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Public Private Business Models for Defence Acquisition

A Multiple Case Study of Defence Acquisition
Projects in the UK



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Thomas Ekström



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Dedication

Verba volant, scripta manent

In loving memory of my father, Lars-Emil Gunnar Ekström (1918-2000)
and in loving memory of my mother, Siv Berit Ekström (1934-2011)

Sic transit gloria mundi – Carpe diem (Do it now!)

With earnest love and sincere gratitude I hereby dedicate this licentiate thesis to my parents, my wife and my children.

To my steadfast father, Lars-Emil Ekström, who was a resolute believer in the value of knowledge, and who inspired me to seek higher education, but first and foremost motivated me to seek data, information, and knowledge, and to strive for understanding and wisdom.

To my supportive mother, Berit Ekström, *née* Blomberg, who was an unwavering and encouraging force throughout my quest for higher education, and who always, only partially in jest, entertained the notion that I should, “*at least*”, become a professor (we will have to see about that), but who predominantly wanted me to pursue happiness and health.

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To my vivacious children: Emelie; Carl; Alexander; Vilhelm; and Josephine; who have, in succession and in all conceivable permutations, provided me with a novel interpretation of the illusive acronym SCM, namely Small Children Management, a topic in which I have yet to excel, but I am sure that I will be given ample opportunities to try, try and try again.

Thomas Ekström

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Consummatum est. Forsan et haec olim meminisse iuvabit.

Roslagen, 2012-07-25

Thomas Ekström

Abstract

Since the ending of the Cold War, the defence sector, particularly the areas of military logistics and defence acquisition, has been undergoing a comprehensive transformation. There are several factors that explain this transformation: changes in defence and security policies for nations and organisations; reductions in defence expenditure; participation in Peace Support Operations; Lessons Learned from these operations, especially in the area of logistics; revolutionary development in the area of Information and Communication Technology; emergence of novel Commercial Best Practises in the areas of business and business logistics; and changes in the legislation regarding the conduct of public procurement in Europe.

In military logistics, the relatively easily described static supply and support chains of the Cold War Era, designed for military units that stood in preparedness, Just-in-Case, of full-scale military conflicts in Europe, are now being substituted for flexible, dynamic operational supply and support chains, designed for military units that are deployed on Peace Support Operations around the globe. Hence, new types of missions have to be provided for. As a consequence, new military concepts have to be considered; new technology is being implemented; and new Commercial Best Practises are being evaluated, adapted and adopted; in order to enhance performance and ensure Value-for-Money.

In defence acquisition, the single Business Model of the Cold War Era, i.e. procurement of equipment, is being replaced by a spectrum of emerging Business Models, ranging from the traditional procurement of equipment, via acquisition of equipment and support, to acquisition of availability and capability, i.e. acquisition of performance. Consequently, new Commercial Best Practises are being evaluated, adapted and adopted; Commercial and Military-Off-The-Shelf products and services are being utilised; and Public Private Participation, Cooperation, and Partnerships are being investigated and initiated; in order to enhance performance and ensure Value-for-Money, while simultaneously mitigating operational risk in the supply and support chains.

This licentiate thesis reports on a research project that was commissioned by FMV, the Swedish Defence Materiel Administration, and conducted in order to “*study, analyse, and evaluate Business Models regarding how they can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept*”. This research purpose was used to formulate three Research Questions:

- Research Question 1: How can a generic Business Model for a non-profit, governmental, Defence Procurement Agency be described?

- Research Question 2: Which strengths and weaknesses do different Business Models have in the context of defence acquisition?
- Research Question 3: Which risks are associated with different Business Models in the context of defence acquisition?

Using constructs from: Business Model theory, Public Private Participation theory, defence acquisition theory and practise, and military logistics theory and practise; a generic Public Private Business Model for defence acquisition was developed. The generic model consists of numerous variables, which enables an array of possible configurations. The model was used in a multiple case study to describe and analyse four defence acquisition projects in the UK. The multiple case study demonstrated that the generic Public Private Business Model is useful in order to describe defence acquisition projects. The model has also demonstrated that it is useful in order to analyse acquisition projects, including performance and risk.

The Public Private Business Model has demonstrated its usefulness by discovering internal and external misalignments. The internal misalignments are Business Model configurations where the different building blocks are working against each other. The research has revealed examples where the mitigation of operational risk in the supply and support chains creates new risks in other building blocks. An external misalignment occurs when a Business Model configuration works against the deal for which it was designed, or the strategy that it is intended to realise. The research has revealed examples where there is a risk that the Business Model configuration is detrimental to the overarching strategy, e.g. transferring risk to the private sector or incentivising industry to enhance performance. Hence, the Public Private Business Model ought to be useful to identify and eradicate negative patterns and to identify and reinforce positive patterns.

The research has revealed three potential generic problems for Performance Based Contracts: a “*definition problem*” (i.e. *what* to measure); a “*measurement problem*” (i.e. *when, where and how* to measure); and a “*comparison problem*” (i.e. *with what* to compare). The research results demonstrate that it must be made explicit which dimensions of performance; e.g. speed, quality, cost, flexibility and dependability; that should be measured, and why others should be omitted. The research suggests that performance must be explicitly specified for any Performance Based Contract in order to avoid any unnecessary problems with interpretations. Furthermore, the research indicates that performance metrics must be explicitly described. In addition, the results emphasise the importance of having an established baseline, against which to compare the measurements of Key Performance Indicators.

Key words: defence transformation; military logistics; supply chain; support chain; defence acquisition; Business Model; Public Private Participation, Cooperation and Partnership; Value-for-Money; performance; risk; multiple case study; misalignment.

Sammanfattning

Alltsedan det kalla kriget slutade har försvarssektorn, framförallt militär logistik och försvarsmaterielanskaffning, genomgått en genomgripande transformation. Flera faktorer har bidragit till transformationen: förändringar i länders och organisationers försvars- och säkerhetspolitik; reducerade försvarsbudgetar; deltagande i fredsbevarande och fredsframtvängande operationer; erfarenheter från dessa operationer, inte minst inom logistikområdet; den revolutionära utvecklingen inom Informations- och Kommunikationsteknologin; utvecklandet av nya koncept inom företagande och affärslogistik; samt förändringar i den europeiska lagstiftningen avseende offentlig upphandling.

Inom den militära logistiken har den statiska försörjnings- och underhållskedjan från det kalla krigets dagar, vilken var utformad för militära förband som stod i beredskap, i händelse av ett fullskaligt krig i Europa, påbörjat en förvandling till en flexibel och dynamisk operativ försörjnings- och underhållskedja, utformad för militära förband som sätts in i fredsbevarande och fredsframtvängande operationer över hela världen. Således måste nya typer av militära missioner försörjas. Som en konsekvens övervägs nya militära koncept; ny teknologi implementeras; och civila koncept utvärderas, anpassas och införs; för att förbättra *”prestationen”* (performance) och för att säkerställa valuta för pengarna.

Inom försvarsanskaffningen har det kalla krigets affärsmodell, materielanskaffning, börjat ersättas av ett spektrum av nya affärsmodeller, från den traditionella materielanskaffningen, via anskaffning av materiel och försörjning, till anskaffning av tillgänglighet och förmåga, det vill säga anskaffning av *”prestation”* (performance). Således utvärderas, anpassas och införs civila koncept; civila och militära produkter och tjänster köps direkt från hyllan; och Offentlig Privat Samverkan utvärderas och initieras; för att förbättra prestationen och för att säkerställa valuta för pengarna, samtidigt som den operativa risken i försörjnings- och underhållskedjan hanteras.

Denna licentiatavhandling redovisar ett forskningsprojekt som beställts av FMV, Försvarets Materielverk, och som genomförts för att *”studera, analysera och utvärdera affärsmodeller avseende hur de kan hantera det nya försörjningskoncept som ett nytt logistiskt gränssnitt medför, med särskild tyngdpunkt på det risktagande som är den del av affärskonceptet”*. Detta forskningssyfte användes för att formulera tre forskningsfrågor:

- Forskningsfråga 1: Hur kan en generisk affärsmodell för en icke vinstdrivande, statlig försvarsanskaffningsmyndighet beskrivas?

- Forskningsfråga 2: Vilka styrkor och svagheter har olika affärsmodeller inom försvarsanskaffning?
- Forskningsfråga 3: Vilka risker har olika affärsmodeller inom försvarsanskaffning?

Genom att använda teori och praktik från områdena affärsmodeller, Offentlig Privat Samverkan, försvarsanskaffning och militär logistik utvecklades en generisk Offentlig Privat affärsmodell för försvarsanskaffning. Den generiska modellen utgörs av otaliga variabler, vilka möjliggör ett flertal möjliga konfigurationer. Modellen användes i en multipel fallstudie för att beskriva och analysera fyra försvarsanskaffningsprojekt i Storbritannien. Den multipla fallstudien visade att den generiska Offentlig Privata affärsmodellen är användbar för att beskriva försvarsanskaffningsprojekt. Modellen har också demonstrerat att den är användbar för att analysera försvarsanskaffningsprojekt, inklusive prestation och risk.

Den Offentlig Privata affärsmodellen har demonstrerat sin användbarhet genom att upptäcka exempel på intern och extern *”inkonsekvens”* (misalignment). Den interna *”inkonsekvensen”* uppstår då konfigurationer av affärsmodellens bestandsdelar motverkar varandra. Forskningen har upptäckt exempel på hur hanteringen av operativ risk i försörjnings- och underhållskedjan skapar nya risker i andra bestandsdelar. Extern *”inkonsekvens”* uppstår då en konfiguration av affärsmodellen motverkar den affär den utformats för att stödja, eller den strategi den är tänkt att implementera. Forskningen har upptäckt exempel då konfigurationen av affärsmodellen motverkar den övergripande strategin, exempelvis att överföra risk till industrin eller försök att få industrin att höja prestationen. Således borde den Offentlig Privata affärsmodellen vara användbar för att identifiera och eliminera negativa mönster, samt förstärka positiva mönster.

Forskningen har avslöjat tre potentiella generiska problem med prestationsbaserade kontrakt: ett *”definitionsproblem”* (dvs. *vad* skall mätas); ett *”mätproblem”* (dvs. *när, var och hur* skall det mätas); och ett *”jämförelseproblem”* (dvs. *med vad* skall det jämföras). Forskningsresultaten visar att det måste göras explicit vilka dimensioner av prestation; exempelvis hastighet, kvalitet, kostnad, flexibilitet och tillförlitlighet; det är som skall mätas, samt varför andra skall exkluderas. Forskningen föreslår att prestation måste specificeras explicit för prestationsbaserade kontrakt för att undvika onödiga problem med tolkningar. Forskningen visar vidare att mätetal för prestationer måste beskrivas explicit. Dessutom understryker resultaten vikten av att ha etablerade referensvärden, med vilka mätningar av de viktigaste prestationsindikatorerna kan jämföras.

Nyckelord: transformation av försvaret; militär logistik; försörjnings- och underhållskedja; försvarsanskaffning; affärsmodell; offentlig privat samverkan; valuta för pengarna; ”prestation”; risk; multipel fallstudie; ”inkonsekvens” (misalignment)

Table of Content

Dedication	iii
Acknowledgements	iv
Abstract	vii
Sammanfattning	ix
Table of Content	xi
List of Figures	xv
List of Tables	xix
1 Introduction	1
1.1 Prelude	2
1.2 Background	6
1.3 Research Problem	17
1.4 Research Purpose	18
1.5 Focus and Demarcations	18
1.6 Research Questions	19
1.7 Target Audiences	20
1.8 Acronyms	20
1.9 Thesis Outline	21
2 Research Problem	23
2.1 Introduction	23
2.2 The Swedish Military Supply Chain	26
2.3 Sweden in Peace Support Operations	33
2.4 Swedish International Cooperation	34

2.5	The Swedish Defence Materiel Administration	35
2.6	Practical Research Relevance	36
3	Research Methodology	41
3.1	Introduction	41
3.2	Research Paradigm	42
3.3	Research Approach	46
3.4	Research Strategy	48
3.5	Research Methodology	50
4	Frame of Reference	63
4.1	Introduction	63
4.2	What Theory is – And what Theory is not	64
4.3	Identification of Relevant Areas of Theory	68
4.4	Frame of Reference and Research Questions	70
4.5	Business Models	71
4.6	Defence Acquisition	93
4.7	Public Private Participation	109
4.8	Military Logistics	131
4.9	Performance Measurement	148
4.10	Supply Chain Risk Management	160
4.11	Key Theoretical Constructs	166
4.12	A Generic Public Private Business Model	168
4.13	Theoretical Research Relevance	176
4.14	A Model for Analysis of Acquisition Project Performance	179
4.15	A Model for Analysis of Acquisition Project Risk	180
4.16	A Comparison between PCP and PPBM	181
5	Defence Acquisition in the UK	183

5.1	Introduction	183
5.2	Recent Defence Reviews	184
5.3	Current Defence Acquisition	187
5.4	The UK MoD Defence Equipment and Support	202
6	Case Descriptions	205
6.1	Introduction	205
6.2	Case A: The C Vehicle Acquisition Project	208
6.3	Case B: The STSA Acquisition Project	221
6.4	Case C: The HASP Acquisition Project	228
6.5	Case D: The ADAPT Acquisition Project	239
7	Analysis and Synthesis	251
7.1	Introduction	251
7.2	Analysis of the C Vehicle Acquisition Project	256
7.3	Analysis of the STSA Acquisition Project	277
7.4	Analysis of the HASP Acquisition Project	291
7.5	Analysis of the ADAPT Acquisition Project	308
7.6	Cross Case Synthesis	321
8	Implications for Theory	353
8.1	Introduction	353
8.2	A Generic Public Private Business Model	353
8.3	Testing the Public Private Business Model	358
8.4	Implications for Business Model Theory	361
8.5	Implications for Public Private Participation Theory	364
8.6	Implications for other Areas of Theory	366
8.7	Research Questions for Future Research	366
9	Implications for Practise	371

9.1	Introduction	371
9.2	Results of the Multiple Case Study in the UK	372
9.3	Transferability – What is Specific to the UK?	380
9.4	Implications for Swedish Defence Acquisition	383
9.5	Practical Implications for Future Research	389
9.6	Outstanding Issues	390
10	Conclusions and Contributions	393
10.1	Introduction	393
10.2	Conclusions	393
10.3	Contributions to Theory	395
10.4	Contributions to Practise	397
	References	403
	Glossary of Acronyms	435
	Annex A: Interview Guide at FMV	449
	Annex B: Interview Guide at DE&S	451

List of Figures

Figure 1.1: Relationships between the different chapters in the thesis.	22
Figure 2.1: The static, closed military supply chain of the Cold War Era.	29
Figure 2.2: One extreme of the dynamic, open military supply chain of the Post-Cold War Era.	30
Figure 2.3: The two levels of resources in Swedish military logistics (Source: Based on The Swedish Armed Forces (2007c, p 13).	32
Figure 2.4: A generic supply concept for operations (Source: Based on Kress, 2002, pp. 202-203).	33
Figure 2.5: Areas of key challenges that FMV faces.	39
Figure 3.1: The subjective – objective dimension (Burrell and Morgan, 1979, p 3).	43
Figure 3.2: Methodology (Source: Arbnor and Bjerke, 1997, p 17).	44
Figure 3.3: A schematic illustration of the abductive research project.	47
Figure 3.4: A rigorous case based research methodology (Source: Ekström <i>et al</i> , 2009).	50
Figure 4.1: Components of a theory (Source: Bacharach, 1989).	66
Figure 4.2: Frame of reference for the generic Public Private Business Model.	70
Figure 4.3: Frame of reference for evaluation of performance and risk for implemented Public Private Business Models.	71
Figure 4.4: A chain of models (Source: Andersson <i>et al</i> , 2009).	74
Figure 4.5: Hierarchical structure of business logic (Source: Adapted from Petrovic <i>et al</i> , 2001; and Osterwalder <i>et al</i> , 2002).	75
Figure 4.6: Evolution of the Business Model concept (Source: Building on Gordijn <i>et al</i> , 2005; and Osterwalder <i>et al</i> , 2005).	76
Figure 4.7: A framework for structuring Business Model research (Source: Pateli and Giaglis, 2003).	77
Figure 4.8: Evolution of the Business Model concept (Source: Building on Gordijn <i>et al</i> , 2005; Osterwalder <i>et al</i> , 2005; and Pateli and Giaglis, 2003).	78

Figure 4.9: The components of through-life costs (Source: Hambleton <i>et al</i> , 2005, p 40).	97
Figure 4.10: Client's assurance and contractor's motivation per contract type (Source: Based on Sols <i>et al</i> , 2007).	109
Figure 4.11: Contracting and pricing alternatives (Source: Building on Straub and van Mossel (2005); and Glas <i>et al</i> (2011).	109
Figure 4.12: The relations between Public Private Participation, Cooperation and Partnerships.	111
Figure 4.13: Spectrum of public and private participation (Source: OECD, 2008, p 20).	114
Figure 4.14: The spectra of Public Private Participation, Cooperation and Partnerships.	117
Figure 4.15: Public Private Cooperation (Source: The Swedish Armed Forces, 2006a, p 3).	118
Figure 4.16: Partnering continuum (Source: Thompson and Sanders, 1998).	126
Figure 4.17: A generic operational logistics network (Source: Kress, 2002, p 29).	141
Figure 4.18: A generic process for movement of units and supplies from the home logistics base to the theatre of operations (Source: Based on Kress, 2002, pp. 202-203).	142
Figure 4.19: The Joint Supply Chain process is a core enabling capability for Defence (Source: UK MoD, 2005b, p 6).	144
Figure 4.20: Purple gates (consolidation points) in coupling bridge logistics and deployed logistics.	146
Figure 4.21: The triple P-model (Source: Tangen, 2005).	150
Figure 4.22: Determinants of business performance (Source: Afuah and Tucci, 2003, p 4).	151
Figure 4.23: A generic representation of components of a Performance Measurement System (Source: Building on Neely <i>et al</i> , 1995; and Gunasekaran <i>et al</i> , 2007).	152
Figure 4.24: Conceptual framework of efficiency and effectiveness (Source: Building on Mandl <i>et al</i> , 2008, p 3; Neely <i>et al</i> , 2000; Slack <i>et al</i> , 2010, p 11; and Tangen, 2004b, p 47).	156

Figure 4.25: Key areas of acquisition project performance (Source: Adapted from van Weele, 2002, p 259).	159
Figure 4.26: Risk Matrix (Source: Norrman and Lindroth, 2004, p 18).	161
Figure 4.27: Supply Chain Risk – The Basic Constructs (Source: Jüttner et al, 2003).	162
Figure 4.28: Risk allocation process in PPP contract procurement (Source: Ibrahim et al, 2006).	165
Figure 4.29: Public Sector Comparator (Source: Grimsey and Lewis, 2005).	166
Figure 5.1: Distribution of Whole Life Costs over a system's life cycle (Source: UK MoD, 2008a).	191
Figure 5.2: The CADMID lifecycle (Source: The UK MoD, 2011d).	192
Figure 5.3: The CADMIT lifecycle (Source: The UK MoD, 2011d).	193
Figure 5.4: The Defence Acquisition Transformation Staircase (Source: The UK MoD, 2005c, p 135).	196
Figure 5.5: Evolution of Capability Management (Source: Gray, 2009, p 144).	198
Figure 6.1: A schematic illustration of the life cycle of a defence acquisition project.	206
Figure 6.2: C-Vehicle distribution channel for equipment and spares for overseas operations.	213
Figure 6.3: C-Vehicle Type I and Type II distribution channel for equipment for domestic training and exercises.	214
Figure 6.4: C-Vehicle Type I and Type II distribution channel for spares for domestic training and exercises.	215
Figure 6.5: C-Vehicle distribution channel for Maintenance, Repairs and Overhauls (MRO) for overseas operations, and for domestic training and exercises.	216
Figure 6.6: HASP distribution channel for spares for overseas operations.	232
Figure 6.7: HASP distribution channel for spares for domestic training and exercises.	233
Figure 6.8: ADAPT distribution channel for equipment and spares for overseas operations.	245
Figure 6.9: ADAPT distribution channel for equipment and spares for domestic training and exercises.	246

