rents (i.e. profits attributed to inter-firm collaboration) can be generated by sharing resources with external organizations that are part of the same alliance network (Lavie, 2006).

The argument that competitive advantages may lie in inter-firm cooperation and resource combination is inspired by the **relational view** proposed by Dyer and Singh (1998). In brief, the relational view suggests that the firm's critical resources may span its boundaries and may be embedded in inter-firm resources and routines. Dyer and Singh (1998) unpack the mechanisms and associated processes which help create relational rents: relationship-specific assets, knowledge sharing routines, complementary resources and capabilities and formal and informal governance mechanisms. The authors propose that the creation of relational rents through knowledge sharing can be facilitated by rich prior alliance experiences and partner-specific absorptive capacity, which is the ability to recognize and assimilate value knowledge from a specific alliance partner. Relational rents are also dependent on the firm's ability to search and evaluate resource complementarities with partners, and the ability to obtain timely information from the surrounding socio-economic networks regarding potential capability complementarities with alliance partners (Dyer and Singh, 1998).

Lavie (2006) extends the relational view by considering unilateral rents (i.e. profits made by one of the collaborating parties) that spill over from the shared and non-shared partner resources and uncovering the mechanisms of value creation for these two different types of resources. In other words, sharing resources between organizations may entail both joint benefits as well as unilateral rents that are spilled over.

It is worth noting at this point that the Industrial Marketing and Purchasing (IMP) Group has long theorized about the formation and development of long-term business relationships through which firms share and combine their resources and activities to create value (Ford et al., 2003). Resource constellations in the business networks and their evolution over time can explain, amongst other things, technological innovation and the development of new products and services (Håkansson and Snehota, 2002).

3.5 The knowledge based view of the firm

Several scholars working within the resource-based paradigm have emphasized the role of knowledge as a strategic resource that has a bearing on the development of distinctive firm capabilities and superior performance. This literature stream, although far from homogenous, is often referred to as the **knowledge-based view of the firm (KBV)** (Foss, 1996). The knowledge-based perspective is closely associated with the RBV as argued by Conner and Prahalad (1996, p. 477): "The resource-based view generally addresses performance differences between firms using asymmetries in knowledge and in associated competencies or capabilities […] a resource-based theory of the firm thus entails a knowledge-based perspective".

The knowledge-based view proposes a theory of the firm alternative to the contractual one advocated by transaction cost and property rights perspectives, largely by breaking part with opportunism assumptions (Conner and Prahalad, 1996; Kogut and Zander, 1992). It emphasizes the role of learning as well as knowledge, as an outcome of the learning process (see Kogut and Zander, 1992), in the development and evolution of organizational capabilities (Kale and Singh, 2007). Knowledge possessed by organizations can thus help explain a) why some firms realize competitive advantage while other firms do not, and b) how such organizations are more successful than others when it comes to diversification and innovation (Foss, 1996).

Knowledge-based contributions reject the idea that the existence of the firm and its boundaries are determined by property rights and opportunistic behaviour considerations (Kogut and Zander, 1992; Conner, 1991). Rather than simply being conceived as a nexus of contracts, organizations can also function as repositories of distinct productive (technological and organizational) knowledge. Foss (1996), however, argues that knowledge-based and opportunism-based

explanations of the boundaries of the firm could very well function as complements.

Organizations, in the same vein as individuals, learn and build up their knowledge over time. Such knowledge stocks are associated with differential efficiencies, and are accumulated in a path-dependent way i.e. incrementally (Foss, 1996). Firms exist not as a response to moral hazard and incentive alignment, but due to their role as repositories of knowledge that is tacit, socially produced and path-dependent (Kogut and Zander, 1992). Firms know more their contracts can say. Since such knowledge is tacit and path-dependent, it is more efficient to organize it within the firm. In other words, firms know how to create and transfer knowledge more efficiently than markets do. Firms' advantages over markets derive from their "higher order organizing principles". These principles include mechanisms to codify technological knowledge, shared codes as well as languages among individuals that the market fails to provide, and in which the members of the organizations are embedded (Kogut and Zander, 1992).

Kogut and Zander (1992) also provide insights into how capabilities develop and evolve over time by emphasizing the notion of **combinative capability** i.e. the ability to synthesize and apply current and other knowledge acquired. They suggest that firms learn new skills by coming up with alternative, creative combinations of their current capabilities. Such processes of capability (re)combination are social in the sense that they draw upon cooperation and leveraging existing social relationships among individual within the same firm, who have differing knowledge bases and competence sets. They are also path-dependent and entail cumulative knowledge development in the sense that present and future capabilities also depend on what the firm was able to do in the past.

Conner and Prahalad (1996) stress, in turn, the irreducible knowledge differences between individuals as key explanation for the existence of the firm. The underlying assumptions of that are the limited cognitive abilities on the part of individuals (bounded rationality), and the absence of opportunism. The choice of organizational mode (firm or market contracting) determines the extent to which the more valuable knowledge is being applied to business activity.

Grant (1996) conceives the firm as an institution for integrating knowledge. Knowledge is viewed as residing within the individual, and the primary role of the organization is **knowledge application** rather than knowledge creation. Grant (1996) explores the coordination mechanisms through which firms integrate the specialist knowledge of their members. These mechanisms are: a) rules and directives, b) sequencing of productive activities, c) routines that the organization establishes, and d) group problem solving and decision making. The establishment and implementation of these mechanisms require the development of common knowledge within the firm. This common knowledge is based on shared meaning, language and commonality of specialized knowledge. Grant

(1996) conceptualizes organizational capabilities as the outcome of integration of knowledge of individuals. The extent to which firms develop distinctive capabilities depends on accessing and integrating the specialized knowledge of its employees through the integration mechanisms described above.

In a similar vein, Zollo and Winter (2002) stress the fact that organizations make deliberate efforts to learn how to **articulate and codify collective knowledge** which is relevant for undertaking complex organizational tasks. These deliberate efforts act as a basis for improving the organization's competences to manage those complex tasks. In other words, these processes of learning and knowledge accumulation reflect a higher-order capability through which a firm systematically generates and modifies its operating routines or skills in pursuit of improved effectiveness with the task at hand. This higher-order capability is dynamic in nature and may be particularly important when organizations need to develop know-how to manage tasks that occur repetitively (Zollo and Winter, 2002). The concept of dynamic capabilities is elaborated upon in the next section.

3.6 Dynamic capabilities

The literature on **dynamic capabilities** emerged in response to criticism directed towards RBV for being a static theory not considering the highly dynamic business environment within which firms operate (Barreto, 2010). However, dynamic capabilities need not only be useful in highly dynamic environments, but could be developed in moderately dynamic or relatively stable contexts (Barreto, 2010; Eisenhardt and Martin, 2000). Dynamic capabilities stress the evolutionary nature of firm resources and capabilities (Zahra et al., 2006) and complement the RBV by identifying firm and industry-specific mechanisms and processes by which heterogeneous resources create competitive advantages (Wang and Ahmed, 2007).

Barreto (2010) comments that dynamic capabilities have been defined as abilities or capacities (e.g. Teece et al. (1997), organizational processes (e.g. Eisenhardt and Martin, 2000) or routines comprising learned and stable patters of collective activity (Zollo and Winter, 2002). Dynamic capabilities can be defined as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997, p. 516). Another influential definition has been provided by Eisenhardt and Martin (2000, p. 1107) who conceive dynamic capabilities as "the firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change".

However, the research stream on dynamic capabilities is far from homogenous. In their large scale bibliographic analysis of the literature, Vogel and Guttel (2013) conclude that dynamic capabilities is far from a well-defined construct

underpinned by coherent theoretical frameworks and strong empirical research. They attempt to reclassify the literature on dynamic capabilities and they conclude that the main literature stream refers to "strategic learning and change". The focus is on learning capabilities and relates them to firm performance, thus integrating organizational learning and strategic management perspectives.

The first attempt to conceptualize dynamic capabilities is attributed to Teece et al (1997) who drew attention to the role of organizational and managerial processes (resource coordination and reconfiguration mechanisms), learning, as well as company positions in terms of asset ownership and path dependencies in assessing the competitive advantage of the firm. Teece et al (1997) stress the role of dynamic capabilities in rapidly changing environments and posit that these capabilities are embedded in organizational processes that are shaped by firms' asset positions and the evolutionary paths they have adopted in the past. In the same vein, Wang and Ahmed (2007) submit that dynamic capabilities are embedded in explicit and codified processes of combining resources. More recently, Teece (2007) suggested that dynamic capabilities entail resource reconfiguration, sensing and shaping opportunities and threats as well as seizing opportunities.

Dynamic capabilities have been conceptualized as the higher-order ones directly influencing performance in the long run and operating to adapt and change the lower-order capabilities and operating routines of the firm (Barreto, 2010; Ambrosini and Bowman, 2009). Wang and Ahmed (2007) present resources as the 'zero-order' element of the hierarchy which can provide the basis for creating competitive advantages if they have VRIN features. Capabilities are 'first-order' elements and entail the ability to deploy resources to attain a desired goal. Core capabilities are 'second-order' and are a bundle of a firm's capabilities that are strategically important to its competitive advantage at a certain point in time. Dynamic capabilities are, finally, 'third-order' capabilities that entail the organizational efforts to reconfigure, renew or re-create internal resources and capabilities in the face of environmental change (Wand and Ahmed, 2007). Wang and Ahmed (2007) identify three components of dynamic capabilities:

a) **Adaptive capability** refers to the ability to adapt to environment changes and align internal resources with external demands, as well as to identify and capitalize on emerging market opportunities.

b) **Absorptive capability** relates to the ability to recognize the usefulness of new information, to assimilate and to apply it. This ability is also a function of prior knowledge (Cohen and Levinthal, 1990) and determines the rate of learning and adoption of advanced technologies that lead to superior performance. Firms exhibiting absorptive capability tend to commit resources in the long-run, learn from other partners, develop and use complementary technologies and know-how and share new knowledge into multidisciplinary teams.

c) **Innovative capability** refers to the ability to develop new products or markets through aligning strategic innovation orientation with innovative processes and behaviours. The more innovative a firm is, the more it possesses dynamic capabilities.