Figure 6.10: ADAPT distribution channel for Maintenance, Repairs and Overhauls (MRO) for overseas operations, and for domestic training and exercises. 247

List of Tables

Table 3.1: Summary of central aspects of the research design.	52
Table 3.2: A model for the evaluation of defence acquisition project performance.	60
Table 3.3: Case study tactics for four design tests (Source: Based on Yin, 2009, p 41).	62
Table 4.1: Four approaches in knowledge creation (Source: Arlbjørn and Halldórsson, 2002).	65
Table 4.2: Current dimensions for theoretical contribution (Source: Corley and Goia, 2011).	67
Table 4.3: A general procedure for theory building (Source: Wacker, 1998).	68
Table 4.4: The connection between the research purpose and different areas of theory.	69
Table 4.5: Classifications of Business Model research.	76
Table 4.6: Selected Business Model definitions – Part I.	80
Table 4.7: Selected Business Model definitions – Part II.	81
Table 4.8: Selected Business Model decompositions.	83
Table 4.9: The Business Model Ontology (Source: Osterwalder, 2004, p 43).	85
Table 4.10: Generic description of a Business Model element (Source: Osterwalder, 2004, p 47).	86
Table 4.11: A comparison between the BMO and other BM decompositions.	86
Table 4.12: The Business Model Canvas (Source: Osterwalder and Pigneur, 2010, p 44).	87
Table 4.13: Operationalisation of the BM building blocks – Part I (Source: Osterwalder and Pigneur, 2010, pp.20-41).	88
Table 4.14: Operationalisation of the BM building blocks – Part II (Source: Osterwalder and Pigneur, 2010, pp.20-41).	89
Table 4.15 Advantages and disadvantages with Fixed-Price Contracts (Source: van Weele, 2002, p 56).	105

Table 4.16: Advantages and disadvantages with Cost-Plus Contracts (Source: van Weele, 2002, p 56).	106
Table 4.17: Advantages and disadvantages with different types of contracts (Source: Sols <i>et al</i> , 2007).	107
Table 4.18: Activities that can be handled by the private or the public sector.	116
Table 4.19: Overseas operations, overseas training and exercises, domestic operations, and domestic training and exercises.	139
Table 4.20: Supply and support chain distribution channels for overseas operations, and for domestic training and exercises.	140
Table 4.21: Multiple dimensions of performance metrics (Source: Neely <i>et al</i> , 1995).	153
Table 4.22: Key constructs from the theoretical frame of reference.	167
Table 4.23: A generic Public Private Business Model for defence acquisition (Source: Adapted from Osterwalder and Pigneur, 2010, p 44).	175
Table 4.24: A model for analysis of acquisition project performance.	180
Table 4.25: A model for analysis of acquisition project risk.	180
Table 4.26: A comparison between the PCP and PPBM frameworks.	182
Table 5.1: Equipment and Support Value Proposition matrix.	199
Table 5.2: First and Second Generation Defence Acquisition Contracts.	202
Table 6.1: An overview of some of the characteristics of the cases.	207
Table 6.2: Sharing of responsibilities in the C Vehicle Business Model.	218
Table 6.3: Sharing of responsibilities in the STSA Business Model.	225
Table 6.4: Sharing of responsibilities in the HASP Business Model.	234
Table 6.5: Sharing of responsibilities in the ADAPT Business Model.	248
Table 7.1: A generic Public Private Business Model for defence acquisition.	252
Table 7.2: A model for analysis of acquisition project performance.	254
Table 7.3: A model for analysis of acquisition project risks.	255
Table 7.4: The C Vehicle Business Model configuration.	256
Table 7.5: The configuration of the four most differentiating building blocks in the C Vehicle Business Model.	261
Table 7.6: The C Vehicle acquisition project performance.	264

Table 7.7 The performance of the C Vehicle acquisition project.	269
Table 7.8: Summary of strengths and weaknesses in the C Vehicle Business Model.	270
Table 7.9: The C Vehicle acquisition project risks.	273
Table 7.10: The C Vehicle Business Model risks.	276
Table 7.11: The STSA Business Model configuration.	277
Table 7.12: The configuration of the four most differentiating building blocks in the STSA Business Model.	281
Table 7.13: The STSA acquisition project performance.	283
Table 7.14: The performance of the STSA acquisition project.	287
Table 7.15: Summary of strengths and weaknesses in the STSA Business Model.	287
Table 7.16: The STSA acquisition project risks.	288
Table 7.17: The STSA Business Model risks.	290
Table 7.18: The HASP Business Model configuration.	291
Table 7.19: The configuration of the four most differentiating building blocks in the HASP Business Model.	296
Table 7.20: The HASP acquisition project performance.	299
Table 7.21: The performance of the HASP acquisition project.	302
Table 7.22: Summary of strengths and weaknesses in the HASP Business Model.	303
Table 7.23: The HASP acquisition project risks.	306
Table 7.24: The HASP Business Model risks.	308
Table 7.25: The ADAPT Business Model configuration.	308
Table 7.26: The configuration of the four most differentiating building blocks in the ADAPT Business Model.	311
Table 7.27: The ADAPT acquisition project performance.	314
Table 7.28: The performance of the ADAPT acquisition project.	316
Table 7.29: Summary of strengths and weaknesses in the ADAPT Business Model.	317
Table 7.30: The ADAPT acquisition project risks.	319

Table 7.31: The ADAPT Business Model risks.	321
Table 7.32: The Business Model configurations in the four cases.	322
Table 7.33: The Customer Segments in the four cases.	323
Table 7.34: The Customer Relationships in the four cases.	323
Table 7.35: The Channels in the four cases.	324
Table 7.36: The Value Proposition in the four cases.	326
Table 7.37: The Key Activities in the four cases.	329
Table 7.38: The Key Partnerships in the four cases.	331
Table 7.39: The Cost Structures in the four cases.	333
Table 7.40: The configurations of the four most differentiating building blocks in the four Business Models.	335
Table 7.41: Strengths and weaknesses in the Channels building block.	341
Table 7.42: Strengths and weaknesses in the Value Proposition building block.	342
Table 7.43: Strengths and weaknesses in the Key Activities building block.	344
Table 7.44: Strengths and weaknesses in the Key Partnerships building block.	345
Table 7.45: Strengths and weaknesses in the Cost Structure building block.	345
Table 7.46: A schematic illustration of PPBM configurations containing the combination of the PG and CfAs.	347
Table 7.47: A schematic illustration of PPBM configurations containing the combination of the PG and private sector ownership.	348
Table 7.48: A schematic illustration of PPBM configurations containing the combination of SRs and CfAs.	348
Table 7.49: A schematic illustration of PPBM configurations containing the combination of private sector financing and banks.	349
Table 7.50: A schematic illustration of PPBM configurations containing the combination of CfAs and FFPs, CPFFs or CPIFs.	349
Table 7.51: Risks in the Channels building block.	350
Table 7.52: Risks in the Value Proposition building block.	351
Table 7.53: A schematic illustration of PPBM configurations containing a combination of the PG and a CfA.	352
Table 8.1: A generic Public Private Business Model for defence acquisition.	354

1 Introduction

“Many of the requirements for organisations and personnel that are herein stated as necessary to logistic effectiveness and efficiency in wartime may be considered to be too costly for our peacetime establishment. This is a matter in which official opinion and decisions will vary in accordance with the degree of apprehension to our national security which may exist at any particular time. Regardless of what the decisions may be it is still important that the military professional have a clear idea of the manner in which various deficiencies affect our combat strength. In particular, the professional should not fall a victim to the facile assumption that combat strength can be increased by the simple expedient of arbitrary reductions in logistics forces. There is an important distinction between the rigorous elimination of waste or unwarranted luxury, and the mirage of false economy. The first is merely the application of a strict logistic discipline. The second is the delusion based upon a failure to understand the nature and magnitude of the logistic base on which the combat forces must rest before they can begin to fight. High military commanders may be called upon to accept many arbitrary and unsound political decisions but they themselves must not fall into the trap of self-deception”.

Eccles (1959, pp. 320-321)

This licentiate thesis reports on a research project on Business Models (BMs), which was commissioned by the Swedish Defence Materiel Administration (FMV, see Section 2.5), i.e. the Swedish Defence Procurement Agency (DPA). The research was supported by the Swedish Armed Forces and the Swedish Defence Research Agency (FOI). The United Kingdom (UK) defence sector served as a “*benchmark*” in the research, and the UK Ministry of Defence (MoD) Defence Equipment and Support (DE&S, see Section 5.4), i.e. the UK DPA, provided respondents for the interviews in the multiple case study.

That the research was commissioned constituted an added complexity for the researcher, since the research entailed a practical challenge and a scientific challenge. The research was initiated because of perceived problems in practise, rather than on identified gaps in theory. FMV had expectations on the research regarding what it was that should be researched (research problem; research purpose), how it should be researched (research strategy), and when and how it should be reported (including the format of the results). However, the research must be useful for practise, i.e. FMV, *and* produce a scientific contribution. In order to contribute to science, the author had to evaluate FMV's expectations as an initial step in the research project. This added complexity had effects on the conduct of the research project (it motivated an initial interview study at FMV in order to explore the problem), and on the structure of this licentiate thesis (e.g. the research problem formulation in Chapter 2).

In this chapter, after a prelude in Section 1.1, the research background is outlined in Section 1.2, the research problem is summarised in Section 1.3 and the research purpose is presented in Section 1.4. In Section 1.5 the research focus and demarcations are presented, whereas the Research Questions are presented in Section 1.6. The target audiences for the reported research are defined in Section 1.7. The issue of acronyms is addressed in Section 1.8. The content of the thesis is outlined in Section 1.9.

1.1 Prelude

“The defence procurement and logistic environment is now more commercial. Commercial approaches, particularly the purchase of services, may work well in a benign (home base) environment. However, when on deployed operations, whilst there is a business imperative for the purchase of services or more accurately services providers, there are also operational imperatives that cannot be compromised. This requires careful balancing of the risk of failure against the benefits of the use of service providers.”

Moore (2000, p 947)

“On 2 September 2006, RAF (Royal Air Force) Nimrod XV230¹ was on a routine mission over Helmand Province in Southern Afghanistan in support of NATO (North Atlantic Treaty Organisation) and Afghani ground forces when she suffered a catastrophic mid-air fire, leading to the total loss of the aircraft and the death of all those on board” (Haddon-Cave, 2009, p 5). The Board of Inquiry (BOI), which did not consider responsibility for the accident, concluded that the accident was caused by *“the escape of fuel during Air-to-Air Refuelling (AAR)...”* and *“the ignition of that fuel following contact with an exposed element...”* Later, the Nimrod Review was announced in order to, *inter alia*, *“assess where responsibility lies for any failures”* (Haddon-Cave, 2009, p 6). The reviewer concluded that the loss of XV230 could have been avoided and even identified, named and criticised three individuals within BAE Systems², three individuals in the UK MoD Nimrod IPT (Integrated Project Team), and two individuals at QinetiQ³ for being partially responsible for

¹ The XV230 was the first Nimrod MR (Maritime Reconnaissance) built by Hawker Siddeley to be delivered to the RAF. It entered into service in 1969 (Haddon-Cave, 2009, p 16).

² BAE Systems, the largest defence industry in Europe, was created in 1999 through the merger of British Aerospace (BAe) and Marconi Electronic Systems (MES), which was the defence business unit of the General Electric (GE) Company.

³ In 2001 the UK MoD Defence Evaluation and Research Agency (DERA), a UK MoD agency, was split up into QinetiQ, which was turned into a commercial company, and the Defence Science and Technology Laboratory (Dstl), which remained a UK MoD agency.

the accident and for “*incompetence, complacency, and cynicism*” in their preparation of the “*Nimrod Safety Case*” (Haddon-Cave, 2009, pp. 10-11). The reviewer also identified the huge organisational changes, particularly three major themes, driven by budget cuts after the 1998 Strategic Defence Review (SDR, see Section 5.2), within the UK MoD, as a significant part of the explanation of the events that led to the accident (Haddon-Cave, 2009, pp. 11-12): “*A shift from organisation along purely “functional” to project-oriented lines*”; “*The “rolling up” of organisations to create larger “purple” and through-life management structures*”; and “*Outsourcing to industry*”.

The loss of the XV230 is not the only accident or incident that puts focus on emerging risks associated with the combination of an increased number of Peace Support Operations (PSOs, see Section 1.2.2), military budget cuts, requirements for increased military performance (see Section 4.9), and subsequent outsourcing (see Section 4.7.6) initiatives. At the other end of the incident spectrum, less spectacular than the loss of Western lives and advanced equipment such as the Nimrod aircraft, even if it manages to occasionally make headlines, and not involving any official inquiries or reviews, are, e.g., the attacks on outsourced fuel convoys from Pakistan to Afghanistan, which involve the loss of, e.g., Pakistani lives. The Western powers do have alternative routes into Afghanistan, but they assert that “*the Pakistani ones are the cheapest and most convenient*” (The Telegraph, 2010), and “*most of the coalition’s non-lethal supplies are transported over Pakistani soil after being unloaded at docks in Karachi*” (The Telegraph, 2010). Some of these convoys are contracted out (see Section 4.7.6) and protected by Private Security Contractors⁵ (PSCs). “*Often the death of a PSC goes unheralded; after all, they risk their lives for money, not country*” (Time, 2009). News flashes such as: “*On 4 April 2011, Islamist rebels in north-Western Pakistan cut the throats of three security guards in the latest fatal attack on a NATO truck convoy headed for Afghanistan*” (UPI, 2011) have, perhaps, become too numerous to register among the populace in Western countries, and do not seem to cause changes regarding Course-Of-Action (COA) on the part of the nations and organisations within the alliance (ISAF, see Section 1.2.2).

⁴ Purple: UK Tri-service, i.e. the Joint British Army, Royal Navy and Royal Air Force (Khaki, Navy Blue and Light Blue = Purple) (Haddon-Cave, 2009, p 341).

⁵ No distinction is made between a Private Military Company (PMC), a Private Military and Security Company (PMSC), a Private Security Company (PSC), and a Private Security Contractor (PSC).

After the ending of the Cold War, the governments of many Western countries have embraced expressions such as “*doing more with less*”⁶ and “*faster, cheaper, better*” (see Section 4.14) in their rhetoric and in their directives to their Armed Forces; partly in order to transfer resources, “*the peace dividend*” (see Section 1.2.1), to other sectors of society; partly in order to transfer resources within the military sector, from “*supporting activities*” to “*operational activities*”, i.e. international Peace Keeping (PK, see Section 1.2.2) operations, so that the government does not have to increase the military budget despite the fact that the military is expected to do more. In addition to the political rhetoric, in the area of military logistics (see Section 4.8) there is an emerging, predominantly self-inflicted, jargon concerning “*reduced logistics footprint*”⁷, or “*reduced logistics tail*”, where “*reduced*” has sometimes been replaced by “*adequate*”, “*optimised*” or “*minimised*”. Similar expressions, such as “*reducing the logistics burden*”, has also been used in this context. The exact meaning of adequate, reduced, optimised and minimised in this context is, however, somewhat opaque. Furthermore, the stringent definitions of logistics footprint, tail and burden are illusive. Ultimately, though, regardless of the absence of exact definitions in this respect, the political rhetoric translates into an increased pressure on the military to reduce costs, and the military response to this pressure has, hitherto, been to primarily suggest, prefer and accept reductions in the *so called* supporting functional areas, such as Research and Development (R&D), acquisition and logistics. International organisations such as NATO and EU have recently contributed with new rhetorical expressions such as “*Smart Defence*”⁸ and “*Pooling and Sharing*”⁹, in order to deal with their member states’ reductions in their defence budgets.

⁶ In the interpretation of Christopher (2000) and Stock *et al* (2010), the political rhetoric “*doing more with less*” can be translated to, e.g., the implementation of six sigma and/or lean management approaches.

⁷ Logistics footprint is sometimes understood to refer to the affect that the military presence and activities have on the geographical, societal, and/or financial environment where they are on an operation, and sometimes, especially when footprint is replaced by the more derogatory tail or burden, intended to refer to the, allegedly disproportionate, amount of resources that goes to logistics, particularly for overseas operations. Depending on the interpretation, it is either the effect on the environment by the operation, or the cost of the operation, that is supposed to be adequate, reduced, optimised, or even minimised.

⁸ Smart Defence is a new approach to defence spending during tight economic times: “*ensuring greater security, for less money, by working together with more flexibility*”. A part of the approach is to: “*pool and share capabilities, to set the right priorities, and to better coordinate our efforts*”. “*Pooling and sharing are vital if we want to develop our military know-how and capabilities and NATO is best placed to identify and connect nations that have similar needs but not enough money to build a capability on their own*”. However: “*Pooling resources isn’t enough*”; “*Money spent on defence needs to be prioritised*”; and “*We need to reduce bureaucracy and slim down our structures*” (NATO, 2011a).

The endeavour to reduce costs and transfer resources has led to a formidable transformation¹⁰ of defence, military logistics, and defence procurement (acquisition, see Sections 4.6.2 and 4.6.3), and the emergence of terminology such as: procurement of Commercial-Off-The-shelf (COTS) and Military-Off-The-shelf (MOTS) products and services; outsourcing; contracting out; Public Private Partnerships (PPPs); Private Finance Initiative (PFI); partnerships; and alliances, see Sections 4.6 and 4.7. One of the issues to address in this transformation is how it can be carried out while maintaining an acceptable level of military, operational risk. Any moral or ethical indignation in the Western world regarding the transfer of risk to the private sector in, e.g., Afghanistan and Pakistan, or to Western Private Military Companies (PMCs), seems to be inconspicuous. Such aspects on risk transfer to the private sector do not seem to be high on the political agenda. Moreover, the previous negative headlines after transfer of risk in Iraq do not seem to have had any effect in this respect. Hence, transfer of risk from this perspective is not, at least not yet, part of the complex equations of *“doing more with less”, “faster, cheaper, better”* or *“adequate/reduced/optimised/minimised logistics footprint/tail/burden”*.

Of the three themes identified in the Nimrod Review, i.e. a shift from organisation along purely *“functional”* to project-oriented lines; the *“rolling up”* of organisations to create larger *“purple”* and through-life management structures; and outsourcing to industry (Haddon-Cave, 2009, pp. 11-12), the reported research primarily addresses the latter, i.e. outsourcing to industry, and its potential consequences for the military supply and support chains.

To investigate the logic and rationale of realising savings primarily in the areas of acquisition and logistics, i.e. the *“The Lifeblood of War”* (Thompson, 1991), is a political question that is well beyond the scope of the reported research. However, the prefatory quote in this chapter serves the purpose of illustrating the complexity of the military system that is affected by such savings. In the Post-Cold War Era, the situation has become more complex than it was during the Cold War. The alternatives are no longer restricted to the two black and white extremes of war and

⁹ *“Pooling and sharing military capabilities in Europe has become a necessity rather than a mere option in a world facing an increasingly complex and unpredictable security environment”. “There is a political momentum (for pooling and sharing) and expectations remain high”. “If the EU is to remain an active player in the world, it must maintain highly capable military forces – these are crucial to a credible EU Common and Security Defence Policy (CSDP)”* (EU, 2011a).