Adaptive, absorptive and innovative capabilities "underpin the firm's ability to integrate, reconfigure, renew and recreate its resources and capabilities in line with external changes" (Wang and Ahmed, 2007, p. 39).

In connection with the notion of absorptive capability, Wang and Ahmed (2007) discuss **absorptive capacity** as a dynamic capability pertaining to learning and knowledge utilization that enhances the firm's ability to gain a competitive edge. They discuss absorptive capacity as a multidimensional construct and propose four elements of absorptive capacity: a) knowledge acquisition (which is also a function of prior investments, experience and knowledge and exposure to diverse knowledge bases), b) knowledge assimilation (through comprehension of links with existing knowledge bases), c) knowledge transformation, and d) knowledge exploitation.

Zahra and George (2002) relate the four elements of absorptive capacity with a distinction between **potential and realized absorptive capacity**. Whereas potential capacity is manifested through knowledge acquisition and assimilation (reflected also in Cohen and Levinthal's 1990 definition), realized capacity refers to knowledge transformation and exploitation. Realized capacity reflects the firm's capacity to leverage knowledge that it has absorbed and can result in improved performance and innovation. Despite the limited empirical attention it has attracted, potential capacity provides firms with the strategic flexibility needed to adapt and evolve in dynamic market environments (Zahra and George, 2002).

Ambrosini and Bowman (2009) provide a list of the main antecedent factors (in terms of internal and external enablers and inhibitors) which impact on the development and deployment of dynamic capabilities. Such factors include the pace of change in an industry, the role of managers and their perceptions of the business environment and its changes, firm paths and positions both internally (in terms of resource base) and externally as well as trust, social capital and leadership .

Multiple mechanisms regarding the creation and evolution of dynamic capabilities have been proposed in the literature (Barreto, 2010). For instance, Zollo and Winter (2002) stress the importance of deliberate learning and explicit cognitive efforts to codify such learning. The processes of knowledge articulation (e.g. through performance reviews) and knowledge codification and their contribution to development of dynamic capabilities when the experiences related to a specific task are limited or heterogeneous are discussed. Eisenhardt and Martin (2000) suggest that the main mechanisms are likely to be repeated

practice (and experience), past mistakes, and the pace of experience. Variation and selection mechanisms are both important for dynamic capability evolution, in moderately dynamic markets and rapidly changing markets respectively. Zahra et al. (2006) argue that experiential learning helps established firms build their dynamic capabilities, while trial and error and improvisation processes are more relevant in innovative contexts (new ventures).

The existing literature also draws attention to the impact of dynamic capabilities on firm performance. Although some authors suggest a direct link between dynamic capabilities and firm performance (Teece et al., 1997), the majority appears to argue that competitive advantages result from dynamic capabilities in an indirect fashion. More specifically, performance outcomes depend on the way dynamic capabilities are deployed and used by managers or by the resource reconfigurations they entail (Barreto, 2010). In support of the latter view, Wang and Ahmed (2007) argue that the relationship between dynamic capabilities and performance is mediated by capability development, which is underlined by the path-dependent nature of dynamic capabilities (Wang and Ahmed, 2007). In other words, Wang and Ahmed (2007) conceptualize dynamic capabilities as an antecedent of capability development.

Similarly, Zahra et al. (2006) stress that dynamic capabilities affect performance by helping change the substantive capabilities of the firm over time. The authors also warn against the inappropriate use of dynamic capabilities, though: the deployment of dynamic capabilities may damage rather than improve a firm's performance if they are used when there is no need for them (Zahra et al., 2006). Finally, Ambrosini and Bowman (2009) emphasize that dynamic capabilities do not equate with sustainable competitive advantage and that the word 'dynamic' refers to the environment (context) rather than the capability. This contingency approach is in line with Colis (1994) who suggested that it shouldn't be taken for granted that organizational capabilities lead to sustainable competitive advantages insofar as such capabilities may be superseded by higher order, learning-to-learn capabilities. In other words, the value of capabilities depends on the industry and specific point in time that these capabilities are deployed.

3.7 Indirect vs. direct capabilities

The literature stresses not only capabilities required to undertake productive tasks but also the know-how needed to draw on resources and capabilities outside the organization. Loasby (1998) draws an important distinction between "know what" and "know how", with the latter referring not only to knowledge and skills but also to when and where these should be applied. Capabilities are constituted by know-how, both direct and indirect. Building on that, he also draws a distinction between direct and indirect capabilities. **Direct capabilities** are equated with "knowing how to do something" and **indirect capabilities** with

"knowing how to get something done by others" (Loasby, 1998). In other words, indirect capabilities refer to the know-how required to get access to the capabilities and productive knowledge of other firms such as customers, suppliers and their partners (Araujo et al., 2003; Spring and Araujo, 2009).

Firms can be seen as a set of direct and indirect capabilities (Loasby, 1998). Access to external capabilities is gained through the market and inter-firm relationships, which is a key mechanism to coordinate productive activities that are complementary but are also based on dissimilar knowledge bases and competences (Richardson, 1972). In cases where such capabilities are not available in the market or are very costly to access, firms may decide to integrate forward or backwards to acquire such know-how. The costs associated with gaining access to external capabilities have been referred to as "dynamic transaction costs", that is, "the costs of persuading, negotiating, coordinating and teaching outside suppliers", or alternatively "the costs of not having the capabilities you need, when you need them" (Langlois and Robertson, 1995, p. 35).

Mota and de Kastro (2004) draw on a dynamic evolutionary perspective to explain the boundaries of the firm. As an alternative to transaction cost explanations of asset specificity and opportunism, a capabilities perspective suggests that the boundaries of the firm are influenced by the division and integration of knowledge among firms in an industry. An industrial market is seen as a network of connected inter-firm relationships whereby firms not only access each other's capabilities, but they may also combine their resources and activities and productive knowledge.

Mota and de Kastro (2004) argue that firms' vertical boundaries reflect their relationships with specific counterparts and the way they address the division and integration of knowledge through configurations of direct and indirect capabilities. Beyond merely accessing external know-how, firms may try to influence the capability development of their counterparts and hence the division of labour in the industry through processes of learning. This view is also supported by the industrial network (IMP) theory's notion of relationship connectedness i.e. relationships with a specific counterpart affect and are being affected by relationships with others (Ford et al., 2003; Axelsson and Easton, 1992).

Araujo et al. (2003) examine the problem of economic organization (markets vs. firms) from a capability perspective, suggesting that the hold-up problem emphasized by transaction cost and property rights theories cannot fully explain the definition of firm boundaries. They draw on the work of Loasby (1998) to argue that the boundaries of the firm are determined by the capabilities necessary to undertake productive activities (i.e. direct or core capabilities) as well as by the capabilities the firm requires to interact with, and get access to the resources

of, its customers, suppliers and other external actors (i.e. indirect or ancillary capabilities, see Langlois and Robertson, 1995; Loasby 1998).

The above suggest that gaining and organizing access to external capabilities is a capability in itself. Accessing complementary capabilities requires different types of indirect capabilities depending on whether the form of access can be described as market or relationship-based (Araujo et al., 2003). The more firms rely on complex inter-firm relationships to access complementary capabilities, the more the boundary of the firm will have to expand, to incorporate indirect capabilities mutually specialised to relevant partners. Conversely, the more firms rely on markets to access dissimilar but complementary capabilities, the more the boundaries can contract and the less specialized the range of indirect capabilities the firm needs to retain (Araujo et al., 2003).

The corollary to this argument is also that the firm's boundaries can contract or expand without matching on a one-to-one basis the capabilities and knowledge that a firm possesses. Vertical integration leads to the development of in-house capabilities, but outsourcing of production does not necessarily entail divesting in capabilities that previously supported in-house production. In other words, make or buy decisions does not directly reflect needs in productive activities and often firms need to "know more than they make" (Brusoni, Prencipe and Pavitt, 2001), since they may need to retain broader technological competences and capabilities. Indeed, "indirect capabilities allow us to understand how firms 'know more than they do' and why boundary decisions at the product level do not match the boundaries drawn from a capabilities perspective" (Araujo et al., 2003, p. 1268).

The empirical observation that organizations may know more than they need to know for strict productive purposes suggest that they have the **absorptive capacity** (Cohen and Levinthal, 1990) which helps the firm to decide how best to use and combine external capabilities with its own capabilities for productive purposes (Wang and Ahmed, 2007). Such absorptive capacity can also manifest itself through partner-specific learning and creative combination and exploitation of the capabilities of the partners.

Araujo et al (2003) suggest that the notion of indirect capabilities could incorporate capacities into specifying and procuring a productive resource, capabilities to design and test purchased inputs as well as capabilities to coordinate and integrate internally and externally generated inputs into effective products and production systems (systems integration capability). In what follows certain types of indirect capabilities that are relevant to the study at hand are discussed.

3.7.1 (Out)sourcing capabilities

The above discussion suggests that capabilities related to outsourcing and procuring external resources and capabilities are key indirect capabilities. Outsourcing of corporate functions is a complex task with considerable effect in organizational performance and requires the development of procurement know-how in order to design and manage successful outsourcing relationships. The literature on capabilities required to outsource and procure external resources and capabilities is dispersed and tends to use different terms and definitions such as sourcing, procurement, and contracting capabilities.

Axelsson, Bouwmans, Rozemeijer & Wynstra (2005) adopt the term **sourcing capabilities** to discuss firm-level capabilities (which differ from skills of individual purchasers), processes, technologies and measures related to firms' procurement activities. Key sourcing capabilities include know-how regarding supply market analysis, individual supplier analysis, organization and execution of the procurement process, cost management/engineering, supplier performance measurement and review of current contracts. Such know-how requires considerable effort to develop, maintain and upgrade according to changing circumstances (Axelsson et al., 2005).

Selviaridis, Agndal and Axelsson (2011) discuss sourcing capabilities as a function of prior outsourcing experiences, technical expertise and operational knowledge of the outsourced service, supply market and knowledge and testing, as well as capacity to comprehensively specify the service and to measure and evaluate service provider performance. The level of sourcing capability impacts on the stability of service specifications during the procurement process. In the same vein, Selviaridis, Spring and Araujo (2013) stress the importance of sourcing capabilities and examine one specific class of such capabilities, namely the ability to define service requirements. In the absence of such capabilities, service providers may have an increased involvement in shaping the object of service exchange and co-developing service specifications in joint with the buying firm.

This is in line with recent research on acquisition of complex products and services suggesting that in the absence of internal expertise, such sourcing capabilities could be accessed through relationships with external partners such as consultants (Flowers, 2004). Buyer organisations faced with infrequent sourcing tasks, high rates of technological change and solution complexity appear to know less than they buy (Flowers, 2007) and make use of contingent capabilities of consultancies and other parties during the acquisition process. The use of external expertise can refer both to strategic issues (e.g. need identification) and tactical areas such as specification development and technical data analysis (Flowers, 2004).

Ordanini and Rubera (2008) suggest that the development of distinctive capabilities in procurement has a bearing on firm performance and they identify two key **procurement capabilities**: procurement process efficiency and procurement process integration. The former refers to the ability to reduce costs while maintaining relationships with external suppliers and internal activities complementary to the purchasing transaction. The latter to the ability to effectively incorporate procurement in the whole supply chain, reducing time-to-market and increasing the fit with market needs. They find that process efficiency and process integration capabilities provide a significant (and equally important) contribution to firm performance, but there are no complementary effects between them.

3.7.2 Contracting capabilities

Türksever and Wynstra (2013, p. 529) use the term **contracting capabilities** to refer to those "capabilities that enable organizations to analyse situational characteristics of outsourcing, select the optimum contract specification method, design the appropriate contract (ex-ante), and manage, adjust and eventually terminate the contract effectively (ex-post)". In short, those organizational capabilities aimed at creating sustainable advantages from the Purchasing and Supply Management function through successful contracting in the context of outsourcing. Based on their literature review, Türksever and Wynstra (2013) identify three classes of contracting capabilities which exist at different organizational levels, namely the individual, team-level and organization level:

a) **Capabilities of processing and managing knowledge**:

- ability to create multidisciplinary personnel base and foster continuous knowledge sharing and exploitation
- ability to establish multi-disciplinary sourcing teams and assigning them to projects or contracting phases
- ability to develop knowledge of organizations, profession, supply market, customer and product/service

b) **Capabilities of coordination and collaboration**:

- ability to create an open communication network and supportive climate
- ability to implement contract and evaluate supplier performance
- ability to develop collaborative skills and knowledge

c) **Capabilities of learning and improvement**/ability to:

- ability to learn from sourcing experience within buying organization

- ability to learn from others' experiences in the broader network of relations
- ability to learn from experiences within the contractual relationship with customer

Contracting capabilities can also be classified as indirect capabilities since they contribute to shaping and managing inter-firm exchanges of productive resources and capabilities (e.g. Mayer and Salomon, 2006). Although not well articulated in the literature, the notion of contracting capabilities can be related to Argyres and Mayer's (2007) discussion of **contract design capabilities**. Drawing on resource-based explanations of the firm, the authors suggest that capabilities in contract design may constitute a source of competitive advantage. Developing contract design capabilities entails learning about the required level of extensiveness and sophistication of contractual provisions in response to exchange attributes as well as potential contingencies and hazards. Capabilities for designing specific contract terms reside differentially within the firm and among managers, engineers and lawyers (Argyres and Mayer, 2007).

Within the field of public administration, the notion of contracting capacities has been put forward to stress that public agencies contracting out services need to have appropriate contracting capabilities in order to ensure performance in terms of effectiveness and cost efficiency (Yang et al., 2009). Brown and Potoski (2003) stress the need to study the organizational capacities in the contracting process as an imperative for improving contract performance. They identify three types of **contract management capacities** based on the three typical contracting phases:

a) **Feasibility assessment capacity** refers to the capacity to determine whether a particular good or service is appropriate for contracting and whether there is sufficient market competition for that good or service.

b) **Implementation capacity** addresses the issues of contract bidding, vendor selection, contract negotiation, and contract writing. Some of the techniques that might be used in this stage include benchmarking other jurisdictions, experimenting on a trial basis, and allowing government employees to compete in the bidding.

c) **Evaluation capacity** involves monitoring and evaluating the contractor's performance to determine whether the contractor has fulfilled its responsibilities outlined in the contract. Some of the techniques used in this stage include conducting citizen surveys, monitoring customer complaints, making field observations, and analysing operational records.

Brown and Potoski (2003) suggest that the level of investment in developing and sustaining contracting capacities may explain differences in success of

outsourcing projects and contract performance. Contracting experience, transaction costs, characteristics of government structure and its external environment have a bearing on contract management capacity. Prior contracting experiences affect the level of investment in capacity development e.g. negative experiences and numerous outsourcing projects in the pipeline increase the likelihood of substantial investment in contracting capacity. Higher transaction costs for some types of goods/services outsourced entail higher investment in contract management capacity.

Expanding on Brown and Potoski (2003), Yang et al (2009) conceptualize contracting out as a policy choice consisting of four stages—agenda setting, policy formulation, policy implementation, and policy evaluation. Corresponding to these four contracting stages, there are four types of **contracting capacities:**

a) **Agenda setting capacity**: ability to take and evaluate the make or buy decisions taking into account the multiple stakeholders (e.g. citizens-users, politicians) and their requirements.

b) **Contract formulation capacity**: ability to select the right supplier, manage the tendering process effectively and design a good contract.

c) **Contract implementation capacity:** ability to collaborate with and help the supplier deliver as promised, work with the contractor to develop standardized service processes and procedures and support implementation work.

d) **Contract evaluation capacity:** ability to develop and manage a formal performance measurement and reporting system, evaluate and follow up supplier performance.

Yang et al. (2009) suggest that such contracting capacities are associated with contract performance in terms of cost, quality and efficiency gains. The development of contracting capacities entails both benefits and costs (Yang et al., 2009). It should be noted however that the empirical study conducted by the authors focuses on contracting activities and processes that underpin contracting capacities, and therefore only indirectly captures the requisite capacities. In other words, it is assumed that contracting capabilities are tightly related to contracting activities.

The above, however, provide a rather static view of (performance) contracting capabilities since it does not address how they can evolve over time (Vanneste and Puranam, 2011). Indeed, empirical research on contracting capabilities (Yang et al., 2009) suggests that dynamic effects of provider and buyer learning should be considered when a public agency contracts out activities. Such effects can be either positive in the sense that organizations learn how to collaborate and increase service effectiveness, or negative meaning that contractors learn how to

take advantage of their incomplete contracts and information asymmetry or monopolistic power.

3.7.3 Relational capabilities

The literatures both on indirect capabilities (e.g. Araujo et al., 2003) and on contracting capabilities (e.g. Argyres and Mayer, 2007) appear to emphasize capabilities to manage and leverage relationships with exchange partners, beyond mere outsourcing and procurement know-how as well as contract design and contract monitoring capacities and related activities. Araujo et al. (2003) stress the need to analyse what type of relationships firms need to develop with their suppliers and customers to get access to their capabilities. Moreover, they suggest that this issue is closely associated with the division of labour in inter-firm networks. As they put it, "the problem of organizing access to capabilities the firm does not control cannot be divorced from the decision of where the boundaries should be drawn… and organizing access to external capabilities requires its own set of capabilities and may involve a focal firm in actively attempting to influence the development of capabilities in specific counterparts" (Araujo et al., 2003, p. 1265). In the same vein, Türksever and Wynstra (2013) suggest the ability to actively manage inter-firm relationships is a key to success of contracting processes.

The emphasis on relational capability development is also in line with the broader exchange governance literature suggesting that contractual governance is complemented or even substituted at certain points during a long-term exchange by relational mechanisms based on social capital, trust, and flexibility (Klein-Woolthuis et al., 2005). Contracts are incomplete either by design, or due to inability to foresee all potential contingencies and the prohibitively high costs associated with writing extensive contracts (Collins, 1999). Therefore, relational governance mechanisms are often deployed to support contract management and improve exchange performance (Poppo and Zenger, 2002). Trust, rather than contractual governance, may be of critical importance when firms work on cooperative projects and gain access to each other's technological capabilities and accumulate knowledge about market situations and the working methods of partners (Bosch-Sijtsema and Postma, 2009).

Relational capabilities are instrumental for knowledge development and innovation. In their study in the context of biomedical innovation, Swan et al (2007) find that even large pharmaceutical companies do not possess all of the resources necessary to successfully develop new medicine and they, therefore, need to collaborate formally and informally to acquire the necessary resources. In this context, mechanisms linked to relational capabilities include aligning interests and expectations, building upon existing networks to generate resources and sustain more risky projects, using networks to shape regulations and ensure innovation approval (Swan et al., 2007). Relational capabilities also refer to

know how to manage relationships with employees within the firm insofar as those affect the collective competence of organizations to manage external relationships. In particular, satisfied and loyal employees are better in developing relationships with customers and strategic partners (Theoharakis et al., 2009).