¹⁰ Military transformation is a continuous *“change process”*, that will continue indefinitely; not a *“change project”*, that will end at some predetermined point in time (de Nijs, 2010).

peace, but have evolved into an entire spectrum of different shades of greys in between, corresponding to different levels of the volatile political ambition regarding participation in Military Operations Other Than War (MOOTW, see Section 1.2.2), i.e. PSOs. How much of society's resources that should be allocated to the defence sector is ultimately a political issue. Nevertheless, consequences of decisions made at the political level constitute part of the setting for the research and must therefore be addressed.

1.2 Background

"In recent years, driven by successive governments enamoured of "market-based solutions" to the "problem" of the need for taxation and public spending, the British Armed Forces have embraced the metaphor of army-as-a-business. The combination of this metaphor with an ideological distaste for expenditure has produced a focus on the subcontracting of logistic support services and an enthusiasm for cost cutting. In "genuine" businesses, the worst that is likely to happen if sub-contracting and cost cutting are carried out incompetently is that companies may be bankrupted and people may lose their jobs. If an army makes the same mistakes, however, people may lose their lives."

"It is only possible to talk about "business imperatives" in this way, after you have accepted the validity of the army-as-a-business metaphor. If you reject the metaphor, then there can be no relevant "imperatives". Thus, the choice of language employed in describing purchasing phenomena can have profound and, in this case, potentially life-threatening, consequences."

Ramsay and Caldwell (2004)

The past two decades have seen several dramatic developments, in many different areas, that have had a profound influence on the Armed Forces of the northern hemisphere in general, and, arguably, on their logistical functions in particular. These developments include the ending of the Cold War; ensuing changes in national security and defence policies; consequent budgetary reductions for military expenditure; emerging political aspirations to participate in an increasing number of PSOs of increasing complexity, in most parts of the world, and led by an increasing number of different organisations; Lessons Learned¹¹ (LL) from these PSOs, especially in the area of logistics; revolutionary development in the area of

¹¹ Lessons Learned (LL) is a term used in the military to signify the utilisation of the experience that is made from operations, training and exercises. Lessons Identified, or Lessons-To-Be-Learned, would be a more appropriate term, since experience is not always transformed into adequate actions throughout the Defence Lines of Development (DLoDs, see Section 5.3.6).

Information and Communication Technology (ICT); and the emergence of novel Commercial Best Practises¹² (CBPs) in the areas of business and business logistics. In Europe, there have also been changes in the legislation regarding the conduct of public procurement, which have had effects on governmental business.

In isolation, any of these developments could have had an enormous influence on the Armed Forces of the world, including their logistical functions. Together, and in combination with the experiences (LL) from the wars in the Persian Gulf, these developments paved the way for an unparalleled transformation of the Armed Forces, particularly in the United States (US) labelled the Revolution in Military Affairs (RMA). In the US, one of the prerequisites of the RMA was considered to be a corresponding Revolution in Military Logistics (RML).

1.2.1 The Ending of the Cold War

“An army’s strength is derived from its manpower and equipment reserves. It would be a rare logistician who argued that an army should be all “Tail” and no “Teeth”. Equally, the thinking combat officer appreciates that a modern mechanised army cannot be all “Teeth”; and no “Tail”. Such an army would grind to a halt after a few days. Arguably, the “Teeth-to-Tail” arguments are no longer applicable. A modern combat force is one whole, combat troops and logisticians. If peace dividend reductions in armies are to be made it could be that complete military formations should go; for it is in these formations that the bulk of a peacetime army’s manpower lies. Reductions made in this fashion would be balanced; as the combat units left the order of battle then so would the logistics units that supported them”.

(Foxton, 1994, p 151)

After the Second World War (WW2), the member states of the North Atlantic Treaty Organisation (NATO) and the Warsaw Pact (WP), and many of the neutral countries in Europe, including Sweden, prepared for a full-scale, third World War (WW3) on European soil. These war-preparations included the build-up of huge stores of supply. The underlying philosophy was to have the potentially necessary supplies ready, Just-In-Case (JIC), in order to avoid having to produce and move mountains of supplies in a very limited time, as in the two previous World Wars.

¹² RAND has given much attention to identifying Commercial Best Practises (CBP) and adapting them to the US government. CBP are things that commercial firms do that their peers identify as “best in class” and try to emulate. According to Camm (2006, p 11), all CBP share a few key attributes: Focus on the Customer (“Who is the customer?”, “What does the customer want, when and where?”); Focus on the Processes (“What processes do we use to service the customer?”, “How are those processes linked and coordinated?”); and Focus on Continuous Improvement (“What can we do to please the customer more?”, “How can we make it easier to please the customer?”).

The US, a major contributor of supplies during WW1 and WW2, was reluctant to put itself in a similar situation again.

The Cold War was not a period without war. Members of the WP and NATO were engaged in wars: the Soviet Union (SU) fought a war in Afghanistan; the United States (US) fought wars in Korea, Vietnam and Grenada; and the UK fought the Argentines over *the Falkland Islands*, or *las Islas Malvinas*, depending on one's linguistic, cultural and geographical perspective and preferences. Despite the fact that both countries had to circumnavigate half the Globe to wage war, neither the US nor the UK seemed to draw the conclusion that the logistical concept of the Cold War was becoming obsolete.

Two decades ago, the preparations for WW3 came to an abrupt halt, as the revolutionary development that had been going on for some time behind the Iron Curtain reached its climax, and culminated in a series of dramatic events, which changed the foundations of the preparations in Europe. In 1989 the Berlin Wall came down and in 1990 East and West Germany were reunited; in 1991 the Soviet Union was dissolved, resulting in 15 relatively independent states; the Socialist Federal Republic of Yugoslavia (SFRY) was divided into five new countries; the socialist governments of the remaining WP-states were triumphed over by domestic uprisings; and the WP broke up. The demise of the USSR would later lead to unrest in many of the former Soviet satellite states, but this turmoil was next to a mild breeze in comparison to the consequences of the break-up of the SFRY, which would lead to full-scale war, and even, allegedly, genocide, on European soil, albeit geographically limited to the Balkans.

The ending of the Cold War is one of the most important developments behind the transformation of the Armed Forces. It had the direct effect that it led to changes in defence and security policies for nations and organisations such as the United Nations (UN), NATO, and the European Union (EU). Defence and security policy reviews were in many countries followed by reductions in defence expenditure, since it was presumed that there would be a "*peace dividend*" to reallocate to other sectors of the society. In the UK, between 1985 and 1997, spending on military equipment was reduced by 40%, spending on military Research and Development (R&D) was reduced by 45%, and the number of defence industry employees was reduced by 50% (Humphries and Wilding, 2001). In other countries, e.g. Sweden, reductions were substituted for transfers from *so called* supporting activities to operational activities, while the military budget was kept intact, but without compensation for inflation or other increased costs for equipment, personnel, or for participation in PSOs.

1.2.2 Peace Support Operations

Peace Support Operation (PSO) is a term that was initially primarily used by the military to cover Peace Keeping (PK) and Peace Enforcement (PE) operations. The concept was introduced in 1998 and replaced the earlier concept of Wider PK which was introduced in 1994. Military Operations Other Than War (MOOTW) is another of several other terms that have been suggested for military activities that are not war, and, e.g., Operations Other Than War (OOTW), Other Operations, Stabilisation Operations, and Support Operations have also been proposed to describe this phenomenon (UK MoD JDCC, 2004, p 2-5). Today, the term PSO is used more widely to include a spectrum of activities that are undertaken to maintain international peace and security: conflict prevention, peace-making, PE, PK, peace building, and humanitarian assistance (Woodhouse and Ramsbotham, 2000, p 70).

In 1990, Iraq invaded Kuwait. As a response, the US immediately deployed troops to the Persian Gulf, under the code name Operation Desert Shield (ODS I, 1990). After the necessary UN Security Council (UNSC) resolution in 1991, the US led a coalition of more than 30 different countries. The US code name for its own efforts in this phase of what is now known as the First Gulf War was Operation Desert Storm (ODS II, 1991). The UK, the other major contributor to the war, used the code name Operation (Op) Granby for both phases of the war.

The first UN PK operation was launched in the Middle East (ME) in 1948, and since then there have been a total of 64 UN PK operations deployed around the world (UN, 2011a). Throughout the Cold War Era, there were in total 13 UN PK operations, so called “*traditional*” or “*Nordic*¹³” PK operations (UK MoD JDCC, 2004a, p 1-4) while the remaining 51 missions have taken place since 1988 (UN, 2011a). The 13 Cold War PK operations fell into one of two categories: observer missions and PK missions (Jakobsen, 2006, p 11). The term UN PK operation was, however, not used until the Suez crisis in 1956, when it was coined by Lester B. Pearson, then Minister of External Affairs in Canada, and Dag Hammarskjöld, then Secretary-General of UN (Bring, 2008, p 361).

¹³ The Nordic Model consisted of four parts: “*an institutional framework made up of regular meetings between the Nordic ministers of defence and a number of working groups; a series of joint special UN PK courses for officers; national standby forces which generally consisted of volunteers recruited at short notice on an individual basis and deployed in the field with only a few weeks of preparation and a minimum of logistical support; and finally a high willingness to provide personnel for UN operations*” (Jakobsen, 2006, p 10).

Between 1988 and 1992 UN initiated as many PK operations as it did during the entire Cold War (Carr and Ifantis 1996, p 110). The UN Security Council (UNSC) authorised no less than 20 new PK operations between 1989 and 1994, thus raising the number of peacekeepers from 11,000 to 75,000 in only five years (UN, 2011b). Between 1988 and 2004, UN commanded 35 Chapter VI operations, 12 Chapter VI ½ operations, and 20 Chapter VII operations (Jakobsen, 2006, p 47). As of 31 December 2010, there were almost 123,000 personnel serving on 16 UN PK operations on four continents (UN, 2011c).

In parallel to the increase in the number of missions and soldiers in the field, the ending of the Cold War also meant that UNSC established larger and more complex PK missions. Having originally been developed as a means to deal with Chapter VI inter-State conflict, UN PK has evolved to be applied also to Chapter VII intra-State conflicts and civil wars. Hence, the clear distinction between “*war-fighting*” in a war and Operations Other Than War (OOTW) is no longer applicable in the Post-Cold War Era (UK MoD JDCC, 2004a, p 2-5).

The operations have also expanded from traditional military PK operations, implicitly (UN, 2010, p 14) deployed under Chapter VI of the Charter of UN (UN, 2011d), to more complex PK operations, explicitly (UN, 2010, p 14) deployed under Chapter VII of the Charter of UN, that include administrators and economists, police officers, legal experts, electoral observers, human rights monitors, specialists in civil affairs and governance, humanitarian workers and experts in communications and public information (UN, 2011b).

The Charter of UN does not define PK *per se* (Carr and Ifantis 1996, p 110). In the Charter, no separate article or chapter present the ideology of collective security (Bring, 2008, p 360). Instead, Chapters VI, VII, and VIII, collectively, constitute an attempt at creating a unified system for maintaining international peace and security. These three chapters present three different avenues towards collective security: co-operation (Chapter VI); coercion (Chapter VII); and regional initiatives (Chapter VIII) (Bring, 2008, p 360).

UN PK missions deployed under a Chapter VI mandate, i.e. traditional PK missions, are based on the three basic principles: consent of the parties; impartiality; and non-use of force except in self-defence and defence of the mandate (UN, 2010, p 31). Hence, in Chapter VI operations, the Rules Of Engagement (ROE) for the military units restrict them to the use of force at the tactical level (UN, 2010, p 34). By contrast, PE, as envisaged under a Chapter VII mandate, does not require the consent of the main parties and may involve the use of force at the strategic or international level (UN, 2010, p 34).

The Charter of UN did not anticipate modern PK. Chapter VI is built on consent among all parties and Chapter VII is built on forcing an aggressor to retreat. Self-

defence for UN troops in a Chapter VI mandate was not foreseen by the Charter. Hence, an unwritten “*Chapter VI ½*”, i.e. not formally included in the Charter, which allowed self-defence but still required consent among all parties, was introduced in the rhetoric as a judicial foundation for PK (Bring, 2008, p 361). Chapter VI ½ PK has also been referred to as “*Wider PK*” and “*Second Generation PK*” (Bellamy *et al*, 2010, p 194).

For NATO, Article 5 (where the member states agree that an armed attack on one or more of them should be considered as an attack on them all) of the North Atlantic Treaty is the cornerstone (Carr and Ifantis, 1996, p 56). During the Cold War, NATO limited itself to solving conflicts within its member states. The end of the Cold War challenged NATO’s *raison d’être* (Carr and Ifantis, 1996, p 62). However, the alliance reinvented itself, and since 1994, NATO has been involved in PK, coordinated with the UN PK operations and UNSC resolutions. In 1999, NATO updated its strategic concept, and defined two types of NATO military operations: Article 5 Collective Defence Operations and non-Article 5 Crisis Response Operations (CRO) (MAS, 2001, p xi). Since 2003, the European Union (EU) has also been involved in PK operations, using the acronym EUFOR, or European Union Force, as a label for its missions.

In the beginning of the 1990s, the disintegration of the SFRY led to serious unrest in the Balkans, forcing UN, NATO and EU to intervene. The UN Protection Force (UNPROFOR) was the first UN PK mission in the Balkans during the Yugoslav wars. UNPROFOR, which was formally mandated by Chapter VI in the UN Charter, was created by the UNSC Resolution 743 (UNSC, 1992), and existed between 1992 and 1995. While UNPROFOR was a Chapter VI mission, it was regarded as a “*Chapter VI ½*”, hence allowing troops a necessary degree of self-defence in the ROE (Almen, 2011).

UNPROFOR was relieved in 1995 by the multinational Implementation Force (IFOR). The Transfer of Authority (TOA) from UNPROFOR to IFOR was discussed in the UNSC Resolution 1031 (UNSC, 1995). IFOR, which was the implementation of the military aspects of the Dayton Peace Agreement, was NATO’s first CRO. IFOR, which only had a one year mandate, was the first NATO-led multinational PK force in Bosnia and Herzegovina, and worked under the code name Operation Joint Endeavour. Unlike its predecessor, IFOR was mandated by Chapter VII in the UN Charter. Hence, IFOR operated under PE ROE, not (extended) PK ROE such as UNPROFOR.

The task of IFOR was taken over by a NATO-led multinational force, the Stabilisation Force (SFOR), in 1996, operating under the code names Operation Joint Guard (1996-1998) and Operation Joint Forge (1998-2004). SFOR was established in the UNSC Resolution 1088 (UNSC, 1996). As IFOR before it, SFOR was mandated by Chapter VII in the UN Charter. SFOR was succeeded by

EUFOR Operation Althea in 2004. This succession involved a TOA, from NATO to EU, but the mandate remained the same, as did the lion's share of the military units. The Kosovo Force (KFOR) is another NATO-led international PK force under UN mandate in the Balkans. KFOR, which entered Kosovo in 1999, was created by the UNSC Resolution 1244 (UNSC 1999).

The attack by Al-Qaeda upon the US on September 11, 2001 led to the so called Global War on Terrorism (GWOT), which, in turn, has resulted in the wars in Afghanistan (2001) and Iraq (2003), referred to by the US as Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) and by the UK as Op Herrick and Op Telic. The International Security Assistance Force (ISAF) is a NATO-led security and development mission in Afghanistan established by the UNSC Resolution 1386 (UNSC, 2001).

It is not only the disintegration of the WP and the GWOT that have led to an increase in global intervention in the name of peace and security. Today most operations are unrelated to these developments. In 2011, there were 15 UN peace operations, of which 14 were UN PK operations, on four continents (UN, 2011e). Six of these were on African soil, including the UN Mission in Liberia (UNMIL), which was established by the UNSC Resolution 1497 (UNSC, 2003).

1.2.3 Developments in Logistics and Technology

One of the major lessons that was identified (LL) after the ending of the Cold War, particularly by the US during the preparations, conduct and evaluation of the first Gulf War, was that the logistical concept that had served its purpose so well for so long, i.e. to stock-pile huge supplies in Europe in order to support potential war efforts in the European theatre, Just-in-Case (JIC), had more or less instantaneously become obsolete. It was too expensive, too slow and stored the supplies were they were no longer required. To address the challenges of participation in an increasing number of PSOs, of increasing complexity, in most parts of the world, and led by an increasing number of different organisations and constellations of different nations, it was realised that the logistical concept would have to be altered completely. Focus switched to the war fighter, who was supposed to be supplied with the right supply, at the right time, at the right place, and at the right price.

During WW2, and throughout most of the Cold War, the requirements of the Armed Forces were drivers for technological development in many areas. With the arrival of the revolution in ICT in the 1980s, this state of affairs was about to change. In combination with the fact that governments, after the ending of the Cold War, are no longer prepared to spend as much of their available resources on the military as previously, it has had the effect that the Armed Forces of the world

are no longer drivers behind the technological development in many areas, especially not in the area of ICT. The emergence of civilian applications such as Electronic Data Interchange (EDI), the World-Wide-Web (WWW), cellular phones, bar-codes, Radio Frequency Identification (RFID), broad band, etc., meant that the Armed Forces were faced with a number of unexploited technological opportunities. Especially in the US this led to a transformational initiative, labelled the Revolution in Military Affairs (RMA). The RMA included concepts such as Dominant Battle-space Awareness (DBA), which was supposed to be realised by the superior utilisation of new ICT. While the realisations of DBA may be debatable, it is undisputable that the utilisation of new ICT such as RFID, has aided the development of new military capabilities such as Total Asset Visibility (TAV) and In Transit Visibility (ITV).

In the US it was realised that the RMA could not be realised without a parallel RML. After WW2, military logistics gave birth to business logistics (Rutner *et al*, 2012). After the ending of the Cold War, it was realised that business logistics had developed a number of new Commercial Best Practices (CBPs) and concepts, such as Just-In-Time (JIT), Supply Chain Management (SCM), outsourcing, lean, agile, etc., which the Armed Forces of the world had yet to explore, adapt and adopt, in order to increase effectiveness and efficiency.

Revolutionary development in the area of ICT, and the emergence of novel CBPs in the areas of business and business logistics, have had a tremendous effect on the Armed Forces of the world. In the area of military logistics, the requirement to “*do more with less*” and “*faster, cheaper, better*”, and the logistics interpretation of this into “*adequate (reduced, optimised, minimised) logistics footprint, tail, or burden*”; has led to the development of new concepts such as: Velocity Management¹⁴ (VM); Just Enough (rather than JIT or JIC); contracting out; Total Asset Visibility (TAV); and In Transit Visibility (ITV); through the utilisation of new ICT and the adaptation and adoption of new CBPs. The necessity to “*do more with less*” and to do things “*faster, cheaper, better*” has also led to the utilisation of COTS and MOTS (OTS) products and services, and, e.g., the exploitation of PPPs and PFIs.

¹⁴ Velocity Management (VM) was developed for the US Department of Defense (DoD) by RAND. VM is based on CBPs, e.g. Six Sigma, and hence the Deming, or Shewhart, cycle, i.e. the PDSA (Plan, Do, Study, Act) cycle, or the PDCA (Plan, Do, Check, Act) cycle. The military reader will recognise the striking resemblance with the Boyd cycle, or the OODA (Observe, Orient, Decide, Act) loop. In Six Sigma programs, the PDSA cycle is called DMAIC (Define, Measure, Analyse, Improve, and Control). In VM, DMAIC has been distilled down to the more militarily adapted, three letter acronym DMI (Define, Measure, and Improve), even if, presumably, analysis and control are still necessary elements of the process.

1.2.4 Increasing International Cooperation

Throughout the world the RMA initiated new concepts such as Network Centric Warfare (NCW) in the US, Network Enabled Capabilities (NEC) in the UK, and Network Based Defence (NBD) in Sweden. The development of new concepts has become so important, so complex, and so dependent on international cooperation, that new centres for national experimentation, and for Multinational Experimentation (MNE), using a new method called Concept Development and Experimentation (CD&E), have emerged over the past few years. At these centres, including at the NATO ACT in the US and at the Joint Forces Command (JFC) in Sweden, new concepts, such as NCW, NEC, NBD, Effect Based Operations (EBO), Effect Based Approach to Operations (EBAO), Comprehensive Approach (CA) and Expeditionary Logistics, have been invented, developed, tested and rejected or accepted. Concept development through MNE is not the only area that has seen an increase in international military cooperation the past few years. Particularly the areas of operations, exercises, defence acquisition, and strategic transportation have seen a number of initiatives in order to solve common problems in the Post-Cold War Era.