Pagano (2009) finds that the most recent literature recognizes the increasing complexity of managing relations with external partners and highlights the need to uncover those organizational capabilities supporting such interactions. Studies across disciplines increasingly stress the role the processes and capabilities within the organization as opposed to attributes pertaining to a specific exchange relationship. Such studies bring forth the notions of "alliance capability" (Kale, Dyer and Singh, 2002), and "relational capability" (Lorenzoni & Lipparini, 1999; Kale and Singh, 2007), and emphasize three main features of relationship management capabilities: a) the experience accumulation and learning processes through which the firm is able to acquire and develop knowledge about how to manage its network of relations, b) the establishment of specific organizational mechanisms concerning the management of external relations. Such mechanisms represent a complementary to mechanisms of trust and communication and may be difficult to imitate, and c) the integrated approach to managing inter-firm relationships through deploying common organizational mechanisms (Pagano, 2009).

With respect to the above features, Lorenzoni and Lipparini (1999) study the process of vertical disintegration and focus on the ability to coordinate competencies and combine knowledge across corporate boundaries. They stress the role of **relational capability** (i.e. the ability to interact with other companies) in accelerating the knowledge access and transfer and enabling growth and innovation. The ability to integrate knowledge residing both inside and outside the firm's boundaries emerges as a distinctive organizational capability. The implication of this is that supplier networks can be deliberately designed over time with the focal firming focusing on a core set of distinctive competencies (Lorenzoni and Lipparini, 1999).

Kale et al. (2002) stress the importance of creating a dedicated alliance function as an organizational structure that facilitates retention, assimilation and sharing of alliance know-how within the firm. In broader terms, such higher-level organization principles and processes are useful for integrating and coordinating knowledge across different units and functions within the firm. This forms the basis for developing alliance capability by capturing, sharing and disseminating the alliance know-how associated with prior experiences and lessons learned. Firms that have greater alliance experience and invest in dedicated alliance functions are more successful in their strategic alliances. An investment in a dedicated alliance function can enhance a firm's alliance capability by:

a) Acting as a focal point for learning and leveraging both explicit and tacit lessons from prior and ongoing alliances.

b) Keeping numerous stakeholders, including investors, apprised of new alliances and successful events in ongoing alliances.

c) Improving internal coordination and resource support of alliances.

d) Monitoring and evaluating alliance performance. All these activities should help the firm in generating greater value and success with its alliances.

Kale and Singh (2007) shows how the relationship between the alliance function and alliance success is positively mediated by an **alliance learning process** that involves four stages, namely articulation, codification, sharing, and internalization of alliance management know-how. Conceptually, each of these aspects of the alliance learning process is somewhat distinct in terms of the manner in which it facilitates learning and accumulation of alliance know-how.

a) **Articulation** helps in externalizing individually held alliance management know-how of managers and making it more explicit.

b) **Codification** helps in creating codified and usable tools, templates, or guidelines to help managers when undertaking specific alliance-related tasks.

c) **Sharing** helps in disseminating alliance management know-how, both explicit and tacit, throughout the firm.

d) **Internalization** helps individual managers absorb or retain the alliance management knowledge derived internally from their own firm/colleagues or from external sources.

Each of these aspects emphasizes learning and accumulation of alliance management knowledge within the firm. Draulans et al. (2003) extend the work of Kale and colleagues (2007; 2002) by not only looking at a dedicated alliance function (the alliance specialist as the individual who has expertise and knowledge of multiple alliances), but also at specific methods to gather alliance knowledge. These methods include alliance training (both internal and external training is considered) and evaluation of alliance capabilities (evaluation both per alliance and across all the alliances that the firm is involved in).

4 PBC capabilities in Swedish defence acquisition

This section of the report analyses and discusses the notion of performance-based contracting capabilities, as well as the types of capabilities that Swedish defence authorities might wish to consider for fulfilling their strategic aims. In addition, relevant theoretical perspectives and conceptual frameworks that could be potentially useful for empirically studying capability development in PBC are explored.

Before moving on to address the above, it is important to provide a background discussion of the defence acquisition process and associated developments, both internationally and in the Swedish defence context.

4.1 The defence acquisition context and process

The acquisition of equipment and associated service solutions and the provision of logistical support contribute to the development and deployment of military capability. Military capability can be defined as "the continuing ability to generate a desired operational outcome or effect which is relative to the threat, physical environment and the contributions of coalition partners. Capability is not a particular system or equipment. Capability is delivered by Force Elements i.e. ships, aircrafts, army formations and other military units and force enablers, combined into packages by Joint Force Commanders and tailored for particular operations or missions" (Ekström, 2012, p. 190).

In the context of Swedish defence, military capability is seen as a system comprising different elements: military units, functional chains, technical systems, functional objects and operations control competences (FM and FMV workgroup report, 2013). All of these are controlled to varying degrees by FM.

The **functional chains** ensure that all units of FM can function together effectively and describe how military resources interact to realize a military capability. FM appears to be following the UK MoD in terms of investing in and establishing the defence lines of development such as doctrine, organization, materiel, information, and logistics.

Technical systems describe the system configurations which FM uses in the formation of units and joint forces.

The concept of the **functional object** describes a collection of supplies required for operations (e.g. the kit that soldiers need). It describes the minimum functionality that the Swedish Armed Forces would manage in a modular way.

Function objects are linked to supply solutions, which includes how the supply of the goods takes place and associated services. Functional objects are basically unit-independent and can thus be used in all types of units that have requirements for current functionality. Function objects are validated for interoperability in all relevant functional chains.

Finally, the concept of **operations control** refers to how the equipment is used and to the rational decision-making process and prioritization of requirements taking into account operational conditions.

Acquiring equipment such as tanks, aircrafts and battle ships is a complicated process due to the long term operational implications of decisions and the significant investments made by the defence authorities and governments. It has been suggested that a large part, in fact the lion's share, of the acquisition budget is spent on equipment support since such equipment has long life cycles and the costs related to maintenance, repairs, upgrades and refurbishment can be quite high (Howard and Miemzcyk, 2010).

Defence authorities in different countries have therefore recognized the importance of taking a life cycle perspective when considering equipment acquisition and support. In the UK, for instance, reference is made to the concept of Through Life Capability Management as a tool for stressing a whole life cycle approach to defence acquisition as well as the long terms implications of equipment acquisition (Ekström, 2012).

In addition, it is crucial to integrate equipment acquisition decisions with other important aspects such as training, equipment, personnel and information management (in the UK context these are called "defence lines of development") in order to be able to seamlessly deliver the required military capability (Ekström, 2012).

In line with the emphasis on through life management and long-term performance implications of defence equipment acquisition, there has been increasing interest in performance-based contracting schemes such as contracts for availability (CfA) and contract for capability (CfC), although the latter type hasn't really been taken up yet (Ekström, 2012; Datta and Roy, 2011; Caldwell and Howard, 2010). These types of performance-oriented contracts change the incentives of private suppliers. More specifically, under transaction-oriented contracts suppliers of equipment were gaining additional revenues for providing spare parts and doing maintenance and repairs work when a system failed. However, under performance-oriented contracting schemes (e.g. Rolls Royce's' "Power-by-the-Hour" offering) suppliers assume operational responsibility and financial risk for the equipment's quality and availability in the sense that spares parts are provided and maintenance and repairs activities are conducted at the supplier's cost. Hence, defence suppliers have an incentive to reduce

system/equipment failure and associated support costs (Datta and Roy, 2011; Ng et al., 2009).

The above trends are also, to a large extent, applicable in the context of the Swedish defence acquisition. The ongoing restructuring project entails that FMV will be responsible for acquisition of equipment and support services (including logistics services) taking a life-cycle perspective into account. The aim is to reduce total cost of equipment ownership while fulfilling the military capability requirements of the Swedish Armed Forces. Similarly, the Swedish defence authorities have made some progress towards adopting and designing contracts for availability of military equipment (Ekström, 2012). Such an example is the availability contract FMV signed with SAAB for the supply and support of the SK-60 trainer aircraft.

Within the Swedish defence context a new model of defence acquisition is currently in the making. The new model requires that FM work closely with FMV to enable a logical and hierarchical flow from military capabilities, functions, and functionality chains to resources (such as personnel and equipment), and finally the organization (such as the different units). This means that capabilities need to be defined before the functions and resources, and finally resources before the choice of organization (FM and FMV workgroup report, 2013).

FMV is responsible for business coordination, systems development, and configuration management related to functional objects and detailed technical system and its service support solutions. This includes all the defence logistics that FMV provides to FM. FMV ensures technical interoperability in units and function chains for equipment and logistics and business coordination within FMV support solutions. FMV will ensure that market opportunities are utilized. It also supplies equipment, materiel and logistics systems and associated service support solutions for inclusion in FM's fixed configurations of units (i.e. it provides total solutions integrating both goods and services).

FMV has technical design responsibility, which involves determining design for allowable configurations of technical systems (including maintenance solutions) that meet legal requirements, set objectives and other requirements in terms of performance, functionality, information and system's life cycle. The concept of "maintenance preparation" is used to ensure that a technical system together with its support solution meets the highest standards of reliability and life cycle costs. The final lifecycle plan includes an estimation of life cycle costs, which forms the basis for FMV's requests for quotation, FM's investment decisions and the mandate for future maintenance. In other words, through life costs are taken into account during the acquisition of equipment and support solutions (FM and FMV workgroup report, 2013).