The Partnership for Peace (PfP) was launched by NATO in 1994 as a bilateral cooperation between NATO and individual partner countries. After two rounds of NATO enlargements, where several former partners have become allies, there are 28 members of the alliance, and 22 remaining partners. For practically working together in PSOs, new concepts have been developed and implemented. The Combined Joint Task Force (CJTF) Concept is a multinational (combined) and multi-service (joint) task force developed by NATO, which is task-organised and formed for the full range of the Alliance's military missions requiring multinational and multi-service Command and Control (C2) by a CJTF Headquarters (HQ). EU has contributed with the Battle Group (BG) concept and the EU C2 concept, which consists of: Operational Headquarters (OHQ); Force Headquarters (FHQ); Component Commands (CC) for the different arenas, i.e. Land (LCC), Maritime (MCC), and Air (ACC); and, e.g., BGs and Task Groups (TGs).

The NATO Maintenance and Supply Agency (NAMSA) is NATO's principal logistics support management agency. NAMSA was established in 1958, and its main areas of involvement are supply, maintenance, procurement, contract management, and engineering and technical support. NAMSA is not the only pan-national organisation in the area of multinational defence acquisition cooperation. OCCAR, EDA and NORDAC are examples of other initiatives in this area. OCCAR (Organisation Conjointe de Coopération en matière d'ARmement) was established in 1996. Its aim is to provide more effective and efficient arrangements for the management of certain existing and future collaborative armament programmes. EDA (European Defence Agency) was established in 2004, and has

four functions: developing defence capabilities; promoting Defence Research and Technology (R&T); promoting armaments co-operation; and creating a competitive European Defence Equipment Market and strengthening the European Defence, Technological and Industrial Base. NORDAC (Nordic Armaments Cooperation) was established in 1994, but was replaced by NORDEFCO¹⁵ (Nordic Defence Cooperation) in 2009.

Airlift capability is essential in order to participate in missions throughout the world. Aircraft to realise this capability is, however, very expensive, and are therefore a very limited resource. Hence, a number of international initiatives to share costs and resources have been established. These initiatives include the Movement Coordination Centre, Europe (MCCE); the Air Transport, Air Refuelling and other Exchanges of Services (ATARES); the Strategic Airlift Interim Solution (SALIS); the Strategic Airlift Capability (SAC); the European Air Transport Fleet (EATF); and the European Air Transport Command (EATC). MCCE was established in 2007 as an amalgamation of the Sealift Coordination Centre (SCC) and the European Airlift Centre (EAC). MCCE is a multinational organisation based on Technical Arrangements (TAs), signed by the participating countries. MCCE coordinates air, sea, land, and channel transportation; and Air-to-Air Refuelling (AAR) resources. MCCE provides support to NATO and EU operations.

ATARES is a TA, which was established in 2001 in order to facilitate the exchange of military capabilities based on equivalent flying hours with Lockheed C-130 Hercules. SALIS is an interim solution, intended to be operative until some of its member states have established their own long-term capability, through which six Antonov AN-124 Ruslan are chartered. SAC is a permanent solution, established in 2008, through which its member states have acquired three Boeing C-17 Globemaster III. The EATF, planned to be established in 2015 and with the purpose of cost-effective utilisation through international cooperation, will consist of twelve countries, which have ordered Airbus A400M or which will contribute with other transportation aircraft. The EATC Concept foresees the transfer of Operational Command (OPCOM) for Air Transport and AAR assets of signatory

¹⁵ The Nordic countries have a long tradition of engaging in close and comprehensive defence cooperation. The past two decades, the cooperation has predominantly consisted of three separate initiatives: the Nordic Armaments Cooperation (NORDAC) since 1994, the Nordic Coordinated Arrangement for Military Peace Support (NORDCAPS) since 1997, and the Nordic Supportive Defence Structures (NORDSUP) since 2008. A Memorandum of Understanding (MoU) was signed in 2009, which established the Nordic Defence Cooperation (NORDEFCO). NORDEFCO succeeded the three separate pillars of cooperation, i.e. NORDAC, NORDCAPS and NORDSUP, which were simultaneously terminated.

nations to the EATC, aiming to overcome capacity shortfalls in making best use of already existing assets.

1.2.5 Challenges and Drivers for Change

In summary, after the ending of the Cold War, the Armed Forces of the Western world were faced with a number of challenges. There was a (still on-going) transformation from military forces that had been designed for national defence in full-scale military conflicts in Europe, to flexible military units that can be deployed in PSOs around the globe. It was realised that the logistical system had become obsolete. The revolutionary development in the area of ICT had, to a large extent, yet to be exploited by the Armed Forces. The emergence of new CBPs in the area of business logistics had yet to be exploited. As is common in times of peace, the idea of the illusive *peace dividend* led to an increasing pressure from governments to reduce costs in the military system, which, *inter alia*, led to the necessity to exploit COTS, MOTS, PPPs and PFIs.

Without prioritisation or any other particular relative order, the drivers for change for defence acquisition after the ending of the Cold War can, based on the development outlined above, be summarised as: Significant changes in national security and defence policies; Shift from preparations for war in Europe to participation in PSOs; The on-going transformation of the Armed Forces; Budgetary reductions, and/or transfer of resources from support to operations; Changes in legislation regarding the conduct of public procurement; Shift from legislative regulation of defence procurement to contracts on commercial basis; LL from the first Gulf War; Revolutionary development in the area of ICT; Emergence of new CBPs in business logistics; Instructions from MoD to utilise OTS to a larger extent; Emergence of international cooperation in the areas of defence acquisition and strategic transportation; and Emergence of an array of potential types of Public Private Participation. In combination, these drivers for change of defence acquisition constitute the condensed background to the reported research.

1.2.6 The Changing Role of the Defence Procurement Agency

The Defence Procurement Agencies (DPAs) of the Western world are at the centre of the challenges and drivers for change that are outlined in Section 1.2.5. The DPAs' roles are changing from previously dealing primarily with system specification, procurement and integration; to increasingly dealing with acquisition of availability and capability. For FMV, the Swedish DPA, this development is summarised in Sections 2.2.1 and 2.2.2. The corresponding development for

DE&S, the British DPA, is recapitulated in Sections 5.3.7 – 5.3.10. A generic DPA is described in Section 4.6.4.

The changing roles of the DPAs have several dimensions. Some DPAs, e.g. DE&S, have already taken over, while other DPAs, e.g. FMV, are about to take over, responsibilities from the national Defence Logistics Organisations (DLOs), which were previously responsible for the provision of support to the systems that the DPAs acquired. Furthermore, the DPAs are increasingly acquiring performance, e.g. availability, rather than systems, from the defence industry. This means that the DPAs will take over responsibilities for acquisition and provision of more Defence Lines of Development (DLoDs, see Section 5.3.6) from the Armed Forces and other agencies within the defence sector. Consequently, the role of the DPAs is going from acquisition of systems, by way of acquisition of systems and support to systems, to acquisition of availability, and, eventually, acquisition of capability. Furthermore, different forms of Public Private Participation (see Section 4.3) are gaining in popularity. The changing roles and responsibilities of a nation's Armed Forces, DPA and DLO, and the multinational defence industry, have resulted in new supply concepts and new logistical interfaces between the actors in the system. From the point of view of a DPA, the situation can be summarised as a requirement to go from the single Business Model (BM, see Section 4.5) that was appropriate during the Cold War, to an array of BMs that are more suitable to the requirements of the Post-Cold War Era.

1.3 Research Problem

The research problem is formulated in Chapter 2. Based on interviews performed within FMV, the Post-Cold War challenges facing the Swedish Armed Forces and FMV can be summarised as: To perform new types of activities; In remote locations; In cooperation with new partners; In novel ways; Using contracts rather than relying on legislation; While at the same time spending less money; By utilising OTS products and services, capitalising on new ICT, adapting and adopting new CBP, using Public Private Cooperation, and international cooperation.

Six potential research problem areas for Swedish defence acquisition have been identified (see Section 2.6): Sourcing issues; Business Model issues; Internal issues; Moral and ethical issues; Supply chain issues; and Support chain issues. The next step is to compare these potential research problem areas with the research purpose.

1.4 Research Purpose

In agreement with Lund University, FMV has stated that the research purpose is to “*study, analyse, and evaluate Business Models regarding how they can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept*”.

The concept of Business Models (BM) is central to this thesis, and will be thoroughly reviewed in Section 4.5. New supply concepts are interpreted as new ways of supplying and supporting military units on operations, training and on exercises. New logistical interfaces are understood to be the borders between different actors, which command different resources and perform different activities, and their roles and responsibilities in the supply and support chains. Risk taking is taken to first and foremost refer to the operational risk that may occur in “*the last mile*” (see Section 4.8.6) due to new ways of supplying and supporting military units, i.e. due to new business concepts.

The research purpose is interpreted to be threefold: “*study, analyse, and evaluate*”. The word “*study*” implies an *exploratory* study, which is particularly useful in order to clarify the understanding of a problem (Saunders *et al*, 2009, p 139). The words “*analyse and evaluate*” imply an *explanatory* study, where the emphasis is on studying a situation or a problem in order to explain the relationships between variables (Saunders *et al*, 2009, p 140). Hence, there is a dual research purpose: to explore and to explain the phenomenon of BMs, which will be addressed in Section 1.6 and in Section 3.3.

1.5 Focus and Demarcations

In order to conduct relevant and rigorous research within a restricted time limit, it is necessary to focus the research and make appropriate demarcations. Based on the two previous sections, the main focus of the research is to identify and evaluate Business Models (BM) for defence acquisition. In order to evaluate BMs, Performance Measurement and Supply Chain Risk Management (SCRM) are also of importance.

Of the six potential research problem areas presented in Section 1.3, the research has not addressed internal issues (culture, organisation and competence) or moral and ethical issues (regarding risk transfer). The remaining four areas are BM issues, sourcing issues, supply chain issues, and support chain issues. BM issues are the focal area for the research, while the other three areas will be touched upon indirectly through the focal area.

The financial flow (“*Revenue Streams*” and internal “*Cost Structures*”) has not been included in the research. Even though “*Revenue Streams*” are of potential interest to study also in a non-profit context, it was decided not to include the financial flow. Besides the fact that demarcations have to be made, the “*Revenue Streams*” between a DPA and its customer is likely to be less “*business-like*”, and therefore of less interest than the “*Revenue Streams*” between two private companies in a Business-to-Business (B2B) relationship.

Throughout the thesis, particularly in Chapter 6 and Chapter 7, there are statements such as “*apparently*”, “*unclear*” and “*not clear*”. The author wish to make it clear that these statements simply state that something is not explicitly known to the author. Within DE&S, its contractors or other actors it may be crystal clear, but based on the primary information from the interviews, and secondary information from other sources, it is not clear to the author.

1.6 Research Questions

The explorative research purpose, i.e. to “*study*”, motivated the interview study at FMV (see Annex A), which was used to explore the research problem and the research purpose (see Chapter 2), and the literature review (see Chapter 4). A consequence of the interview study is that there are two descriptions of the background to the research: a generic overview from an international perspective (see Section 1.2) and a specific, more detailed, description from a Swedish perspective (see Chapter 2). This was deemed necessary in order to provide a thorough description of the research context. The results of the interview study provided the necessary insights in order to identify the following Research Questions (RQs):

- Research Question 1: How can a generic Business Model for a non-profit, governmental, Defence Procurement Agency be described?
- Research Question 2: Which strengths and weaknesses do different Business Models have in the context of defence acquisition?
- Research Question 3: Which risks are associated with different Business Models in the context of defence acquisition?

With the intention of ensuring practical research relevance (see Chapter 2), representatives of FMV and the Swedish Armed Forces, the two principal stakeholders for the reported research (see Section 1.7), were offered the opportunity to give their points of view on these RQs. The RQs have also been

presented to military logistics and defence acquisition researchers at FOI, the UK Defence Science and Technology Laboratory¹⁶ (Dstl), and at the Centre for Defence Acquisition (CfDA) at Cranfield University in the UK, in order to ensure practical research relevance.

The explanative research purpose, i.e. to “*analyse and evaluate*”, was the dominating research purpose in the case based research (i.e. Chapters 5-10).

1.7 Target Audiences

There are two dimensions along which to categorise the target audiences of this thesis: the practitioner-theorist dimension and the military-civilian dimension. Hence, the four broad target audiences for this thesis are practitioners and theorists in the military and the civilian domains.

The research was commissioned by FMV, the Swedish DPA, supported by the Swedish Armed Forces and FOI, the Swedish DRA, and performed at DE&S, the UK DPA. These organisations are the primary target audiences among military practitioners for this thesis. More generally, defence organisations, particularly in the area of defence acquisition, facing similar challenges as FMV and the Swedish Armed Forces, dominate the practitioner part of the target audience. Extending the scope even further, military and civilian practitioners engaged in Public Private Business Models (PPBMs, see Section 4.12) in a non-profit, governmental context are also part of the target audience.

Academia is also an important part of the target audience. This thesis’ main theoretical contributions are in the fields of Business Models (BM, see Section 4.5) in a non-profit, governmental context and Public Private Participation (see Sections 4.3 and 4.7). Hence, theorists, predominantly civilian, in these research areas constitute the target audiences within academia.

1.8 Acronyms

All different human enterprises have their own specialised languages, with their own nomenclature. The military domain has its fair share of acronyms, arguably to an even larger extent than most other human endeavours, but areas such as

¹⁶ In 2001 the UK MoD Defence Evaluation and Research Agency (DERA), a UK MoD agency, was split up into QinetiQ, which was turned into a commercial company, and the Defence Science and Technology Laboratory (Dstl), which remained a UK MoD agency.

logistics, SCM, BMs, PPPs, etc., are also abundant with acronyms; and nations and organisations will also contribute with acronyms.

The most frequently used acronyms have been interpreted, and to some extent explained, in the “*Glossary of Acronyms*”, which can be found immediately after “*References*”, i.e. after the main body of text, and used as cautiously as possible in the text. Regrettably, it is presumably unavoidable that some acronyms are used with different meanings in different contexts. This thesis is not an exception, but has a few duplicates of its own. Hopefully, this will not present the reader with any insurmountable obstacles.

1.9 Thesis Outline

A written account, such as this licentiate thesis, gives the illusion of portraying a linear, sequential research project, where each stage in the project logically preceded the next step, and where each step was visited only once. In this instance, such a written account can in no way resemble the intricacies of the actual research project, i.e. capture and convey the complexity of what was an iterative research project, where each stage was visited several times, and not in any stringent, sequential order. Nevertheless, as illustrated in Figure 1.1, this thesis, which can be regarded as a linear projection of an iterative research project, follows the established logic of an academic thesis.

In Chapter 2, the research problem is formulated. Chapter 2 includes descriptions of FMV, the on-going transformation of the Swedish Defence, the Swedish military supply chain, and Swedish participation in PSOs and international cooperation. In Chapter 3, the methodology is presented. Chapter 4 describes the frame of reference, the proposed generic Public Private Business Model (PPBM) for defence acquisition and models for analysis of acquisition project performance and risk. Defence acquisition in the UK is summarised in Chapter 5 in order to provide the context and setting for the case descriptions in Chapter 6. In Chapter 7, the cases are analysed individually, and the results of these analyses are synthesised across the cases in order to identify any common patterns and provide generic results. In the concluding chapters, the results and implications for theory and practise are presented in Chapter 8 and Chapter 9, and the conclusions and contributions are summarised in Chapter 10.

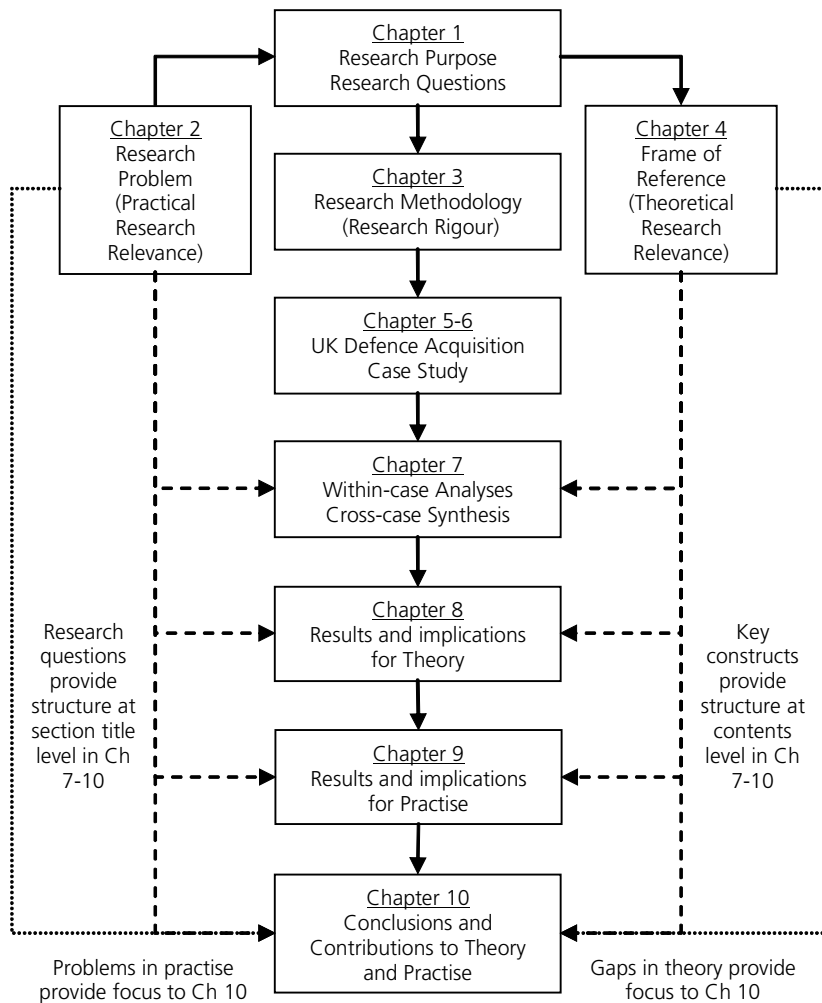


Figure 1.1: Relationships between the different chapters in the thesis.

After the main body of text, “*References*” and “*Glossary of Acronyms*” are intended to assist the reader to identify references and interpret acronyms. Finally, at the end of the thesis, there are two Annexes. “*Annex A*” provides a translated, abridged account of the Interview Guide that was used for the semi-structured interviews that were conducted in Swedish at FMV, the Swedish DPA. “*Annex B*” provides an abridged account of the Interview Guide that was used for the semi-structured interviews that were conducted in English at DE&S, the British DPA.

2 Research Problem

“Successful problem solving requires finding the right solution to the right problem. We fail more often because we solve the wrong problem, than because we get the wrong solution to the right problem.”

Russell Ackoff (1974, p 8)

The above quote illustrates the importance of research relevance. Hence, problem formulation, i.e. to structure the problem area and to produce the necessary insights in order to describe the research problem, is essential when formulating relevant Research Questions (RQs), in order to ensure research relevance, or to minimise the risk of a knowledge production problem, i.e. the problem of *“lost before translation”* (Shapiro *et al*, 2007).

This chapter is devoted to ensuring practical research relevance. Methodological research rigour is addressed in Chapter 3 and theoretical research relevance is addressed in Chapter 4. Section 2.1 provides an introduction to the transformation of the Swedish defence sector. In Section 2.2, the development of the Swedish supply chain is described. Swedish participation in international operations is described in Section 2.3, and Swedish international cooperation in other areas is presented in Section 2.4. Section 2.5 provides a brief introduction to FMV. In Section 2.6, the practical research relevance is defined.

2.1 Introduction

Sweden has followed the international development and the Swedish Armed Forces is in a state of unprecedented transformation, which involves the transition from a defence force against invasion, prevalent during the Second World War (WW2) and throughout the Cold War, to a modern, flexible and mobile operational defence force, adapted to the requirements of the Post-Cold War Era, which can participate in international operations. The transformation has had a profound effect on all aspects of the military system, but, arguably, the most dramatic effects are to be found in the logistics system, including defence acquisition. The transformation has been guided and directed by a series of bills that were authored by the Swedish Ministry of Defence (MoD) and approved by the Swedish Parliament. The foundation for the renewal of the Swedish Armed Forces was initially laid down in the bills *“A changing world, a reformed defence”* (The Swedish MoD, 1999a), and *“The new defence”* (The Swedish MoD, 1999b). These initial bills have been followed by several bills, the most influential of which include *“A continued renewal of the defence”* (The Swedish MoD, 2001), *“Society's security and*

preparedness” (The Swedish MoD, 2002), “*Our future defence*” (The Swedish MoD, 2004), and “*A useful defence*” (The Swedish MoD, 2009a).

In Sweden, the “*peace dividend*” (see Section 1.2.1) has not been targeted directly by the politicians. Instead, the Swedish government has sought to transfer funds within the military sector, from so called “*supporting activities*”, e.g. from: Defence Research and Development (R&D), i.e. from FHS (the Swedish National Defence College, NDC), FMV (the Swedish Defence Procurement Agency, DPA) and FOI (the Swedish Defence Research Agency, DRA); Defence Acquisition, i.e. from FMV; and Defence Logistics, i.e. from FMLOG (the Swedish Defence Logistics Organisation, DLO), to so called “*core activities*”, i.e. to the Swedish Armed Forces operational activities such as the Nordic Battle Group (NBG) and the Swedish Armed Forces participation in PSOs. The “*peace dividend*” has, however, been tapped into indirectly by the politicians, by not compensating the Armed Forces for the inflation since the ending of the Cold War, and by not compensating the Armed Forces for the significantly increased costs for defence equipment and support during the same period. Furthermore, there has been no compensation for participation in PSOs and no reimbursement for the increased costs associated with the transition from the century old enlisted conscript system to the contracted soldier system.

The Swedish government’s primary tool for rationalising the supporting activities has been two formal Swedish government inquiries, “*Swedish Government Official Reports*” (SOU¹⁷), and one formal Swedish MoD investigation. In 2004, the “*Defence Administration Inquiry*” (FFU¹⁸), a Swedish government inquiry, was directed (The Swedish Government, 2004) to identify cost reductions of supporting activities in the vicinity of 2 billion SEK¹⁹, corresponding to approximately 5% of the Swedish defence budget, in accordance with the directives given in the bill “*Our future defence*” (The Swedish MoD, 2004). As directed, in 2005 the Inquiry suggested the expected cost reductions in supporting activities, i.e. 2 billion SEK, and how these funds should be transferred to operations (SOU, 2005). In 2008, a Swedish MoD investigation²⁰ was directed (The Swedish Government, 2009) to present two reduction alternatives, 20 and 30%, on the

¹⁷ SOUs are “*Statens Offentliga Utredningar*”, i.e. “*Swedish Government Official Reports*”.

¹⁸ FFU, “*Försvarsförvaltningsutredningen*”, i.e. the “*Defence Administration Inquiry*”, which was referred to as the “*Lagerblad Inquiry*”, after *Peter Lagerblad*, who was responsible for the inquiry.

¹⁹ SEK is the Swedish currency, i.e. the Swedish “*krona*”.

²⁰ This investigation was referred to as the “*Hafström Investigation*”, after *Marie Hafström*, who was responsible for the investigation.

support, defined as equipment acquisition and logistics, to the Swedish Armed Forces. The investigation concluded that the costs for the support, i.e. *costs for equipment acquisition and logistics*, i.e. *not* including the *costs of equipment*, to the Armed Forces constituted approximately 10 billion SEK, or about one fourth of the Swedish Defence budget. Hence, the directed reduction alternatives were concluded to correspond to 2 and 3 billion SEK. As directed, in 2009 the investigator reported conclusions and suggestions, amounting to a 3 billion SEK reduction of the support to the Swedish Armed Forces (The Swedish MoD, 2009b). The Swedish MoD did not make any immediate decisions based on this investigation. Instead, in 2010, the “*Defence Structure Inquiry*” (FSU²¹), a Swedish government inquiry, was directed to identify cost reductions in the vicinity of 2 billion SEK, corresponding to approximately 5% of the Swedish defence budget, in the support activities provided by FMLOG, FMV, FOI and FHS (The Swedish Government, 2010). The inquiry was directed to use the MoD report from the previous year (The Swedish MoD, 2009b) and the opinions, submissions and referral comments on that report from other Swedish authorities (The Swedish MoD, 2009c) as its point of departure. As directed, in 2011 the inquiry suggested the expected cost reductions, in fact even exceeded the reductions in the directive by 20%, (SOU, 2011, p 38). The inquiry also proposed that FMLOG should merge with FMV into a new defence authority, the “*Defence Logistics Authority*” (FLM²²) (SOU, 2011, p 35).

In the Swedish Government’s Budget Bill for 2012 (The Swedish Government, 2011) the Swedish government declared its intention to make successive decisions in line with several of the suggestions in the Defence Structure Inquiry. However, the Swedish government decided to reduce the suggested merger of FMV and FMLOG to assimilation. Hence, FMV is likely to absorb a number of activities from the Swedish Armed Forces and most of the activities from FMLOG, corresponding to in excess of 3,000 personnel. As a consequence of the expected decisions, the intended effects are likely to include the following: equipment acquisition will merge with logistics provision in order to create “*defence logistics*”; activities and competences that are related to logistics that is “*closely related to operations*”²³ will remain within the Swedish Armed Forces; resources for the rear

²¹ FSU, “*Försvarsstrukturutredningen*”, i.e. the “*Defence Structure Inquiry*”, which was referred to as the “*Segebergs Inquiry*”, after Jan Segerberg, who was responsible for the inquiry.

²² FLM, “*Försvarslogistikmyndigheten*”, i.e. the “*Defence Logistics Authority*” (DLA), was the suggested name for the new authority.

²³ It remains to be defined and decided what is included in logistics that is “*closely related to operations*”. Figure 2.3 illustrates part of the complexity related to making a distinction between

defence logistics, and resources for planning and execution of acquisition, maintenance and disposal of equipment, will be brought together at FMV; finally, the roles and responsibilities of the Swedish Armed Forces as the decider (customer) and FMV as the provider (supplier) will be made clear. It remains to be seen which decisions that are made and when they are made, and which consequences these decisions will invoke within the Swedish defence sector once they are made. In April 2012 the Swedish MoD authored the bill *“More Effective Defence Logistics”* (The Swedish MoD, 2012), which is in line with the suggestions in the Budget Bill, but which reduces the transfer of personnel from FMLOG to FMV to about 1,500 (The Swedish MoD, 2012, p 8).

Readers with insight into the development in the military sector in Sweden in recent years will recognise the striking resemblance between the three UK themes (see Section 1.1), as identified by Haddon-Cave (2009), and the on-going transformation in Sweden. In addition to these similarities, the suggestion to merge FMLOG and FMV into a Defence Logistics Authority (DLA) is also mirrored by the merger of the Defence Logistics Organisation (DLO) and the Defence Procurement Agency (DPA) into the Defence Equipment & Support (DE&S) within the UK MoD.

It is probably fair to say that Sweden, from a military point of view, has gone from a rather closed and static military supply system, based on regulation, and designed to defend Sweden, to a more open and dynamic military supply system, based on contracts on commercial grounds, and which is supposed to be used outside the borders of Sweden. The Swedish Armed Forces and FMV must deal with the generic challenges, as outlined in Section 1.2.5, which face all Armed Forces of the Western world. However, the Swedish Armed Forces and FMV must also face the challenges that are indigenous to Swedish circumstances, hence increasing the complexity even further.

2.2 The Swedish Military Supply Chain

In this section, the Cold War and Post-Cold War military supply chains are generically illustrated from the point of view of the acquisition of a complex piece of military equipment, e.g. a platform such as a Main Battle Tank (MBT), a war

what is rear and forward logistics on the one hand, and what is “*closely*” related to operations and “*not closely*” related to operations on the other hand.

ship, a fighter aircraft, or a Command and Control (C2) system, in order to satisfy a capability requirement. Defence procurement involves more than the procurement of military platforms or systems, but the most complex type of procurement is used as an illustrative example. The generic military supply chain also excludes the fact that the procurement of advanced systems would have to be approved by the government.

In military logistics, the terms strategic, operational and tactical military logistics are used in order to distinguish between different hierarchical levels of logistical activities (see Section 4.8.3). In NATO, the term production logistics, or acquisition logistics, is used as a synonym to strategic logistics; and consumer logistics is used as a synonym to operational (and, implicitly, tactical) logistics (see Section 4.8.3). The terms production and consumer logistics are used in this section to describe the distinction between the production and storage (strategic military logistics) of capabilities during the Cold War, and the production and storage (strategic military logistics), and utilisation (operational and tactical military logistics) of capabilities, which characterise the Post-Cold War military supply chain.

2.2.1 Cold War Production Logistics

From a military point of view, Sweden could be regarded as a stable, closed system during the Cold War Era. Sweden was considered to be self-contained, with an advanced domestic defence industry, which to a certain extent initially was owned by the government, which provided state-of-the-art equipment to the Armed Forces. However, even during the Cold War, when Sweden possessed a domestic, partially governmentally owned, defence industry, an ever increasing percentage of components and sub-systems, for very complex platforms like fighter aircraft, would have to be purchased from sub-suppliers outside the borders of Sweden, particularly from the US.

The military supply chain consisted of three categories of actors, i.e. the Armed Forces, FMV, and the domestic defence industry. Since Sweden is a relatively small country, the domestic defence industry consisted of a limited number of potential suppliers for a specific piece of equipment. The roles, responsibilities, interactions, and interfaces between the supply chain actors had developed over several decades and were clearly defined. Sweden was not an isolated island during the Cold War, but, from a military point of view, the supply chain was primarily influenced by stable domestic security and defence policies, including a stable defence budget; and stable defence-driven technology development, delivered by a stable domestic defence industry.

Based on directives and guidelines, regarding tasks and resources at its disposal, from the government, the Swedish Armed Forces would initially define which capabilities it required and could afford in order to perform its assigned tasks. The Swedish Defence Materiel Administration (FMV) would then, in cooperation with the Swedish Armed Forces, transform these requirements into system specifications. After approval by the government, FMV would then procure the system from an appropriate domestic supplier, which would develop the system according to the specifications from FMV. FMV would then receive the system and integrate it with existing systems within the Swedish Armed Forces. The system would constitute a part of the required capability, and be delivered to the Swedish Armed Forces.

Sweden has not been in a state of war for almost 200 years. The last time Sweden fought a defensive war on Swedish soil was in 1809, when Sweden lost its eastern half, i.e. Finland, to Russia. Further, Sweden has not participated in any offensive wars on foreign soil since 1814, when Sweden, as a substitute for Finland, forced Denmark to cede Norway, which was to remain Swedish until 1905. Consequently, the required capability could after delivery be regarded as being put into storage. FMV would retain responsibility for support, i.e. Maintenance, Repairs and Overhaul (MRO), of the system until its Out-of-Service-Date (OSD), when it was destroyed, sold, or otherwise disposed of.

While Sweden participated in a number of UN missions, e.g. in the Congo and on Cyprus, the Armed Forces were primarily designed and dimensioned to constitute a defence force on Swedish soil during the Cold War. Since Sweden has been fortunate enough not to participate in any wars since 1814, the supply chain can be described as a system designed to produce capabilities that were never used. This Cold War system can be regarded as an example of production logistics, or military logistics at the strategic level, which is not, with the exception of logistics for training and exercises, followed by consumer logistics, or military logistics at the operational and tactical level.

For a generic piece of equipment that was necessary for a generic capability, the supply chain of the Cold War Era can be schematically illustrated as in Figure 2.1. Figure 2.1 illustrates the military supply chain, including the actors, their relationships and their main areas of responsibilities. Hence, Figure 2.1 illustrates the logistical interfaces between the actors, and the supply concept of the Cold War Era. Figure 2.1 also illustrates the principal flows in the supply chain, but only the main directions of the principal flows are depicted. In reality, there would be information flowing in both directions, and there would also be a reverse physical flow, representing, e.g., the return of damaged equipment and a reverse financial flow due to penalty mechanisms.

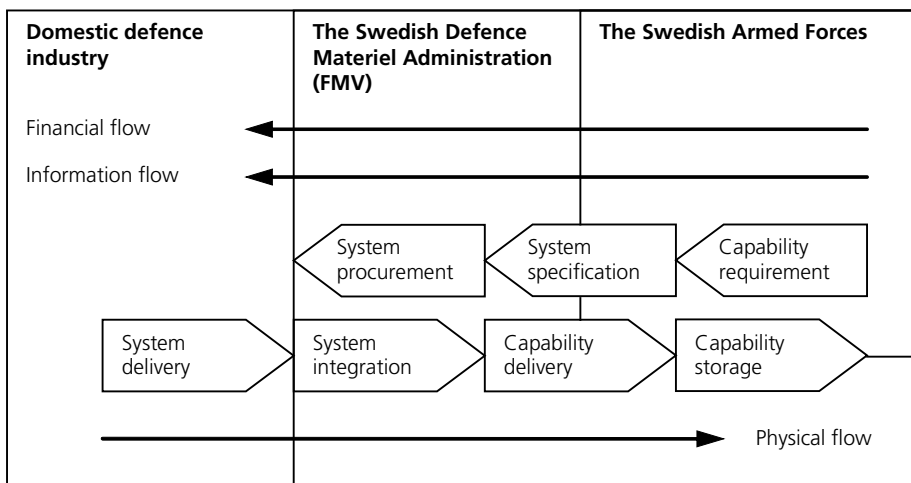


Figure 2.1: The static, closed military supply chain of the Cold War Era.

Throughout the Cold War, the external factors, i.e. the Political; Economic; Societal; and Technological environment; influencing the military supply chain remained stable. Defence and security policies, and hence the defence budget, remained stable and predictable. Military technology development was stable, driven by the requirements of the Swedish Armed Forces, and delivered by a stable domestic defence industry.

2.2.2 Post-Cold War Production Logistics

Since the ending of the Cold War, the Swedish Armed Forces is in a state of transformation from a domestic defence force to a flexible, deployable force. The relatively easily described military supply chain of the Cold War Era is now in a state of flux. New types of missions, e.g. KFOR, have to be provided for, new military concepts, e.g. NBD, have to be considered, and, simultaneously and in parallel, new ICTs, e.g. TAV, are being implemented; new CBPs, e.g. SCM, are being evaluated, adapted and adopted; OTS products and services are being utilised; and PPPs are being investigated and initiated, in order to make the supply chain more effective and efficient. Not even the actors have remained the same. The defence industry is now multinational, privatised, globalised and owned by foreign conglomerates; and FMLOG, the Swedish Defence Logistics Organisation (DLO), has entered the scene. While the generic illustration of the static, closed military supply chain of the Cold War Era, as depicted in Figure 2.1, is valid after the ending of the Cold War, it is now only one of the extremes of an entire spectrum of possible supply chains in the Post-Cold War Era. Figure 2.2 illustrates the other extreme of the dynamic, open military supply chain of the Post-Cold

War Era. The new extreme, which can be described as “*Contracting-for-Capability*” (CfC, see Section 5.3.7), involves FMV acquiring the capability that the Armed Forces requires, and the multinational defence industry subsequently delivering capability directly to the Armed Forces. In between the two extremes is an entire spectrum of possible Business Models, including “*Contracting-for-Availability*” (CfA, see Section 5.3.7), i.e. “*power-by-the-hour*” (see Section 4.6.7).

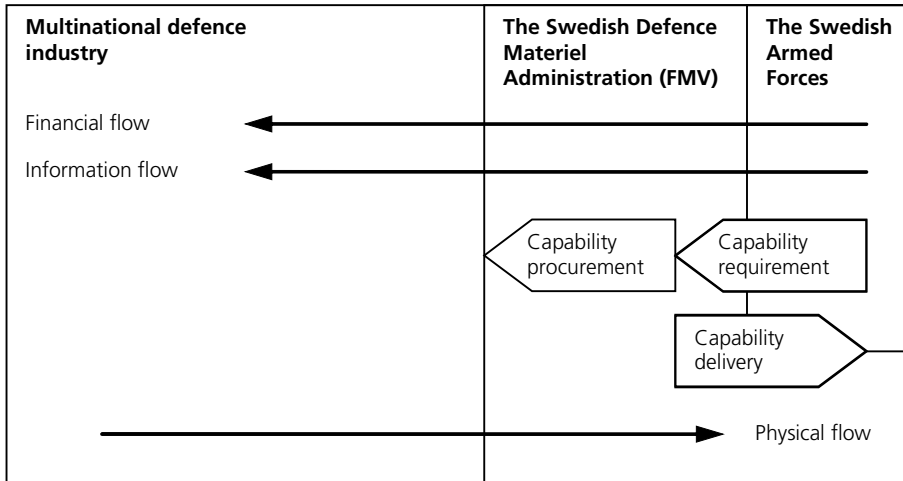


Figure 2.2: One extreme of the dynamic, open military supply chain of the Post-Cold War Era.

After the ending of the Cold War, the Swedish Defence, and hence its supply chain, is used for four tasks; national defence, international missions, territorial integrity, and support to society. Swedish military units are being used in PSOs throughout the world. Hence, the supply chain must now be described as a system that is going to be used, and the Swedish Post Cold War system can be regarded as an example of military production logistics that *is* followed by military consumer logistics, which will be illustrated in Section 2.2.3.

Most of the changes in the military supply chain have their origin in the external environment. Sweden, that was previously a neutral country, with limited military cooperation and collaboration with other nations, is now a member-state of EU, which has increasing aspirations in the military domain; is one of the remaining non-NATO member states of the Partnership-for-Peace (PfP); and an active contributor of military forces to UN, and UN endorsed EU- and NATO-led coalitions, in several missions throughout the world. The development of new technology is no longer driven by the requirements of the Armed Forces, particularly not in the area of ICT. Business logistics, which was born out of the military success in logistics during WW2, has now developed and has become an

inspiration for the military domain in terms of new methods of rationalisation, i.e. new CBPs. The domestic, semi-governmentally owned, defence industry of the Cold War is now part of a few private sector multinational defence industry conglomerates. New security and defence policies, followed by an increased complexity in the international PSOs that the Armed Forces participates in, in combination with defence budgets that do not compensate for inflation, increase in equipment costs and costs for participation in PSOs, and changes in legislation and the internationalisation of the defence industry, have forced the Armed Forces and FMV to make extensive alterations in the logistical interfaces between the actors in the military supply chain.

2.2.3 Post-Cold War Consumer Logistics

From a Swedish military perspective, the two dominant consequences of the ending of the Cold War are that the Swedish Armed Forces is now being used, and that it is primarily intended to be used outside the country's borders. The transformation from a dormant defence force against invasion, first and foremost engaged in education of soldiers, to a modern, flexible and mobile operational defence force, being actively used in operations throughout the world, have had major implications for military logistics.