The process of defence acquisition is often framed as one comprising several key stages which reflect the life-cycle of the bought equipment, materiel and/or associated services. Ekström (2012) provides an excellent overview of the defence acquisition process in the United Kingdom. Although a distinction is drawn between the process of equipment acquisition (CADMID) and services acquisition (CADMIT), the main stages of the two processes appear to be common and hence are discussed jointly here. The main stages are briefly outlined as following (for further details see Ekström, 2012):

a) **Concept**: at this stage the needs of the users are specified in the form of a user requirements document, which may also include the required outputs and performance. Technological and procurement options are sought after and analysed, including discussions with potential suppliers, funding is secured, the through life management plan is devised and an initial gate business case for the acquisition is crafted.

b) **Assessment**: at this stage the systems requirement document is established reflecting directly the user requirements needs. Appropriate procurement strategies are identified and the most appropriate technological solution is selected based on trade-off analysis of time, cost and performance aspects. Risks are identified and mitigated, the through-life plan is further elaborated and the main business case is devised for approval.

c) **Demonstration**: this stage entails establishing performance targets for manufactured equipment/delivered services that are in line with user and system requirements, running a tendering process and evaluating supplier bids, placing and negotiating contracts to meet the systems requirements, and demonstrating the ability to provide the required capability.

d) **Manufacture** (for equipment) /**Migrate** (for services): this stage entails delivering the equipment or migrating the service according to the users' requirements as agreed in the main gate business case and defined in the user and system requirements documents. The responsibility is also transferred to the users of equipment and services.

e) **In-service**: during this phase the aim is to provide effective and efficient support to ensure capability/service delivery, maintain the performance levels while trying to reduce total cost of ownership, and carry out any agreed upgrades, refits or improvements.

f) **Disposal** (for equipment) /**Termination** (for services): dispose of equipment and any related assets, or terminate contract for services in an effective way and as specified in the through-life management plans.

The Swedish defence acquisition process in the making, as defined by FM and FMV's joint report (2013), also takes a life cycle perspective (see Figure 4). The established lifecycle applies to all relevant authorities and to acquisition of capabilities, functional chains and resources such as function objects, technical systems/items/services and support solutions. When in use, all of these are defined in terms of their content.

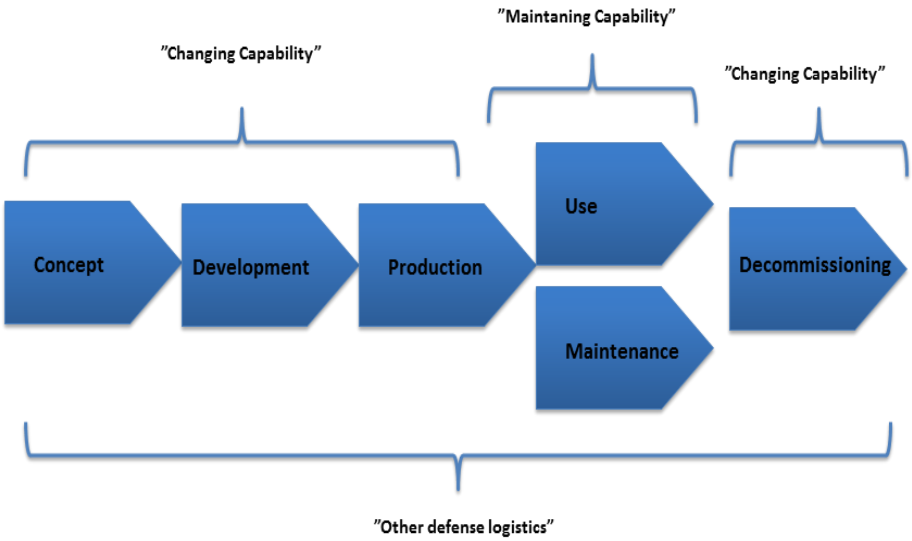

Figure 4: The key stages of the Swedish defence acquisition process (Source: FM and FM workgroup report regarding the new model of "management and ordering process", Annex 17, p. 11).

Throughout all stages a joint dialogue is centred on the optimization of DOTMLPFI for units and Armed Forces' functional chains. Each agency brings its expertise and takes responsibility for their deliverables. In brief, the acquisition process includes the following stages (FM and FMV workgroup report, 2013):

Concept

FM uses its experiences in defence planning, resource monitoring and military units to identify the need for changes in capability, based, for instance, on requests for performing new tasks, or existing tasks that require new solutions. FM specifies its requirements in terms of capabilities, functional requirements, and emergency preparedness and availability requirements over time and defines what would be appropriate solutions at a high level. FMV is responsible for proposing solutions that fulfil these functional demands in terms of equipment and materiel supply, support services and logistics.

Development

FM and FMV focus on creating solutions within a main option chosen in the concept phase. During the development of the functional chain and services, FM works with dependencies within other defence lines of development and resources (DOTMLPFI) and FMV focuses on identifying and elaborating upon requirements and dependencies within and between functional objects or parts of services. FMV identifies possible configurations for the ongoing development of existing functions, or for new function objects in terms of input supplies and its associated support solutions. This work also includes the identification of possible acquisition forms for new technology systems and its support solutions. In this phase supplier selection tasks, such as developing a preliminary design of the configurations of equipment and associated support solutions, developing the life cycle cost plan, and setting up the quotation aims and benchmarks, also take place.

Production

FM is responsible for production of resources (DOT(M)LPFI) and FMV is responsible for the supply of equipment and materiel, parts of the ”information” element, and associated logistics and other services not directly related to the military capabilities. FMV delivers the allowable configurations design of functional objects for use in joint design, verified against both functional chains and units. It also delivers additional/modified substance of the requested change in function objects with associated defence logistic support solutions (including the life cycle cost plan), systems documentation, and precise costing for equipment and services.

Use and maintenance

The equipment and associated services and support solutions are used in-service. As a result of their use, there is a need for maintenance and repair of established allowable configurations. FM requirements regarding unit production, exercises, preparedness and response are fulfilled from a materiel and logistics perspective with varying requirements on the use and maintenance. After the official joint preparation and based on its requirements, FM prepares materiel supply chain orders (MFO), based on which FMV provides FM base organization and its external customers with materiel and associated services. FMV implements the operational control and maintenance planning for an optimized materiel usage and delivers other required services and supplies.

Decommissioning

The decision to carry out impact assessment before decommissioning is taken during the use and maintenance phases. During the decommissioning phase, FM and FMV evaluate whether the configuration of systems and services should be disposed of or re-used.

The different stages of the acquisition model correspond to different types of "orders":

a) The order pattern "Changing capability" refers to orders for operations up to the production stage as well as the decommissioning stage. The purpose is to develop and apply major changes to military capabilities and/or services that are indirectly linked to those capabilities. FM is responsible for military capability development and defining which units and functions are needed, whereas FMV provides support in terms of supply and logistics and is responsible for proposing applicable support solutions which FM decides upon later.

b) The order pattern "Maintaining capability" refers to orders for maintenance, which are valid for the Use and Maintenance phases. The main aim is to provide cost effective solutions for maintenance and support of equipment and systems bought, according to the life cycle cost plans. The extent of equipment use affects the maintenance costs and the life cycle cost plans should be revised accordingly.

c) The order pattern "Other defence logistics" refers to orders of support services to the FM units and base organization such as acquisition, postal and travel and accounting services.

The new model attempts to draw a clear distinction of responsibilities between FM and FMV. According to the report, FM is responsible for producing military units in its entirety, whereas FMV is responsible for delivering the physical and logistical content of units in accordance with set configurations up to a specified transfer point. FM is responsible for configuration of operational capabilities, functional chains, joints and the base organization. FMV, on the other hand, is responsible for configuration of functional objects, technical systems with support solutions coordinated with FM configuration management of the functional chains and joints. Configuration management takes place in the context of a long term planning horizon.

4.2 PBC capabilities: What are they?

One of the key aims of this report has been to examine performance-based contracts from the perspective of capabilities that buying organizations require to successful design and manage them. Such a perspective has been underplayed by existing academic research (Selviaridis, 2011). As highlighted earlier, the literature on product-service systems puts emphasis on the capabilities that **suppliers** of integrated product-service solutions should develop to effectively design and sell such customer value-oriented solutions (Davies et al., 2006). However, this research stream primarily focuses on non-contractual aspects and

capabilities related to operations, service design and delivery (e.g. Johnstone et al, 2009; Araujo and Spring, 2009 Oliva and Kallengberg, 2003).

More specifically, Oliva and Kallenberg (2003) propose a phased process model for developing capabilities for servicing the installed based (capital equipment). This entails consolidating product-related services, entering the installed base service market, expanding to relationship-based services and process-focused services and even taking over end-customer's operations. In the same vein, Davies et al (2006) examine the required service capabilities and organizational design implications of offering integrated solutions and they emphasize the importance of building up back end capabilities through standardization and codification of business process and offerings in different projects. Structural aspects such as technology, service capacity and supply chain positioning of suppliers as well as infrastructural factors (e.g. human resources and service quality control) are also emphasized (Baines et al., 2009). The literature also suggests the suppliers of integrated product-service offerings need to develop competence in networking and relationship management in order to be able to draw on the complementary capabilities of external parties such as customers, suppliers, and business partners (Bastl et al., 2012; Spring and Araujo, 2009; Windhal and Lakemond, 2006).

This literature stream focuses on the supplier's side and fails to consider the capabilities that buying organizations require to procure performance-based solutions entailing combinations of products and support services (e.g. availability contracting). What is more, the capability view of providing integrated product-service solutions provides limited empirical insights into contractual aspects and what types of contracting capabilities are required.

Servitization has increased the complexity of contracts and that has clearly created challenges for both the suppliers and buyers of product-service solutions. Empirical evidence of the use of risk and revenue sharing agreements has been provided (see Bastl et al., 2012), but it is much less clear how such formal contracts can be designed and managed in an effective way. As an exception, Datta and Roy (2011) link the servitization trend with the increased application of performance-based contracts (interpreted as results-oriented product-service systems). They particularly stress the importance of specifying and evaluating performance through KPIs, designing a good contract including in it appropriate incentive systems (penalties and additional rewards for the supplier in exchange for increased risk taking).

Against this research background, and given the scope and purposes of this pre-study, the report focuses on the **contracting capabilities that buying organizations require to design, manage and control performance-oriented contracts**. Such capabilities are examined in the context of (out)sourcing equipment and support services (e.g. maintenance, repairs and associated

logistics support services) to fulfil functional requirements within the buying organization i.e. the Swedish defence authorities in this case.