Swedish military consumer logistics is divided into two levels of resources, the forward and the rear resource area (The Swedish Armed Forces, 2007b, p 12, and 2007c, p 12). The forward resource area, or the Forward Logistics Support Area (FLSA), is in the Area of Responsibility (AOR) in the Joint Operations Area (JOA). It consists of the military units' own resources and the resources of specialised logistics units. The forward area logistical resources and activities are primarily dimensioned based on operational and tactical requirements (The Swedish Armed Forces, 2007b, p 12).

The rear resource area is, in turn, divided into two different areas, the Home Logistics Base (HLB) in Sweden, and the Joint Rear Area Support Base (JRASB) in the Joint Rear Area (JRA) in the JOA. It consists of the Swedish Armed Forces own resources, primarily FMLOG, territorial resources, and other actors' resources (i.e. civilian, national, and international partners). The rear area logistical resources and activities are allowed to display a higher degree of peace rationality, and standardised processes with other requirements for delivery and capacity (The Swedish Armed Forces, 2007b, p 12).

Figure 2.3 illustrates the two levels of resources in Swedish military logistics, and the connection to the NATO Line and Role terminology. Lines and roles are the division used in NATO logistics, but are, as a result of the requirements for interoperability, now also used by the Swedish Armed Forces. Lines (see Section

4.8.2) divide military logistics into five resource levels. Roles (see Section 4.8.6) are health and sick care, and are divided into four stages.

FMLOG has the same responsibilities and tasks regarding logistical support, i.e. supplies and services, to a military unit, regardless if the unit participates in an international mission abroad, or is solving tasks, e.g. training and exercises, in Sweden. To support a unit in an international mission, FMLOG will normally create a National Support Element (NSE), in order to handle supply and support regarding those supplies and support services, i.e. Maintenance, Repairs, and Overhaul (MRO), which *may* (see Section 4.8.6) remain a national responsibility throughout an operation, depending on which type of mission it is. In order to rationalise the activities, different nations' NSEs will sometimes be joined into a National Support Group (NSG). In Figure 2.3, an NSE and an NSG are included in the rear resource area.

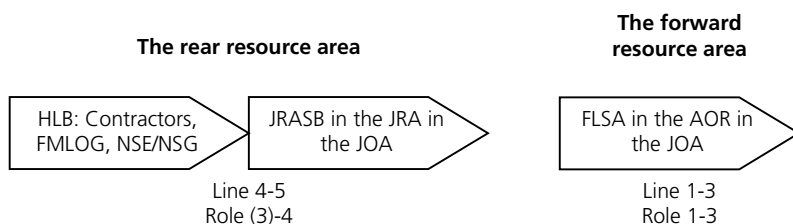


Figure 2.3: The two levels of resources in Swedish military logistics (Source: Based on The Swedish Armed Forces (2007c, p 13).

Strategic lift, or strategic transportation, i.e. to transport the military units from the HLB to the JRA, and to keep them supplied and supported throughout the mission, is a key element in the logistical concept for international missions. If the strategic transport is an airlift, the flights will depart from the Air Port of Embarkation (APOE) in the HLB and arrive at the Air Port of Debarkation (APOD) in the JRA. Transportation by sea, on the other hand, will depart from the Sea Port of Embarkation (SPOE) in the HLB and arrive at the Sea Port of Debarkation (SPOD) in the JRA. For both sea and air transport, operational transport, by air or road or by rail, will then continue the voyage to the AOR, or, more specifically, to the Reception Staging and Onwards Movement (RSOM) area, from where a tactical transport will transport units, supplies and logistical support *“the last mile”* (see Section 4.8.6). Figure 2.4 illustrates a supply concept for military operations, including the Lines of Communication (LOCs).

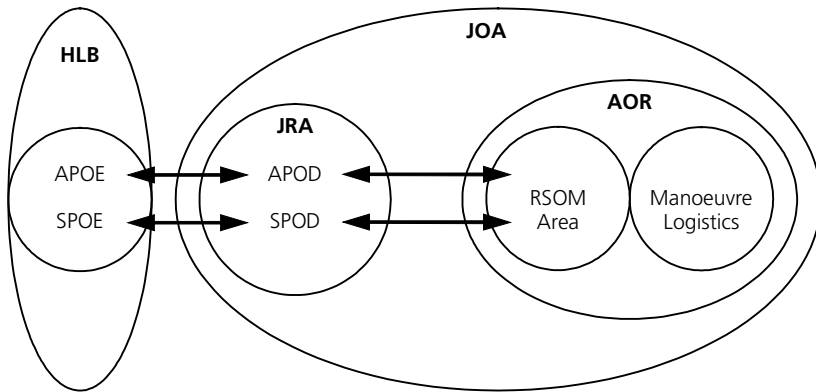


Figure 2.4: A generic supply concept for operations (Source: Based on Kress, 2002, pp. 202-203).

The planning of strategic transportation is complex, as is exercising movement control (MOVCON). Hence, planning and MOVCON is exercised by a special National Movement Coordination Centre (NMCC) at the JFC. For a more comprehensive introduction to military logistics, the reader is referred to Section 4.8. In Section 4.8.6, operational logistics, i.e. logistics for military operations, is somewhat more thoroughly explained, whereas some of the specifics of UK military logistics are summarised in Section 4.8.7.

2.3 Sweden in Peace Support Operations

Changes in security and defence policies have had a profound effect on the Armed Forces of the world, which have been obliged to participate in an increasing number of Peace Support Operations (PSOs) throughout the world. Since the ending of the Cold War, Swedish military units have participated in several UN, NATO, EU, Western European Union (WEU), and Organisation for Security and Co-operation in Europe (OSCE) operations and other activities, including UNPROFOR, IFOR, SFOR, KFOR, EUFOR Althea, ISAF, UNMIL etc. (Tillberg *et al*, 2007, pp. 103-107). Sweden has also contributed with forces to the Nordic Coordinated Arrangement for Military Peace Support (NORDCAPS) and the UN Standby High Readiness Brigade (SHIRBRIG).

During the Cold War, defending the borders of Sweden was the only task that was formally assigned to the Armed Forces, and the one task for which the Armed Forces was designed and dimensioned. Participation in UN PK operations was, however, by no means a new experience for Sweden after the ending of the Cold War. Quite to the contrary: during the Cold War, Sweden participated in 11 of the 13 UN PK and observer missions (Jakobsen, 2006, p 15). Since the first UN PK

operation, the UN Truce Supervision Organisation (UNTSO) in Israel, Lebanon, Egypt, Syria and Jordan (est. 1948), to which Sweden sent military observers, Sweden remained an active Troop-Contributing Country (TCC) to UK PK operations, e.g. UN Emergency Force (UNEF) in Suez and Gaza (1956-1967); Opération des Nations Unies au Congo (ONUC) (1960-1964); UN PK Force in Cyprus (UNFICYP) (est. 1964); UNEF II in Suez and Sinai (1973-1979); and UN Interim Force in Lebanon (UNIFIL) (est. 1978) throughout the Cold War (Swedish Armed Forces, 2006c, pp. 170-223).

Since 1948, over 130 member states have contributed nearly one million troops (Bellamy *et al*, 2010, p 58) to UN PK operations. During the Cold War, Canada, the Nordic countries, Ireland and India dominated as TCCs. By the end of the Cold War approximately 125,000, or about 25% of the personnel that until then had served on UN PK operations, had come from the Nordic countries (Jakobsen, 2006, p 10). The ending of the Cold War changed this. By 1993 the four major TCCs were France, the UK, Canada and the Netherlands, and by 2005, the four major TCCs had changed to Pakistan, Bangladesh, India and Nigeria (Bellamy *et al*, 2010, pp. 58-59). Besides the shift of TCCs to developing countries, the last two decades have also seen a significant increase in the participation of Private Security Companies (PSCs) in PK operations (Bellamy *et al*, 2010, p 321).

Even if Sweden is participating actively in many UN PK operations also after the ending of the Cold War, the role is no longer as a significant TCC. However, by 2006, Sweden had sent about 100,000 troops on PSOs (Swedish Armed Forces, 2006c, pp. 170-223), and in the region of 10% of the personnel ever sent to participate in a UN PK operation, have been Swedes.

2.4 Swedish International Cooperation

In addition to the generic challenges and drivers for change that were summarised in Section 1.2.5, from a Swedish point of view, there are also other developments to take into consideration, increasing the complexity even further. In 1973, a new concept, *business-like approach* (Swedish: *affärsmässighet*) was introduced into the Swedish Public Procurement Ordinance. Some twenty years later, in 1995, Sweden became a member state of EU. The several adjustments of the Swedish society that were a prerequisite of becoming a member state included major alterations of the Swedish legislative systems. Among other new laws that were introduced, “*The Law Regarding Public Procurement*” LOU (1994) would come to have a profound effect on public procurement. LOU builds on the following fundamental principles of European Community law with regard to public procurement: the principles of non-discrimination, equal treatment, transparency (openness and predictability), proportionality and mutual recognition. From the point of view of defence

acquisition, the ending of the Cold War also meant a transition from legislative regulation regarding defence procurement, to contracts with suppliers being based strictly on commercial grounds.

Sweden had previously remained outside alliances such as NATO and EU, in order to be able to maintain neutrality in the event of war. This changed, in practise, when Sweden became a member state in EU, with clear and developing ambitions in the areas of security and defence policies, and when Sweden decided to participate in missions led by NATO and EU, and international cooperation in different military areas. The last two decades, Sweden has participated in PSOs such as UNPROFOR, IFOR, SFOR, KFOR, EUFOR Althea, ISAF, UNMIL, etc. Sweden has also participated in NATO PfP, EU BG, NORDCAPS, SHIRBRIG, MNE, NAMSA, OCCAR, EDA, NORDAC, MCCE, ATARES, SALIS, and SAC. The participation in the EU BG concept was as one of the major TCCs to the Nordic Battle Group (NBG).

The defence industry in Sweden was, to a large extent, domestic prior to the fall of WP. With the globalisation and internationalisation of industry, this is no longer the case. The Swedish defence industry is now part of multinational defence conglomerates. The defence industry in Sweden was also, to a large extent, previously owned by the government. The Swedish privatisation of its domestic defence industry began, however, long before the fall of the WP.

2.5 The Swedish Defence Materiel Administration

As the result of a growing requirement for one single defence management organisation FMV was established in 1968 (FMV, 2012a) and it procures, maintains and supports the whole range of defence equipment, with a responsibility that ranges from the *“cradle to the grave”*, predominantly to the Swedish Armed Forces. However, FMV also has a similar responsibility for civilian authorities in the security sector, e.g. the Police, Customs and the Coast Guard. FMV cooperates with many different actors, nationally and internationally, in order to be able to deliver the most cost-efficient solution.

FMV has activities in several Swedish cities, but its main office is situated in Stockholm. FMV has six Acquisition Offices, which are responsible for procuring equipment and distributing it to different areas of responsibility: Land; Naval; Air and Space; Command and Control (C2); Logistics and General Services; and Special Assignments (FMV, 2012b). FMV has 1,500 employees and in 2010 its total operating revenue was 17 billion SEK (FMV, 2012c).

2.6 Practical Research Relevance

“In business academia, we have long debated the relative importance of rigorous research versus research that is relevant. It is hard to understand why we continue this debate, when the answer is right in front of us: Why would we choose only one? How can research be considered “good” if it is not relevant to the discipline under study? How can research be useful if our methods are not rigorous enough to allow us to be confident in our results?”

Mentzer (2008)

Problem structuring is the process of making sense of an issue; identifying key concerns, goals, stakeholders, actions, uncertainties, etc. Rosenhead (1989) defines problem structuring as *“the identification of those factors and issues which should constitute the agenda for further discussion and analysis”*. The process of making sense of the issue could be an informal one, utilising one of the broad range of general managerial tools such as a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis, or the PEST (Political, Economic, Socio-cultural and Technological) framework. In the military domain, however, frameworks such as DIME (Diplomatic, Information, Military, Economic), and PMESII (Political, Military, Economic, Social, (legal, ethical, environmental,) Information & Infrastructure (and science & technology) are more common, even if the employment of SWOT analysis is instructed in *“A strategy for Public-Private-Cooperation (PPC) in the Swedish Armed Forces”* (The Swedish Armed Forces, 2006a). The sense-making process could, however, also make use of one of the several Problem Structuring Methods (PSMs), sometimes labelled as Soft Operational Research (OR) (Pidd, 2003), or Soft Systems Thinking (SST) (Checkland, 2002), depending on the labeller, that have emerged, primarily in the UK, during the last three decades, as a response to perceived problems with traditional approaches, i.e. Hard Systems Thinking (HST).

According to Schultz and Hatch (2005), there are trends that *“signal a shift away from the prominence of science in social science, to a stronger emphasis on the social significance of social science to society”*. Schultz and Hatch (2005), rather than supporting previous efforts to maximise the benefits of rigour and relevance simultaneously, propose the remedy of *“turning the relationship between research and practise upside down. Instead of defining ourselves as researchers who translate our theoretically derived knowledge into practical solutions..., we advocate seeing ourselves as tapping into practical knowledge in order to produce better theories”*. *“As a consequence of our training and professional standards, we tend to complicate and fragment our theories. We believe exactly the opposite is what is needed to bring rigour and relevance together”*.

The gap between theory and practice, as outlined by Schultz and Hatch (2005), is typically framed as a *“knowledge transfer problem”* (Van de Ven and Johnson, 2006) or a *“knowledge production problem”* (Shapiro *et al*, 2007). Shapiro *et al* (2007) refer to these two types of problems as *“lost in translation”* and *“lost before translation”*. Näslund (2008, p 102) stresses the importance of understanding the difference between the two types of problems: *“If the problem is about knowledge transfer, then relevant research is performed but it is not published or translated into a format that reaches managers. The research is lost in translation. On the other hand, the problem could be that relevant research is not even performed”*.

Van de Ven (2007, p 71), states that problem formulation should play a role in grounding the problem in reality, and ought to directly affect how theory building, research design, and problem solving tasks are performed, but that researchers often overlook or pay little attention to problem formulation. According to Van de Ven (2011, p 3), *“Engaged Scholarship is a participative form of research for obtaining the advice and perspectives of key stakeholders (researchers, users, clients, sponsors and practitioners) to understand a complex problem or phenomenon”*. The Engaged Scholarship Diamond Model consists of: problem formulation, theory building, research design, and problem solving (Van de Ven, 2007, p 10). The process of formulating a research problem can be discussed in terms of four interdependent activities: situating, grounding, diagnosing, and resolving a problem (Van de Ven, 2007, p 95).

The first point in situating the research problem is to identify those whose point of view and interests are to be represented in the problem formulation (Van de Ven, 2007, p 95). This licentiate research was commissioned by FMV, and was made possible because of support from FMV and the Swedish Armed Forces. Hence, both FMV and the Swedish Armed Forces are principal stakeholders regarding the relevance of the research. The second point in situating the research problem is to clarify who the intended users, clients, and audience of the research are (Van de Ven, 2007, p 95). The target audiences for the reported research are defined in Section 1.7. The fifth point in situating the research problem concerns the scope of the problem, i.e. how deep, how broad, and how long the problem will be studied (Van de Ven, 2007, p 95). These issues are addressed in Section 1.5.

The fourth and fifth points in grounding the research problem are to *“Talk to people who experience the problem or issue”* and to *“Conduct interviews and nominal groups with people who know about the issue/problem”* (Van de Ven, 2007, p 96). For the reported research, interviews with knowledgeable people, or Subject Matter Experts (SMEs), within FMV were performed. The respondents included military officers, since military officers to a large extent hold positions within FMV. The SMEs were then offered to validate the transcribed interviews. In combination with this author’s pre-understanding and literature reviews, these interviews were then

used to write: Section 1.2, which is committed to describing the background to the research; Section 2.2, which is dedicated to describing the focal system, i.e. the Swedish Military Supply and Support Chain; and this section, which is devoted to defining the research problem. The respondents, together with representatives of the Swedish Armed Forces, LTH and FMV, were then given the opportunity to read and comment on these sections, in order to validate this part of the thesis and to ensure research relevance. The research proposal, including these three sections, was also presented to research colleagues at LTH, FOI, Dstl and CfDA, in order to validate their contents in a national and an international perspective. Since the research has involved case based research in the UK, it seemed pertinent to include the British point of view in the validation of the problem formulation.

The first and second points of diagnosing the research problem are to “*Classify elements or symptoms of the problem into categories*” and to “*Aggregate categories to infer a problem*” (Van de Ven, 2007, p 96). When the interviews at FMV had been conducted, transcribed and validated, divisive and agglomerative hierarchical Qualitative Cluster Analysis²⁴ (QCA) was applied in order to use the transcribed interviews to identify and categorise the data into key challenges that the Swedish DPA faces during its transformation. The findings of the analysis of the interviews include that under the top level of the dendrogram, i.e. under “*Areas of key challenges that FMV faces*”, six different areas of challenges were identified. Each of these different areas of challenges consists of a number of challenges. At the second level of the resulting dendrogram, the identified areas of challenges, in no particular order, are: “*Sourcing issues*”; “*Business Model issues*”; “*Internal issues*”; “*Moral and ethical issues*”; “*Supply chain issues*”; and “*Support chain issues*”, which is illustrated in Figure 2.5. The sourcing issues include: “*How should what to make, what to buy, and how to buy, be decided?*”; “*How should Value-for-Money (VfM) be calculated?*”; “*How should risk sharing, reward sharing, and information sharing, be handled?*”; “*How should OTS products and services be selected?*”; “*How should OTS be used in order to enhance performance?*”; “*How should the contributions of OTS be evaluated?*”; and “*How do roles and responsibilities change because of OTS products and services?*”.

²⁴ QCA is a methodology used to group items according to attributes chosen by the analyst. Aldenderfer and Blashfield (1984, p 7) describe QCA as a “*generic name for a wide variety of procedures that can be used to create a classification*” with specific procedures to create clusters of related entities, a dendrogram. QCA consists of divisive and agglomerative techniques, where divisive QCA starts from a large cluster and successively splits it into smaller clusters and agglomerative QCA starts with separate objects and successively combines them into larger clusters (Bailey, 1975).

The Business Model issues include: *“How should new ICT be selected?”*; *“How should new ICT be used in order to enhance performance?”*; *“How should the contributions of new ICT be evaluated?”*; *“How do roles and responsibilities change because of new ICT?”*; *“How should new CBPs be selected, adapted and adopted?”*; *“How should new CBPs be used in order to enhance performance?”*; *“How should the contributions of new CBPs be evaluated?”*; *“How do roles and responsibilities change because of new CBPs?”*; *“How should new BMs be selected?”*; *“How should new BMs be used in order to enhance performance?”*; *“How should the contributions of new BMs be evaluated?”*; *“How do roles and responsibilities change because of new BMs?”*; and *“How should it be decided if the public or the private sector should be responsible for designing, building, financing, owning, operating, maintaining, and managing; and if/when leasing and transfer should occur?”*.

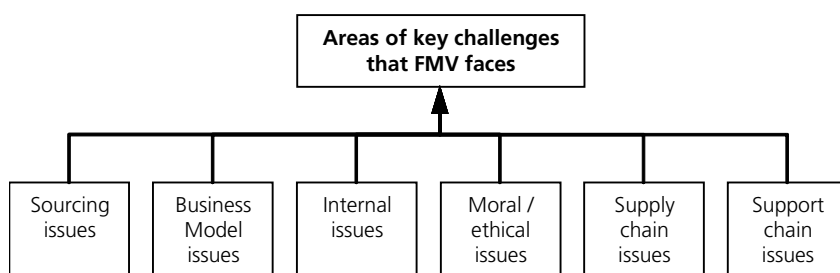


Figure 2.5: Areas of key challenges that FMV faces.