The concept of PBC capabilities is closely related, and draws upon, similar concepts featuring in the literature such as "(out)sourcing capabilities" (Selviaridis et al., 2013; Selviaridis et al., 2011; Axelsson et al., 2005) "contract design capabilities" (Argyres and Mayer, 2007), "contract management capacities" (Brown and Potoski, 2003) and "contracting capacities" (Yang et al., 2009). More specifically, all these concepts appear to converge in terms of their emphasis on core sets of knowledge and competences of the buying organization regarding specification, supplier selection, contracting and post-contract evaluation and management of supplier relationships.

In particular, the definition of contracting capabilities provided by Türksever and Wynstra (2013) appears to provide a suitable frame for conceptualizing performance-based contracting capabilities. Türksever and Wynstra (2013, p. 529) define contracting capabilities as the "capabilities that enable organizations to analyse situational characteristics of outsourcing, select the most suitable contract specification method, design the appropriate contract (ex-ante), and manage, adjust and eventually terminate the contract effectively (ex-post)".

The conceptualization of PBC capabilities can be narrower than the above definition of contracting capabilities insofar as the emphasis here is on the design and management of a specific type of contract i.e. a performance-based contract. Hence, the following working definition is proposed:

"Performance-based contracting capabilities are the capabilities and knowledge sets that enable organizations to contractually specify, evaluate and manage required performance, design appropriate performance-oriented incentives systems, and allocate and manage financial and operational risks associated with performance attainment".

Drawing also upon the conceptualization of PBC in terms of the interplay of performance, incentives and risk aspects (see Figure 2), it can be argued that the notion of PBC capabilities places at centre stage sets of competence and know-how with regards to both contract design and management. Indeed, a closer look at the PBC literature reveals that a few studies have stressed critical capabilities that organizations need to develop to successfully design and implement PBC. Such capability sets include drawing output/outcome-based specifications and crafting well-defined service level agreements, setting up performance measurement systems and monitoring supplier performance on an ongoing basis, allocating and managing risks in an appropriate way, as well as designing well-balanced incentive schemes (Hannah et al., 2010; Behn and Kant, 1999; Barret et al., 1992; Else et al., 1992).

Performance-based contracts may often be applicable in the context of decisions to (out)source complex bundles of products and services (Datta and Roy, 2011;

Hypko et al., 2010). Specifically in the context of defence acquisition, such decisions may entail the deployment of availability contracts for the provision of defence equipment and cost-efficient support solutions throughout the useful life of such equipment. However, PBC capabilities need not necessarily focus on the outsourcing decision (make or buy) as such, which is also addressed during the early stages of the defence acquisition process (i.e. concept and assessment). This is because decisions and choices regarding contract types, definition and selection of KPIs (e.g. definition of availability), design of contract payment schemes and risk transfer to selected defence suppliers are not elaborated upon until the decision to outsource is approved.

PBC capabilities can be conceived as indirect capabilities (Araujo et al., 2003; Loasby, 1998), drawing mainly on the reviewed literature in Section 3. That is, PBC capabilities refer to contracting know-how which helps the buying organization to gain access to external capabilities and resources of its suppliers.

In the specific context of defence acquisition, the main type of direct (productive) capability of the Swedish Armed Forces is military capability, as defined by Ekström (2012). In other words, the Armed Forces have in place a set of core capabilities that help them fulfil their mission and strategic objectives, in terms of defending the national borders of Sweden, participating in peace keeping operations internationally and/or handling domestic emergency situations (Ekström, 2012).

In order to accomplish their strategic aims, the Swedish Armed Forces make use of equipment such as tanks, aircrafts and ship, soldier units and associated military equipment. A military unit is, so to speak, the "carrier" of military capability. The equipment and the associated support services that help military units maintain the levels of performance and operational availability are externally acquired. That is, FM, FMV and other defence authorities make use of the external capabilities of defence suppliers and other related organizations within defence markets. This also entails that FM and FMV need to have in place (out)sourcing and contracting capabilities to be able to successfully carry out this equipment acquisition and support tasks and, in this way, contribute to the development and long term sustenance of military capability of the Swedish Armed Forces.

Contracting capabilities can thus be conceived as indirect or ancillary capabilities (Loasby, 1998). In the same vein, PBC capabilities are a specific class of indirect capabilities that are critical for successfully contracting for equipment and associated support services based on "availability" and/or "capability" outcomes. In line with the above analysis, the initial working definition of PBC capabilities can be refined as following:

"Performance-based contracting capabilities are the indirect know-how and capabilities that enable organizations to specify, evaluate and manage required performance, design appropriate performance-oriented incentives systems, and allocate and manage financial and operational risks associated with performance attainment. The development of these indirect capabilities entails articulation and codification of knowledge regarding performance-based contract design and management, considering also the broader context of the outsourcing decision".

4.3 A proposed classification of PBC capabilities

This section proposes a classification of performance-based contracting capabilities. In connection to the crafted definition of the concept of PBC capabilities, this classification is built upon the concepts of performance, incentives and risk as the key conceptual building blocks of PBC and it also takes into account the design and management phases of the contracting process (see also Table 2). In addition the stage of "performance-based contract assessment" is taken into consideration for both *ex-ante* and *ex-post* processes of contracting know-how articulation, codification and sharing that enables organizational learning regarding performance-based contracting.

Table 3 exhibits the proposed classification of relevant PBC capabilities in the context of defence acquisition projects. As can be seen, the classification relates to the specific stages of the defence acquisition process (still in the making, see Figure 4) to ensure relevance for the Swedish defence authorities. As a reference point, the corresponding stages of the UK defence acquisition process are shown in brackets.

Three key types of PBC capabilities are identified: a) performance-based contract design, b) performance-based contract management, and c) performance-based contract assessment capabilities.

4.3.1 Performance-based contract design capabilities

Performance-based contract design capabilities refer mainly to the "concept" and "development" stages of the defence acquisition process. They are related to know-how regarding the specification of required performance, the design of incentive systems and the identification and allocation of risks between the buying organization and the defence supplier(s). Performance requirements are specified both in terms of (life-cycle) cost efficiency and operational performance (e.g. operational effect, operational availability, or in terms of availability or readiness of acquired equipment). Such requirements must then be "translated" into a set of measurable and "easy to communicate" KPIs. These

need to be clearly defined in terms of their meaning (e.g. what do we mean by "equipment availability" or "operational readiness"?), the targeted performance levels and the minimum and maximum acceptable thresholds.

Table 3: A proposed classification of PBC capabilities in the context of Swedish defence acquisition

	PBC design	**PBC management**	**PBC assessment**
Concept (Concept)	• Specification of functional requirements of end users • Definition of the through life equipment plan in terms of costs and servicing needs		• Definition of required expertise and key functions and managers to be involved in different project phases • Formation of cross-functional acquisition and contracting teams
Development (Assessment and Demonstration)	• Specification and technical system and associated system support requirements • Design of performance metrics, KPIs and service levels (e.g. availability) • Specification of life cycle costs and target costing • Design of payment mechanism and its specific structure • Design of financial penalties/bonuses in terms of structure and intensity in terms of thresholds • Identification of performance-related risks (both financial and operational) • Allocation/transfer of financial and operational risk to supplier		• Leveraging performance-based contracting know-how from previous acquisition projects, supplier experiences (avoiding doing the same mistakes)
Production (Manufacture/ Migration)	• Configuration capability: linking performance of acquired system/support solution with systemic performance, considering all defense lines of development.	• Implementation capability: ensuring smooth transition (especially for support services) • Monitor supplier delivery performance against set milestones (for equipment)	
Use and Maintenance (In-service)		• Measuring and monitoring supplier performance against set KPIs • Monitoring planned repairs/refits/upgrades against set milestones • Administering financial penalties/bonus payments • Ongoing management of financial and operational risks	• (Re)assessing the impact of designed incentives on supplier behavior and adjusting performance metrics, target levels and penalty/bonus thresholds • Learning capability: articulation of lessons learned regarding the ability to design good performance-based contracts
Decommissioning (Disposal/ Termination)		• Ensuring smooth contract termination and that asset disposal/transfer goes as planned	• Codification of lessons learned from specific projects

The buying organization also needs to have know-how regarding the design incentive systems in terms of financial penalties and/or bonuses. Such incentives need to be directly linked to the specified KPIs and they should be clear in terms of their administration (e.g. when does the supplier receive a fine and under what conditions?). An appropriate intensity level of financial incentives should also be achieved in line with the specified performance. Targets that are either too easy or too difficult to hit may discourage suppliers from actively seeking to, e.g., improve operational performance or reduce total life cycle costs. In addition, potential choices of performance-based payment mechanism types (e.g. fixed-price incentive fee contracts, target cost contracts or risk and revenue sharing agreements) need to be analysed and a final decision regarding the structure of payment needs to be made.

In connection to the design of incentive systems, the buying organization requires know-how with regards to identification and allocation of all financial and operational risks associated with performance. In particular, a key feature of PBC is the transfer of performance-related risk to defence suppliers. However, such risk transfer should take into account the balancing of risks and rewards provided to the suppliers, as well as the extent to which such risks (especially operational risks) can really be transferred to private operators given the restricted access of civilians to designated areas of operations (see Doerr et al., 2005; Ekström, 2012).

4.3.2 Performance-based contract management capabilities

Performance-based contract management capabilities refer mainly to the "production", "use and maintenance" and "decommissioning" stages of the defence acquisition process. During the production stage in particular, performance-based contract implementation capability (Türksever and Wynstra, 2013; Yang et al., 2009) is relevant since the buying organization needs to ensure that the equipment manufacturing milestones are met and that there is a smooth transition and implementation in cases of acquiring associated support services.

Contract management capabilities refer to know-how in relation to setting up performance measurement and reporting systems as well as evaluating and monitoring supplier performance against the set performance target levels. This often entails investing in systems and developing operational procedures for collecting performance-related data, analysing those and producing performance reports. However, a lot of these tasks can actually be outsourced to suppliers which may have appropriate technological solutions in place that help them reduce their financial exposure induced by PBC (see for instance Roll Royce's' engine heath management solutions which allows collecting data regarding the use of engines). In addition, capabilities in terms of reviewing and managing operational and financial risks on an ongoing basis, as well as administering the payment of financial bonuses or the collection of performance-related fines from

the suppliers, are required. Effective performance-based contract management should also entail expertise regarding the disposal of assets and the termination of service contracts taking into account the life cycle cost plans in place.