The internal issues include: *“How should the internal cultural challenges that the external challenges bring about be addressed?”*; *“What form of organisation would adequately meet the new challenges?”* and *“Which new competencies are required, and which existing competencies will become obsolete, because of the transformation?”*

The moral and ethical issues include: *“Which, if any, moral and ethical issues are associated with risk transfer to suppliers, e.g. contractors in the field?”* and *“How should risk transfer to contractors be addressed?”*

The supply and support chain issues include: Supply and support chain design issues; Supply and support chain management issues; Supply and support chain Risk Management issues; and Supply and support chain Performance Measurement issues.

Under the supply and support chain issues, there are also fourth levels of questions: *“How should the military supply and support chains be redesigned in order to accommodate the new requirements of the reformed Armed Forces?”*; *“How should strategic deployment (particularly transportation) capability for supplies and support be ensured?”*; *“How should overseas supply and support be ensured?”*; *“How should the supply and support chains be managed?”*; *“Who should manage the supply and support*

chains from “factory to foxhole”?; “How can contracts be used to manage the supply and support chains?”; “Which different types of risks are inherent in defence procurement and the military supply and support chains?”; “How have these risks traditionally been managed?”; “How do OTS, new ICT, CBPs, and PPPs influence existing risks?”; “What new risks are introduced by OTS, new ICT, CBPs, and PPPs?”; “How should the existing and new risks be managed?”; “Who should manage the existing and new risks?”; “How can contracts be used to manage the existing and new risks?”; “How should performance be evaluated?”; “Which measures of performance (MOPs) should be used?”; “How should OTS, new ICT, CBPs, and PPPs be utilised in order to enhance performance?”; and “How should the contributions of OTS, new ICT, CBPs, and PPPs be evaluated?”.

The first and third points of selecting the Research Question (RQ) are *“What part of the problem merits research attention and focus?”* and *“Connect the RQ to your description of the problem”* (Van de Ven, 2007, p 96). When the different elements of the research problem had been categorised with QCA, the formulation of the research problem (see Section 1.3) was compared with the given research purpose (see Section 1.4). In that way, it was decided which of the potential RQs that were the most relevant to FMV and the Swedish Armed Forces. With the intention of further ensuring research relevance, the selection of RQs was discussed with representatives of the principal stakeholders, i.e. FMV, the Swedish Armed Forces, LU, FOI, Dstl and CfDA, in order to reach consensus, or acceptance, and to ensure research relevance. Each of these stakeholders has had the opportunity to give their points of view on these RQs. The RQs that were thus identified have been presented in Section 1.6.

3 Research Methodology

*"I keep six honest serving-men (They taught me all I knew);
Their names are What and Why and When; And How and Where and Who".*

Rudyard Kipling (Kipling, 2001, p 29)

3.1 Introduction

Hitherto, as a practitioner in the area of Operational Research (OR), the serving-men of Kipling have served this author equally well. However, through the PhD (licentiate) studies the author has discovered doors to new fields of knowledge consisting of a seemingly endless array of new concepts and diverging schools of thought, with a terminology bordering on an alien language. In addition, there is no consensus regarding perspectives, terminology, or definitions, which adds to confusion for the novice. This chapter will not present a full account of the revelations discovered behind previously hidden doors, attempt to define all terminology, or discuss different labels and interpretations for all central concepts. However, some of the terminology that has been used in the thesis will have to be addressed and the research paradigm, approach, strategy and methodology will have to be explicated and motivated.

Models, concepts, theories, hypotheses, methodologies and methods are central to research. Silverman (2006, p 15) states that *"Models, concepts, methodologies and methods cannot be right or wrong, only more or less useful"*. Equally important is to understand what the different terms mean. Models *"provide an overall framework for how we look at reality. In short, they tell us what reality is like and the basic elements it contains ("ontology") and what is the nature and status of knowledge ("epistemology"). In this sense, models roughly correspond to what are more grandly referred to as "paradigms" (Silverman, 2006, p 13)*. Concepts *"are clearly specified ideas deriving from a particular model" and "offer ways of looking at the world which are essential in defining a research problem" (Silverman, 2006, p 14)*. Theories *"arrange sets of concepts to define and explain some phenomenon. Theory consists of plausible relationships produced among concepts and sets of concepts"*. Unlike theories, hypotheses are tested in research as testable propositions (see Section 4.2) (Silverman, 2006, p 13-14). Methodology *"refers to the choices we make about cases to study, methods of data gathering, forms of data analysis etc. in planning and executing a research study"*, while methods *"are specific research techniques"* (Silverman, 2006, p 15).

In Section 3.2 the research paradigm, i.e. the researcher's epistemological and ontological position, is described. In Section 3.3, the selected research approach is described and motivated. Then, in Section 3.4, the selected research strategy is described and motivated. Finally, in Section 3.5, the selected research methodology is described and motivated.

3.2 Research Paradigm

According to Jackson (2003, p 36), the word "*paradigm*" is commonly used to refer to something like the "*world view*" or "*way of seeing things*". Originally, however, it referred to the tradition of research regarded as authoritative by a particular scientific community, and according to Kuhn (1996, p 10), "*paradigms*" is closely related to "*normal science*", which refers to "*research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practise*". A "*paradigm*" is "*made up of the general theoretical assumptions and laws and the techniques for their application that the members of a particular scientific community adopt*" (Chalmers, 1999, p 108). A science progresses through the following stages: *pre-science – normal science – crisis – revolution – new normal science – new crisis*. Consequently, "*Kuhn's work in the natural sciences presupposed that paradigms generally succeeded each other*" (Mingers, 2003). However, Arbnor and Bjerke (1997, p 13) observe that it is only in the natural sciences that old paradigms are replaced by new ones, while in the social sciences, "*old paradigms usually survive alongside new ones*". According to Arbnor and Bjerke (1997, p 14), a paradigm consists of "*a conception of reality (view of the world), a conception of science, a scientific ideal, and has an ethical/aesthetical aspect*". In the social sciences, Burrell and Morgan (1979, p 23) constructed a set of paradigms that could exist simultaneously: "*radical humanist*", "*radical structuralist*", "*interpretive*" and "*functionalist*". According to Mingers (2003), a paradigm is thus "*a construct that specifies a general set of philosophical assumptions covering, for example, ontology (what is assumed to exist), epistemology (the nature of valid knowledge), ethics or axiology (what is valued or considered right), and methodology*". Ontological assumptions are assumptions about reality and epistemological assumptions concern knowledge (Mears-Young and Jackson, 1997). According to Jackson (2003, p 38), there are four paradigms in social theory: "*functionalist*", "*interpretive*", "*emancipatory*", and "*postmodern*". Saunders *et al* (2009, p 119) distinguish between four research philosophies, i.e. paradigms, in management research: positivism, realism, interpretivism and pragmatism. Burrell and Morgan (1979, p 1) argue that "*it is convenient to conceptualise social science in terms of four sets of assumptions related to ontology, epistemology, human nature and methodology*". The spectra for each of these dimensions of paradigm are illustrated in Figure 3.1.

In the “*ontological debate*” nominalism (subjectivism, conventionalism) assumes that the social world external to individual cognition is made up of nothing more than names, concepts and labels which are used to structure reality, whereas realism (objectivism) postulates that the social world external to individual cognition is a real world made up of hard, tangible and relatively immutable structures (Burrell and Morgan, 1979, p 4). In the “*epistemological debate*” anti-positivism (realism, critical realism, interpretivism) is firmly set against the utility of a search for laws or underlying regularities in the world of social affairs and states that the world is essentially relativistic and can only be understood from the point of view of the individuals who are directly involved in the activities which are to be studied, while positivism seeks to explain and predict what happens in the social world by searching for regularities and causal relationships between its constituent elements and states that it in essence is based upon the traditional approaches which dominate the natural sciences (Burrell and Morgan, 1979, p 5).

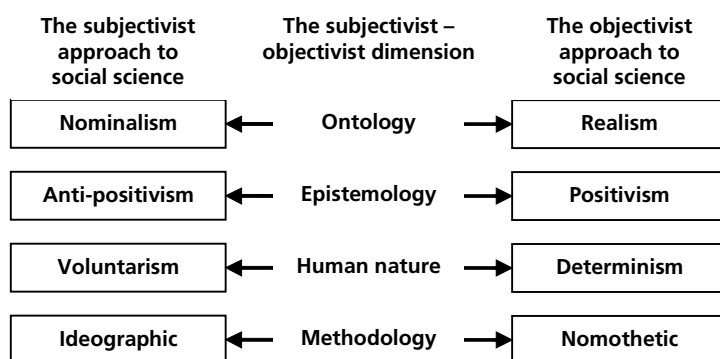


Figure 3.1: The subjective – objective dimension (Burrell and Morgan, 1979, p 3).

In the “*human nature debate*” voluntarism states that man is autonomous and free-willed and determinism regards man and his activities as being determined by the situation or environment in which he is located (Burrell and Morgan, 1979, p 6). In the “*methodological debate*” ideographic approach means that one can only understand the social world by obtaining first-hand knowledge of the subject under investigation and therefore one must get close to one’s subject and explore its detailed background and life history, while the nomothetic approach emphasises the importance of basing research upon systematic protocol and technique and epitomised in the approach and methods employed in the natural sciences, which focus upon the process of testing the hypotheses in accordance with the canons of scientific rigour (Burrell and Morgan, 1979, p 7).

In addition to the subjectivist – objectivist dimension, Burrell and Morgan (1979, p 16) introduce the regulation – radical change dimension. In combination, these

two dimensions define the four paradigms of the social sciences (Burrell and Morgan, 1979, p 23). Using a similar structure, (Arbnor and Bjerke, 1997, p 27) identify six social science paradigms on a scale from subjectivist-relativistic, which is about understanding (interpreting) reality, to objectivistic-rationalistic, which is about explaining reality. The “*understanding knowledge*” created at the subjectivistic end of the scale is referred to as “*hermeneutics*”, whereas the “*explanatory knowledge*” created at the objectivistic end is called “*explanatics*”, and “*hermeneuticists*” (interpreters) claim that “*there is a decisive difference between explaining nature and understanding (interpreting) culture*” (Arbnor and Bjerke, 1997, p 45).

Gummesson (2000, p 18) uses the concept of paradigm to “*represent people’s value judgments, norms, standards, frames of reference, perspectives, ideologies, myths, theories, and approved procedures that govern their thinking and action*” and goes on to state that “*in science, a paradigm consists of the researcher’s perception of what one should be doing and how one should be doing it. In other words, what are the interesting research problems and which methodological approach can be used to tackle them?*” While a paradigm does not change particularly often, an operative paradigm, which consists of “*methodological procedures*” and “*methodics*”, may do so, “*depending on the shifting character of the study area and the type of operative paradigm in question*” (Arbnor and Bjerke, 1997, p 14). This view of paradigm and operative paradigm and the connection between them is illustrated in Figure 3.2.

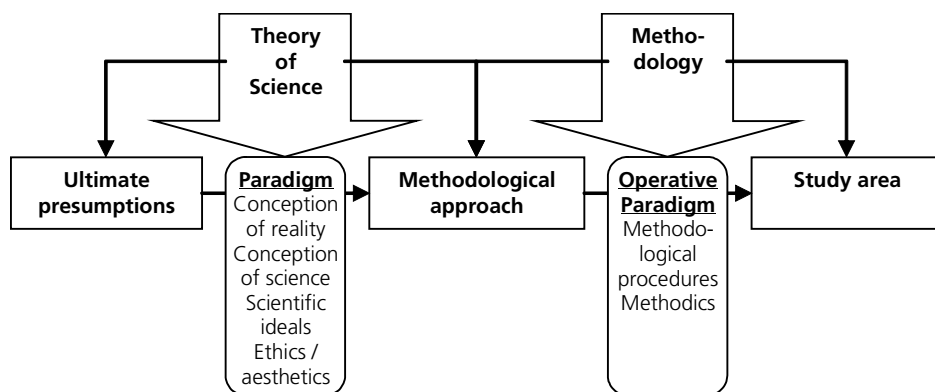


Figure 3.2: Methodology (Source: Arbnor and Bjerke, 1997, p 17).

According to Arbnor and Bjerke (1997, p 16-17), methodology is “*the understanding of how methods are constructed*” or “*how an operative paradigm is developed*”; and the operative paradigm “*relates the methodological approach to a specific area of study*”. In social research, methodologies can broadly be categorised as either qualitative or quantitative (Silverman, 2006, p 15). Features that are claimed to be associated with qualitative methods are: soft, flexible, subjective, political, case study, speculative and grounded; whereas the corresponding features

for quantitative methods are: hard, fixed, objective, value-free, survey, hypothesis testing and abstract (Silverman, 2006, p 35). The positivist paradigm underlies the quantitative methods, while the constructivist paradigm underlies the qualitative methods (Tashakkori and Teddlie, 1998, p 3). According to Tashakkori and Teddlie (1998, p 3), the last three decades of the 20th century saw several debates (wars) “*regarding the superiority of one or the other of the two major social science paradigms*”, i.e. the positivist-empiricist approach and the constructivist-phenomenological orientation, and the end of the paradigm wars saw the emergence of mixed methods and mixed methodology. The emerging pragmatist paradigm, in which the enforced choice between positivism and constructivism is rejected in favour of embracing both points of view, underlies the mixed methods (Tashakkori and Teddlie, 1998, p 22-23). While mixed methodology utilises qualitative and quantitative methodology, multimethodology is the combination of methodologies (Mingers, 2003), but not necessarily from both qualitative and quantitative methodology.

The concepts of ontology and epistemology are related to the individual (Arlbjørn and Halldórsson, 2002), and in line with Gummeson (2000, p 18), it is appropriate for the author to summarise his educational and professional background in order to present his research paradigm. The author holds a Master of Science (MSc) in Industrial Engineering (IE) and Management and an MSc in Military Operational Research (MOR). Hence, the theoretical education is in engineering, i.e. within the positivist paradigm from the natural sciences, and predominantly useful for quantitative problems in mechanical and natural systems. However, the author has nigh on two decades experience of working with MOR in practise, which has for the most part involved qualitative problems in social systems, requiring an interpretivistic paradigm from the social sciences. As a consequence, in line with Alvesson and Sköldberg (2000, p 4), the author has reached the conclusion that both positivistic quantitative and interpretivistic qualitative methodologies have their merits in different situations and for different types of problems. In order to be professional as an Operational Researcher (OR), it is necessary to have both qualitative and quantitative methods in the toolbox, and the necessary knowledge and experience to know why, when, where, how and with whom to use what. Hence, in line with Tashakkori and Teddlie (1998, p 22-23), the author considers himself to be a pragmatist that utilises quantitative methodology from the positivistic natural sciences, qualitative methodology from the interpretivistic social sciences, mixed methodology, or multimethodology (e.g. methodological triangulation) depending on which problems that are to be addressed, resource restrictions in forms of available time and money, etc.

Using the dimensions (see Figure 3.1) proposed by Burrell and Morgan (1979, p 3), the author would place himself somewhere in the middle of the road in the

ontological debate, i.e. between nominalism and realism; far left in the epistemological debate, i.e. quite close to anti-positivism; far left in the human nature debate, i.e. quite close to voluntarism; and to the left of the middle in the methodological debate, i.e. a slight preference for the ideographic approach. Being a pragmatist, the author would position himself on the scale from subjectivist-relativistic to objectivistic-rationalistic (Arbner and Bjerke, 1997, p 27) depending on the research problem at hand, but normally most likely closer to the subjectivist-relativistic end of the scale when investigating social systems, where human participation and interaction are significant aspects.

3.3 Research Approach

A research project will involve the use of theory, which may or not be made explicit in the design of the research, although it will usually be made explicit in the presentation of the findings and conclusions (Saunders *et al*, 2009, p 124). According to Spens and Kovács (2006), there are two general research approaches, deduction and induction. Deduction is about *testing theory*, i.e. testing a proposition about the relationship between two or more constructs (see Section 4.2), whereas induction is about *building theory* (Saunders *et al*, 2009, p 124). Inductive research is normally qualitative, “*since we in this context make conclusions from specific observations to general statements*” (Arlbjørn and Halldórsson, 2002).

According to Lambert (2007), “*deductive reasoning begins with an abstract concept and then tests that concept with empirical evidence*”, and “*support for the concept is achieved if data collected from observations are consistent with the proposed concept*”; whereas “*inductive research creates grounded theory by beginning with data collection and then making generalisations and inferring theories based on the observations*”, and “*should begin with no preconceived ideas of what will be found*”.

“*Theory-building research is begun as close as possible to the ideal of no theory under consideration and no hypotheses to test. Admittedly, it is impossible to achieve this ideal of a clean theoretical slate. Nonetheless, attempting to approach this ideal is important because preordained theoretical perspectives or propositions may bias and limit the findings. Thus, investigators should formulate a research problem and possibly specify some potentially important variables, with some reference to extant literature. However, they should avoid thinking about specific relationships between variables and theories as much as possible, especially at the outset of the process*” (Eisenhardt, 1989). While Eisenhardt (1989) is an advocate of an inductive research approach for building theories from case study research, Yin (2009, p 57) on the other hand, starts the case study method with the development of theory, which is a deductive research approach.

In addition to *deduction* and *induction*, Aristotle also identified *abduction* (which should have been called *retroduction*, but for a misunderstanding due to corrupt text²⁵) as three fundamentally different kinds of reasoning in science, and also identified *analogy*, which “combines the characters of induction and retroduction” (Kovács and Spens, 2005). According to Kovács and Spens (2007): in the positivistic paradigm, researchers are restricted to using the deductive research approach; in the interpretivistic paradigm, researchers are restricted to using the inductive research approach; whereas in the scientific realistic paradigm, researchers are free to use the deductive, the inductive or the abductive research approaches.

As a professed pragmatist (see Section 3.2), this author is free to select any research approach that seems contextually appropriate, and has elected to use abduction rather than any of the two exaggerated alternatives deduction or induction. In Figure 3.3, the abductive research approach used in the reported research, and the different research purposes (see Sections 1.4 and 1.6) in the different phases of the research is schematically illustrated.

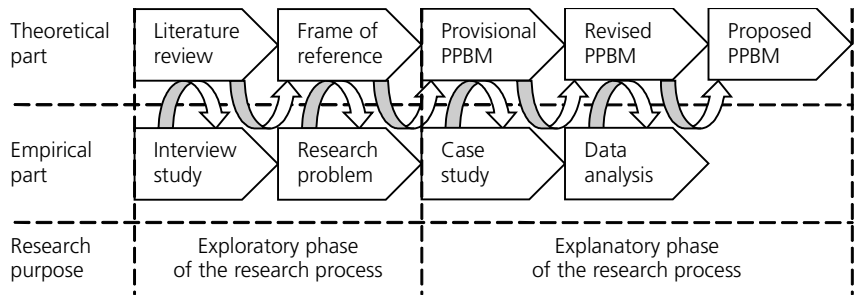


Figure 3.3: A schematic illustration of the abductive research project.

As illustrated in Figure 3.3, the research has had different types of research purposes and moved back and forth between empery and theory throughout the research project, thus indicating an abductive research project. With an explorative research purpose, initially, a literature review was conducted in order to produce the frame of reference (see Chapter 4), and, in parallel, an interview study was conducted at FMV in order to define the research problem (see Chapter 2). The frame of reference and the research problem definition then provided the necessary input to the explanative phase of the research project, in order to, based on theory and empery, create a provisional Public Private Business Model (PPBM, see

²⁵ Kovács and Spens (2012, pp. 459-460), argue that there *is* a difference between abduction and retroduction. However, in this thesis, abduction and retroduction are treated as synonyms.

Section 4.12), i.e. a provisional answer to Research Question 1 (RQ 1, see Section 1.6), and design the case study (see Section 3.5.2), including an interview study that was conducted at DE&S. The case study provided raw data and input that could be used to revise the PPBM. Finally, the analysis of the raw data provided input in order to answer RQs 1, 2 and 3 (see Section 1.6), including to revise the PPBM even further, into the version that is proposed in Section 8.2.