4.3.3 Performance-based contract assessment capabilities

A third category of PBC capabilities relates to performance-based contract assessment. Such know-how and competences cut across all the stages of the defence acquisition process (see Table 3). Broadly speaking, this category refers to what Türksever and Wynstra (2013) define as capabilities of processing and managing knowledge (regarding acquisition and contracting) as well as capabilities of learning and improving by leveraging prior experiences and making use of lessons learned over time. More specifically, in the early stages of the defence acquisition process it is essential to *ex-ante* assess and identify the types of expertise required for successful project management and to form cross-functional acquisition and contracting teams accordingly. For example, it could be appropriate that key personnel from FMV, FM and FSV work in teams to discuss key milestones and decision e.g. with regards to specification of functional and system requirements both in terms of acquired equipment and associated support services. During the development stage knowledge management capabilities in terms of re-using lessons learned from previous experiences with the same supplier or in similar equipment acquisition projects can be critical for avoiding costly mistakes. In addition to codify and re-using earlier internal experiences, commercial best practices can be taken into consideration here.

Learning capabilities are also very important *ex-post* during the use and maintenance (in-service) phase to ensure appropriate design of PBC and rectification of any mistakes and/or omissions during the contract design phase. More specifically, the buying organization benefits from articulating any contracting lessons learned (see Mayer and Argyres, 2004) in terms of badly designed incentives that instigate inappropriate supplier behaviour or inappropriate specification of performance levels and risk allocation (e.g. availability targets too easy or too difficult to hit). It is also important that after the end of the acquisition cycle any lessons learned are also codified in a structured way so that the collective know-how regarding PBC design and management increases over time. Such knowledge articulation and codification processes are meta-type, dynamic capabilities (Zollo and Winter, 2002) that help to develop, sustain and improve PBC capabilities.

4.4 Theoretical frameworks for studying PBC capability development

This section discusses which theoretical perspectives and/or conceptual frameworks would be potentially useful for studying capability development in PBC. In light of the ensuing shift of emphasis of Swedish defence authorities from a transaction-based to a performance-based acquisition paradigm, the role of performance-based contracting is expected to be elevated. Swedish defence authorities would therefore benefit from building up knowledge and developing capabilities in designing and managing performance-based contracts in the context of outsourcing complex bundles of defence equipment and associated services (e.g. maintenance and logistical support).

The departure point of the following discussion is the theoretical and conceptual perspectives presented earlier in this report (see Section 3). More specifically, the aim here is to conceptually explore how some of these perspectives and frameworks could fit the current challenges facing the Swedish defence authorities in relation to the reformation project and the transition towards a performance-oriented acquisition model.

Before proceeding to discuss and present potentially useful theoretical frameworks, it is important to issue a note of caution regarding the relevance of some of the theories presented and discussed earlier, which do not seem to fit well the empirical context of defence markets. In other words, the ontological and epistemological assumptions (see Easterby-Smith et al., 2002) underpinning theories such as the RBV, the extended RBV and theories of alliance capabilities appear not to be fit for purpose.

More specifically, RBV and ERBV both assume a highly competitive business and market environment where the aim of organizations is to develop sustainable competitive advantages by nurturing and maintaining unique and inimitable resources and capabilities (e.g. Barney, 2001; Lavie, 2006). This might be less relevant for Swedish defence authorities, and even defence suppliers, who face much less competition in this industry setting. In a similar vein, the notion of alliance capability (Kalle et al., 2002), although interesting and to some extent useful for the current study, is less relevant for public sector settings where public acquisition laws and regulations apply and where defence authorities such as FMV are restricted in terms of developing close, collaborative relationships and strategic alliances with defence suppliers.

Finally, one could even question the relevance of the notion of "dynamic capabilities" insofar as this applies to highly dynamic business environments where organizations need to often recombine and reconfigure their capabilities to maintain a competitive edge. Clearly a defence market context is not very dynamic from this point of view, given the monopsonistic power of governments

and defence authorities, and the relatively stable relationships with a limited number of defence suppliers. Technological changes are also less frequent as compared to hi-technology industries. However, it has been suggested that dynamic capabilities may well be applicable in moderately dynamic or even relatively stable industry contexts (e.g. Baretto, 2010; Eisenhardt and Martin, 2000) to emphasize how organizations learn to develop and reconfigure their capabilities in response to external environmental changes. In this sense, dynamic capabilities appear to be relevant for the purposes of the present study.

With these caveats and qualifications in mind, the rest of this section discusses a number of theories and conceptual frames that would be applicable in studying capability development in performance-based contracting.

4.4.1 Indirect capabilities perspective

The notion of indirect capabilities is clearly relevant insofar as capabilities in designing, managing and assessing (both *ex-ante* and *ex-post*) performance-based contracts contribute to gaining access to the external resources and capabilities of defence suppliers and third parties. Indirect capabilities refer to "know-how to get things done by others" and stress the role of appropriate knowledge application (know-how, rather than merely know-what). Indirect capabilities here refer not only to contract design and management know-how, but also to capabilities of managing inter-firm relationships with suppliers.

The notion of indirect capabilities and the related literature on (out)sourcing capabilities, contracting capacities and contract design capabilities have been already drawn upon to identify key categories of PBC capabilities (see Section 4.3). Given that access to the capabilities of defence suppliers is organized through market-based, transactional relationships (Araujo et al., 2003) due to the restrictions imposed by public acquisition laws and regulations, it is interesting to examine: a) to what extent Swedish defence authorities make use of suppliers' know-how when it comes to contracting and performance management, b) to what extent do they drawn on the capabilities and expertise of third parties such as consultancies to assist them in the acquisition process? and c) to what extent Swedish defence authorities (FM and FMV mainly) maintain internally knowledge related to the outsourced tasks (e.g. technological knowledge about equipment and support services, including logistics).

4.4.2 Knowledge-based perspectives

A knowledge-based perspective would also be relevant and useful since it puts at centre stage the notion of learning and knowledge (as the outcome of the learning process) and their roles in the development of performance-based contracting capabilities. A knowledge-based approach stresses the design of appropriate organizational structures, processes and mechanisms of learning (Zollo and

Winter, 2002; Grant, 1996; Kogut and Zander, 1992) that the Swedish defence authorities should establish to enable capability development in performance-based contracting and the management of relationships with defence suppliers. More specifically, Kogut and Zander's (1992) notion of combinative capability could help uncover how defence agencies learn and develop their performance-based contracting capabilities and how individuals, specific divisions/functions and even whole authorities (e.g. FMV) come together to (re)combine and integrate their know-how (Grant, 1996) and develop the new capabilities associated with the performance-oriented acquisition model.

In light of the ongoing reformation project and the shift of responsibilities, resources, personnel and skill sets among defence authorities, such an approach appears to be interesting and highly relevant since it also emphasizes the role of tacit knowledge and organizational routines, as well as the path-dependent and social nature of knowledge creation and capability development (Kogut and Zander, 1992). Potential questions to ask here include: How will the restructuring project and the merging of authorities affect tacit knowledge and routines of the new organization? To what extent such tacit knowledge and routines can be transferred to the new structures (e.g. FMV)? What is the role of path-dependency in terms of capability development within FMV? What are the main challenges and opportunities in relation to the development of capabilities in performance-based acquisition and contracting, considering also the complexity of the ongoing restructuring project?

4.4.3 Dynamic capabilities perspective

A dynamic capabilities perspective would be potentially useful to study whether there are deliberate processes and mechanisms of articulation, codification (Zollo and Winter, 2002) and sharing of performance-based contracting knowledge and experiences among the reformed defence authorities. How can such know-how be articulated and codified? What is the rate of learning, given the organization's absorptive capacity (Zahra and George, 2002) and its prior know-how in this area (Wang and Ahmed, 2007)? Do defence authorities such as FMV retain know-how internally (i.e. know more they do) regarding the outsourced equipment/systems and how does this affect performance-based contract design, management, and assessment capabilities as well as value for money?

Furthermore, the PBC literature stresses that designing and managing PBCs is a learning process (Faith et al., 2010; Else et al., 1992). In the context of outsourcing social welfare services for instance, Heinrich and Choi (2007) explain how public agencies can make use of experience gained to prioritize performance measures through adjusting their weighting and adapt financial incentives (e.g. risk premium payment to the service provider can be reduced to reflect early insights that service targets can be hit easily).

A dynamic capability perspective is relevant in the sense that it stresses the role of trial and error, experiential learning and experience accumulation processes (Zahra et al., 2006; Eisenhardt and Martin, 2000). Examination of such processes could help develop an understanding of how PBC capabilities develop and evolve over time. The work of Mayer and Argyres (2004) is also useful here: setting out to amend TCE's lack of emphasis on learning effects, these scholars point out that prior experience and lessons learned matter for inter-firm contracting (Argyres, Bercovitz & Mayer, 2007). Organizations learn how to contract with each other as they gain experience and learn about exchange-specific contingencies and hazards over time. Such knowledge is used to modify, adjust or extend contractual provisions in successive contracts and increase exchange efficiency and effectiveness. In this sense, contracts can serve as repositories of knowledge (Mayer and Argyres, 2004).

Applying this dynamic approach to PBC means that early experiences of defence authorities during the in-service/use phase as well as supplier-specific knowledge can be used to refine output/outcome measures, service level thresholds as well as adjust financial bonus/penalty payments to increase overall contract efficiency and effectiveness (Behn and Kant, 1999; Else et al., 1992). This dynamic approach is also consistent with Türksever and Wynstra's (2013) conceptualization of contracting capabilities as the ability to learn and improve by taking into account prior experiences and knowledge.

4.4.4 Organizational routines perspective

Another interesting and potentially fruitful avenue for empirically studying organizational learning and capability development in performance-based acquisition and contracting is taking an organizational routines perspective (Becker, 2004; Dosi et al., 2000). More specifically, such an approach would focus on routines regarding acquisition and contracting tasks within the relevant defence authorities (e.g. FMV), drawing a distinction between ostensive and performative aspects of relevant routines and the role of relevant artefacts (Pentland and Feldman, 2005).

Studying ostensive aspects would, for instance, entail focusing on artefacts such as acquisition process guidelines, business case documents, tenders, contracts and standard operating procedures and rules regarding the acquisition process (a lot of which are currently in the making due to the introduction of the new acquisition model). Empirical examination of performance aspects of acquisition /contracting routines would focus on how FM and FMV key managers and personnel enact such rules and operating procedures, how they interpret them, and whether they diverge from them or they elaborate upon them e.g. in relation to the specific requirements and aims of each acquisition project.

The interaction between ostensive (abstract, cognitive regularities indicated by things such as rules and standard operating procedures) and performative aspects (how managers enact those in specific times, places, and contexts) could provide a useful theoretical lens to explore how Swedish defence authorities (e.g. FMV) learn and develop their capabilities over time. For instance, it would be interesting to empirically investigate how the enactment of the generic and abstract rules and working procedures (e.g. managing and controlling contractual relationships with defence suppliers) in specific projects produces new insights and lessons learned. And whether those lessons learned and experiences are fed back to the description of routines through the formal documents (e.g. acquisition process model), or they affect the conceptualization and interpretation of what FMV employees and managers do i.e. their interpretative schema (see Salvato and Rerup, 2011).

5 Conclusions and recommendations

This chapter summarizes the main findings and contributions of the report, points out limitations of the pre-study and offers recommendations for future empirical research on Swedish defence acquisition, and more specifically capability development in performance-based acquisition and contracting.

5.1 Revisiting the research questions

The purpose of this pre-study has been to explore and increase awareness of the concept of "performance-based contracting capabilities", as well as to examine what types of capabilities the Swedish defence agencies should consider for implementing a performance-based defence acquisition model. In addition, the study aims at identifying relevant theoretical perspectives and conceptual frameworks for empirically studying, as a next step, capability development in performance-based contracting. Three specific research questions have been formulated, which are revisited in the following:

RQ1: What are performance-based contracting capabilities?

In the context of Swedish defence acquisition, performance-based contracting capabilities are conceived as indirect or ancillary capabilities (Loasby, 1998), as opposed to the direct, military capabilities of the Swedish Armed Forces that help them fulfil their strategic missions and purposes e.g. defend Sweden and participate in international peace keeping operations as part of their international obligations.

PBC capabilities are a specific class of indirect capabilities that are critical for successfully contracting for equipment and associated support services based on "availability" and/or "capability" outcomes. In particular, the following definition of PBC capabilities is proposed:

"Performance-based contracting capabilities are the indirect know-how and capabilities that enable organizations to specify, evaluate and manage required performance, design appropriate performance-oriented incentives systems, and allocate and manage financial and operational risks associated with performance attainment. The development of these indirect capabilities entails articulation and codification of knowledge regarding performance-based contract design and management, considering also the broader context of the outsourcing decision".

RQ2: What types of capabilities should Swedish defence agencies consider to design and manage performance-based contracts as part of the transition towards performance-based defence acquisition?

Three key types of PBC capabilities are identified. First, performance-based contract design capabilities refer mainly to the "concept" and "development" stages of the defence acquisition process. They are related to know-how regarding the specification of required performance, the design of incentive systems and the identification and allocation of risks between the buying organization and the defence supplier(s).

Second, performance-based contract management capabilities refer mainly to the "production", "use and maintenance" and "decommissioning" stages of the defence acquisition process. They mainly relate to know-how in implementing the performance-based contract, measuring, monitoring and managing supplier performance, monitoring the implementation of scheduled equipment refits/upgrades, administering financial incentive payments, as well as managing financial and operational risks in an ongoing fashion.

Third, performance-based contract assessment capabilities cut across all the stages of the defence acquisition process. This category refers to capabilities of processing and managing knowledge (regarding purchasing and contracting) as well as capabilities of learning and improving by leveraging prior experiences and making use of lessons learned over time. These capabilities are important both *ex-ante* (i.e. contract design) and ex-post (i.e. contract management). *Ex-ante* capabilities include identifying and integrating the types of expertise required for successful project management, forming cross-functional acquisition and contracting teams, and (re-)using lessons learned from previous experiences with the same supplier, similar equipment acquisition projects, as well as commercial best practices. *Ex-post* learning and adaptation capabilities ensure appropriate design of PBC and rectification of any mistakes and/or omissions during the contract design phase (e.g. adapting performance and/or financial bonus/penalty levels). They also entail codifying any lessons learned in a structured way so that the collective know-how regarding PBC design and management increases over time.

RQ3: Which theoretical perspectives and/or conceptual frameworks are useful for empirically studying capability development in performance-based contracting in the Swedish defence context, and why?

Four theoretical perspectives have been highlighted as potentially relevant and useful for studying capability development in performance-based acquisition and contracting. These are the notion of indirect capabilities, the knowledge-based

view of the firm, the dynamic capabilities perspective and the organizational routines approach (for further details see Section 4.4).

Other theories such as the RBV, the ERBV and the alliance capability perspective are deemed as not applicable in the defence market context; the ontological and epistemological assumptions underpinning those perspectives (e.g. the assumptions of a highly competitive business environment, the centrality of sustainable competitive advantage and the leveraging of inter-firm alliances) do not fit the public sector context of defence acquisition.

5.2 Limitations

This pre-study and report is based on research of a conceptual nature i.e. review of academic literature on PBC, related theoretical (capability-based) perspectives and reports produced by the Swedish government and defence authorities. Further studies of empirical nature are required to validate and potentially refine the developed definition and classification of PBC capabilities and ensure that those are relevant for the targeted agencies. In addition, further empirical research should be conducted to study how Swedish defence authorities can develop their capabilities in performance-based acquisition and contracting (for recommendations see Section 5.3 below).

In addition, for the sake of simplicity this report has treated the buying organization as a collective entity. As a next step, and considering the ongoing restructuring project within the Swedish defence, the empirical study should draw a distinction between the requisite capabilities of each defence authority (FM, FMV, FSV and even FMLOG) with regards to performance-based acquisition and contracting. Such an empirical investigation can also examine the interactions with other types of capabilities (e.g. internal competences in logistics and equipment support services) and how these affect acquisition and contracting know-how.

5.3 Recommendations for future empirical research

Taking into account the current challenges and opportunities facing Swedish defence authorities and in line with the previous discussion about potentially useful theoretical perspectives to study PBC capability development, the following recommendations for empirical research are made:

a) Focus on the learning processes, structures and mechanisms by which Swedish defence agencies develop their know-how and capabilities in performance-based acquisition and contracting. Are there any explicit processes and mechanisms in place? How is such know-how articulated and

codified, if at all? What is the rate of learning, and how is that affected by the organization's absorptive capability and prior knowledge?

b) In light of the ongoing reformation project and the shift of emphasis towards a performance-based acquisition model, focus on how individuals, specific divisions/functions and even whole authorities (e.g. FMV and FM) come together to (re)combine and integrate their know-how and develop the new capabilities associated with the performance-oriented acquisition model. It will also be interesting to investigate the role of path-dependence and tacit knowledge in this process of capability development.

c) Focus on the role of trial and error, experiential learning and experience/knowledge accumulation in PBC capability development and evolution over time. Capability development in PBC presupposes the existence of dynamic, meta-capabilities of learning and adapting in light of experiences from previous acquisition projects and suppliers as well as within cross-organizational and cross-functional acquisition teams.

d) Focus on organizational routines regarding acquisition and contracting tasks within the relevant defence authorities (e.g. FMV). Such a study would try to empirically investigate the ostensive and performative aspects of such routines and how their interactions may affect learning and know-how development over time. For instance, how enactment of formal acquisition guidelines and procedures guides actual practices and whether any divergence and lessons learned from acquisition project experiences are fed back and reflected in the adjusted formal rules. Also, insofar as the reformation project entails changes in rules and standard operating procedures regarding acquisition and contracting, it would be interesting to examine how such rules are decided, by whom, and how they attempt to codify the ostensive aspects of performance-based acquisition routines.

5.4 Concluding remarks

In conclusion, the Swedish defence authorities are at an important stage of organizational change and development which presents them with challenges as well as exciting opportunities. Supporting FM to fulfil their strategic missions and aims and strengthen their military capability through effective and cost-efficient acquisition and logistics, it will in turn entail that FMV, FM and other relevant agencies develop capabilities in performance-based acquisition and contracting.

Against this background this pre-study offers some initial insights into what such capabilities may be, what they refer to and what their development entails. More specifically, this pre-study and report makes the following contributions:

a) Maps the academic state of the art in PBC, as this relates to the (out)sourcing of integrated product-service offerings

b) Conceptually explores, discusses and proposes the notion of PBC capabilities.

c) Provides a definition of the concept PBC capabilities.

d) Provides a classification of PBC capabilities.

e) Identifies key capability-based theoretical perspectives and discusses their relevance with regards to studying capability development in performance-based acquisition and contracting.

f) Offers specific recommendations for future empirical research in close collaboration with FOI, FM, FMV, and any other related Swedish defence authority.

The above contributions are seen as the first small step towards establishing a collaborative research program on performance-based logistics/contracting in the context of Swedish defence acquisition. In particular, it is hoped that this pre-study will open up avenues for further collaboration between Lund University and the Swedish defence authorities to conduct rigorous and highly relevant research for the Swedish defence practitioner community as well as the international academic scholarship on performance-based contracting.

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