3.4 Research Strategy

That a specific qualitative, quantitative or mixed methodology has to be selected for the research is clear, but first of all, the type of qualitative, quantitative or mixed research methodology has to be decided. The selection of type of research methodology is equivalent to the selection of a research approach (Silverman, 2006, p 15; Creswell, 2007, p 5), a research strategy (Eisenhardt, 1989; Yin, 2003a, p 1; Saunders *et al*, p 141), a research design (Creswell, 2009, p 3) or even a research method (Yin, 2009, p 3) depending on the contributing author, and on when the contribution was made. The much quoted Yin (2003a, p 1; and 2009, p 3) has had an epiphany and changed his mind from strategy to method. In the title of the section “*strategy*” is used, but “*approach*” could easily have sufficed instead. However, “*approach*” was used in the previous section in order to describe something else. Regardless of title, this section reports on the selection of type of research methodology.

According to Arbnor and Bjerke (1997, p 26) a methodological approach “*is a set of ultimate ideas about the constitution of reality, the structure of science, scientific ideals, and the like*”. Arbnor and Bjerke (1997, p 49) distinguish between three different methodological approaches: the analytical, the systems and the actors approach; which are connected to the six social science paradigms previously mentioned. The actors approach is about “*hermeneutics*” and is in the subjectivistic end of the paradigmatic categories; the analytical approach is about explanatics and is in the objectivistic end of the scale; the systems approach is in the middle of the spectrum, overlapping the actors approach, but mostly overlapping the analytical approach (Arbnor and Bjerke, 1997, pp. 44-47). The systems approach is pragmatic in nature, and “*the search for an absolute truth is replaced by the search for a problem solution that works in practise*” (Gammelgaard, 2004). Silverman (2006, p 15) suggests that research design should be thought of in terms of how *useful* a particular approach is for a particular research topic and states that “*Methodologies cannot be true or false, only more or less useful*”; even so, “*the goal is to avoid gross misfits – that is, when you are planning to use one type of method but another is really more advantageous*” (Yin, 2009, p 8). Saunders *et al* (2009, p 141) expand on the suggestion by Yin (2009, p 8), i.e. experiment, survey, archival analysis, history,

and case study; and add action research, grounded theory and ethnography to the list of available research strategies. While recognising that *“Those undertaking qualitative studies have a baffling number of choices of approaches”*, for qualitative inquiry, Creswell (2007, pp. 6-10), propose: narrative research; phenomenology; grounded theory; ethnography; and case study. According to Silverman (2006, p 37), methods of quantitative research include social survey, experiment, official statistics, *“structured”* observation, and content analysis.

According to Yin (2003a, p 1), each research strategy has advantages and disadvantages depending on three conditions: the type of Research Question (RQ), the control the investigator has over actual behavioural events, and the focus on contemporary as opposed to historical phenomena. Depending on these conditions, different research strategies will be most suitable. Sometimes all research strategies may be relevant, sometimes two strategies are equally attractive, but in some circumstances one specific strategy has a distinct advantage (Yin, 2003a, 9). In the reported research, the primary RQ is *“a “how” question”* which *“is being asked about a contemporary set of events, over which the investigator has little or no control”*. In such circumstances the case study is the research strategy that has the distinct advantage (Yin, 2009, pp. 14-15). Hence, the research strategy selected for the reported research was (explanatory) case study research.

Yin (2009, p 18) provides a *“two-fold, technical definition of case studies”*: *“A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”*; and *“The case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis”*.

According to Remenyi *et al* (1998, p 165), *“the case study is independent of research strategy”* (approach) *“and thus may be used with positivistic oriented tools of analysis or with a more phenomenological approach”*. Hence, the case study research approach should not be regarded as an approach at all. However, in line with Silverman (2006, pp. 18-19), the author will consider case study research as a methodology (approach, strategy) that, using the methods of observation, textual analysis, interviews, and audio and video recording, can be used for either qualitative or quantitative research studies. According to Yin (2009, p 19), *“any contrast between quantitative and qualitative evidence does not distinguish the various research methods”*. According to Remenyi *et al* (1998, pp. 164-165), case studies can contribute to the body of knowledge either used as a device for the collection of evidence, or as a narrative. In the first case, *“the evidence may be analysed from either a positivistic or a phenomenological perspective and subsequently synthesised in such a*

way as to produce a theoretical conjecture or even be used as evidence to support or contradict an already established theory” (Remenyi *et al*, 1998, p 164). The phenomenological (interpretivistic, constructivistic), non-positivistic, qualitative perspective is used in the reported research; for research design, data collection and for data analysis (see Section 3.5).

3.5 Research Methodology

Regardless of the type of case study; qualitative or quantitative; or explanatory, exploratory or descriptive; “investigators must exercise great care in designing and doing case studies to overcome criticisms of the method” (Yin, 2003a, p 1). “Using case studies for research purposes remains one of the most challenging of all social science endeavours” (Yin, 2009, p 3).

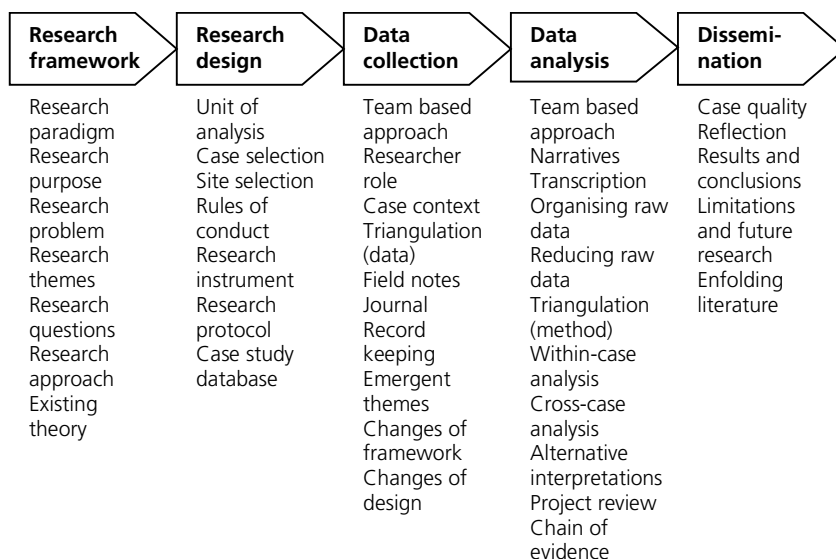


Figure 3.4: A rigorous case based research methodology (Source: Ekström *et al*, 2009).

Several, more or less elaborate, and more or less explicit, case study research methodologies, approaches, research process models, and/or frameworks have been suggested in the literature over the last two decades, ranging from a three-step rigorous case research approach (Näslund, 2008, p 106), to an eight-step theory-building roadmap (Eisenhardt, 1989). A majority of the presented methodologies tend to have either four stages (e.g. Ellram, 1996; Riege, 2003; Pare, 2004; and Meyrick, 2006), or five stages (e.g. Benbasat *et al*, 1987; Darke *et al*, 1998; Stuart

et al, 2002; Cepeda and Martin, 2003; and Seuring, 2008). The different methodologies are all sequential in nature, i.e. describe stages that have to precede subsequent stages, even if some authors acknowledge the possibility that some stages may be executed in parallel, rather than purely sequential. Some authors (e.g. Cepeda and Martin, 2003; and Yin, 2009, p 1) also emphasise that case based research is an iterative, recursive process. Another common denominator is that most of the authors agree on three stages of the process, i.e. research design, data collection, and data analysis, even if they do not agree on names and contents for these three stages. The major disagreement between the different authors concerns whether or not there are stages before and after these three stages, and, if there are, what these stages should be called and what they should contain. Ekström *et al* (2009) analysed 116 peer-reviewed articles dealing with quality criteria, methodologies, approaches, research process models, and frameworks for rigorous case based research; and, using a divisive and agglomerative, Qualitative Cluster Analysis (QCA) approach, synthesised the results into a five-stage methodology for rigorous case based research design and analysis, which is illustrated in Figure 3.4. The five stages of the rigorous case based research methodology are: research framework, research design, data collection, data analysis and dissemination. In Sections 3.5.1 – 3.5.5, these five stages will be addressed and the methodology used for the reported research will be described.

3.5.1 Research Framework

Ekström *et al* (2009) made an extensive literature study in order to produce a framework for case based research and identified seven components of a generic research framework, i.e. a framework that is valid regardless of research methodology: research paradigm; research purpose; research problem; research themes; RQs; research approach; and existing theory. All of these research framework components are addressed elsewhere in this thesis.

The research paradigm is presented in Section 3.2. The research purpose is presented in Section 1.4. The research problem is presented in Chapter 2, particularly in Section 2.6, and summarised in Section 1.3. The research themes, i.e. the key constructs and the propositions, are presented in Sections 4.11 and 4.13. The RQs are presented in Section 1.6. The selection of research approach is presented in Section 3.3, whereas the selection of research strategy is presented in Section 3.4. The connection between the performed research and existing theory is presented in Section 4.4, the existing theory is presented in Sections 4.5 – 4.10, the identified theoretical gaps are presented in Section 4.13 and the contributions to theory are summarised in Section 10.3.

3.5.2 Research Design

As illustrated in Figure 3.4, the case based research design consists of seven components: unit of analysis; case selection; site selection; rules of conduct; research instrument; research protocol; and case study database. Central aspects of the research design, i.e. RQs, the unit of analysis, the type of case study, the case and the site, are summarised in Table 3.1.

Table 3.1: Summary of central aspects of the research design.

Research questions	RQ 1: How can a generic Business Model for a non-profit, governmental, defence procurement agency be described? RQ 2: Which strengths and weaknesses do different Business Models have in the context of defence acquisition? RQ 3: Which risks are associated with different Business Models in the context of defence acquisition?
Unit of analysis	Public Private Business Model (PPBM)
Type of case study	Qualitative, explanatory, holistic multiple case study
Case	Defence acquisition project
Site	MoD Defence Equipment and Support (DE&S), Bristol, UK

In Section 1.6, three Research Questions (RQs, see Table 3.1) were defined based on the formulation of the research problem. According to Yin (2009, p 30), *“Selection of the appropriate unit of analysis will start to occur when you accurately specify your primary Research Questions. If your questions do not lead to the favouring of one unit of analysis over another, your questions are probably either too vague or too numerous”*. The formulation of the primary RQ, i.e. RQ 1, led to the selection of Public Private Business Models (PPBMs) as the single, i.e. holistic (Yin, 2009, p 50), unit of analysis, since it was decided that this unit of analysis would be best suited to answer the RQs. The selection of the PPBM as the unit of analysis is in line with the findings of Zott *et al* (2010); *“there is a widespread acknowledgement – implicit and explicit – that the Business Model is a new unit of analysis in addition to the product, firm, industry, or network levels; it is centred on a focal organisation, but its boundaries are wider than those of the organisation”*. Changes in the research design, due to discoveries during the data collection, are quite permissible in case based research (Yin, 2009, p 30). Changes in the unit of analysis during the course of the research (units may be added, deleted, downsized or upsized) are of potential interest, *“since the reason for the changes may add to both the scientific and practise knowledge”* (Näslund, 2008, p 107). However, the unit of analysis remained unchanged throughout the research.

To define the *“unit of analysis”* is difficult. However, things do not start to get really complicated until entering the quagmire regarding definitions of what a *“case”*, a *“case study”*, and *“case study research”* really is. *“Part of the confusion surrounding case studies is that the process of conducting a case study is conflated with both the unit of the study (the case) and the product of this type of investigation”* (Merriam, 1998, p 27). While not necessary to recapitulate all perspectives of what

a “case”, “case study”, and “case study research” really is, it is essential to declare the author’s position in this regard, prior to selecting a case and conducting the case based research, which means that it is prudent to present a few suggested definitions and interpretations. A case has been proposed to be the “*Object of study*” (Stake, 1995, p 2), “*The unit of analysis*” (Miles and Huberman, 1994, p 25), or a “*Bounded system*” (Creswell, 2007, p 73), which means that some commentators are of the opinion that there is no difference between the case and the unit of analysis; a notion that this author finds it hard to subscribe to. Furthermore, a case study is “*not a methodological choice but a choice of what is to be studied*” (Stake, 2000, p 435), “*both a process of inquiry about the case and the product of that inquiry*” (Stake, 2000, p 436), “*a strategy of inquiry in which the researcher explores in depth a program, event, activity, process, or one or more individuals*” (Creswell, 2009, p 13), or “*an empirical study that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident*” (Yin, 2003, p 13), depending on the author. “*The basic idea is that one case (or perhaps a small number of cases) will be studied in detail, using whatever methods seem appropriate. While there may be a variety of specific purposes and Research Questions, the general objective is to develop as full an understanding of that case as possible*” (Silverman, 2008, p 126).

The following quote summarises the author’s understanding of what case studies are all about (Eisenhardt, 2002, pp. 8-9): “*The case study is a research strategy which focuses on understanding the dynamics present within single settings. Case studies can involve either single or multiple cases, and numerous levels of analysis*”. “*Moreover, case studies can employ an embedded design, that is, multiple levels of analysis within a single study*”. “*Case studies typically combine data collection methods such as archives, interviews, questionnaires, and observations. The evidence may be qualitative (e.g., words), quantitative (e.g., numbers), or both. Finally, case studies can be used to accomplish various aims: to provide description, test theory, or generate theory*”. After some deliberation, the case was decided to be a defence acquisition project.

Given the research problem, the research purpose, the RQs, the unit of analysis and the case; the potential sites for the reported research were limited, even in a global perspective. Only a handful of nations have come far enough in their development in order to provide the necessary data. Out of these few countries, the US and the UK are probably the most relevant countries to study. The UK MoD was selected as the single site for data collection. A single site was selected because of the resource restrictions for this licentiate research project. Because of the same limitations, a site in Europe was preferable because of the advantageous proximity to Sweden. The UK MoD was selected as the site for data collection since the UK is, arguably, exceptional in Europe in the sense that it has developed the furthest in the direction of contemporary trends (i.e. increasing effectiveness and efficiency

through, e.g., outsourcing to the private sector, private sector financing and partnering with the private sector) and, presumably, has produced the most relevant lessons to be learned in these areas. The UK is also unique in Europe because of the multitude and accessibility of governmental evaluations and reports, and of academic research that has been performed and published, which provides ample opportunities for collection of secondary data to complement the primary data that, e.g., an interview study can produce. In comparison to the US, which has also come a long way in its transformational development, the scale in the UK is more reasonable and comparable to Sweden, and the driving forces behind change in the UK are likely to be more similar to Sweden than those in the US.

The reported research was performed in the military domain, which means that the issue of access to potential sites for an interview study is relevant. Access, if granted at all, is bound to be given with several restrictions. In this case, the author was escorted at all times when on the premises of the UK MoD Defence Equipment and Support (DE&S, see Section 5.4). Also the issue of trust is paramount in the military context. The respondent must feel confident that the data collected will be handled responsibly by the researcher and that anonymity is guaranteed when so required, etc. In this case, the necessary trust was established by guaranteeing anonymity to the respondents, by offering the respondents to validate the transcribed interviews, and by allowing the respondents to read the case description and being open to their comments and suggestions for improvement.

For the conducted research four cases were selected, i.e. a multiple-case design (Yin, 2009, p 53). This number of cases was selected for several reasons. First of all, it was decided that a multiple case study would increase the possibility of generalisability (Ellram, 1996), more specifically analytic, *not* statistical, generalisability (Yin, 2009, p 38). Secondly, a representative of FMV had identified a Master of Science (MSc) Thesis (Roberts, 2004) from the Royal Military College of Science (RMCS), Cranfield University, which used eight cases to investigate the role of outsourcing in the UK MoD. According to the FMV representative those cases were all relevant to FMV, since FMV would face similar procurement situations in the near future. Hence, when approaching the UK MoD, the author explicitly asked for interviews with representatives of the Integrated Project Teams (IPTs) that had participated, with different roles, in these eight procurement projects. The author was offered to interview representatives of four of these IPTs. Furthermore, because of limitations regarding resources, i.e. time and money, it was not possible to include more cases in the study. Because of the same restrictions, no pilot case was used. The cases were all current and retrospective in nature. For multiple-case studies literal or theoretical replication, not sampling logic is used (Yin, 2009, p 54). The selection of cases can be regarded as literal replication, since the cases are expected to produce similar results, rather

than contrasting results for anticipatable reasons. In summary, the case study is a holistic multiple-case study design, i.e. a Type 3 design (Yin, 2009, pp. 46-47).

A research instrument was used and it consisted of an interview guide (see Annex B) for the semi-structured interviews at DE&S. The data collected were answers to open-ended questions regarding the acquisition process in general, and activities, actors, relationships, roles, responsibilities, and resources in particular, and issues of trust, longevity of relationships, risk sharing, reward sharing, and information sharing. The design of the interview guide was a funnel model, which is the most common of all question sequences for all types of interviews. In this sequence, the interviewer begins with broad, open-ended questions and moves to narrower, closed-ended questions. The interviewer may also begin with more general questions and gradually ask more specific questions. Because of limitations in available time, piloting (including the interview guide), was not used.

The semi-structured interviews with representatives of four defence acquisition projects were conducted by the author over a period of four days. The respondents were not selected by the author, but provided by DE&S. The respondents, or informants (Yin, 2009, p 107), were, however, senior officials, knowledgeable regarding their respective defence acquisition projects, holders of prominent positions in their IPTs and are to be regarded as key informants. The author conducted the interviews alone, and took notes during the interviews and recorded the interviews (using a digital audio recording device) in order not to miss any important information. The author did not use any pilot interviews. Consequently, the complexity outlined above was not great enough to necessitate an elaborate case study protocol (Yin, 2009, pp. 79-90) with procedures, rules, and guidelines for how the research instrument should be used. Nevertheless, the author used a less sophisticated case study protocol, consisting of standardised information regarding the case study to convey to the respondents, the case study questions, etc.

A case study database (Yin, 2009, pp. 118-122) was used throughout the duration of the research project. In this case data base, everything related to the case studies, e.g. research instrument, case study protocol, digital audio recordings of interviews, transcripts of interviews, a digital journal with ideas for analysis etc., monthly updated versions of the emerging thesis, individual files for all figures and tables to be used in the thesis, individual files for those parts of the thesis that were eliminated from the thesis, and the digitised part of the secondary data, i.e. documents and archival records, relating to the cases, were saved. The author kept the original files on an encrypted memory stick with password access only, and kept frequently updated security back-ups on two hard drives, and on his employer's server, in order to avoid losing the files.

3.5.3 Data Collection

As illustrated in Figure 3.4, data collection consists of ten components: team based approach; researcher role; case context; data triangulation; field notes; journal; record keeping; emergent themes; changes of framework; and changes of design.

This thesis reports on a licentiate research project performed by the author. Consequently, there was no team based approach in the collection of data. The interviews were performed on three visits to DE&S headquarters in Bristol, UK in 2010. On these visits four 90 minute interviews were conducted, two on the 29th of September, one on the 30th of September, and two on the 1st of October. Consequently, the role of the researcher was that of an outside interviewer and the influence on the organisation was minimal.

Yin (2009, p 101) proposes three principles of data collection that are “*extremely important for doing high-quality case studies*”: using multiple sources of evidence; creating a case study database (see Section 3.5.2); and maintaining a chain of evidence (see Section 3.5.4). Case study evidence can come from many sources, e.g. documentation, archival records, interviews, direct observation, participant-observation, and physical artefacts (Yin, 2009, p 99). In the reported research, interviews, archival records and documents were used. Primary data was collected through the interviews that at DE&S. The interviews were focused and semi-structured, not in-depth or structured (Yin, 2009, p 107). In order to enable data triangulation²⁶, secondary data was also collected. The sources for secondary data included: archival data from governmental authorities in the UK, such as MoD (Ministry of Defence), HMT (Her Majesty’s Treasury) and NAO (National Audit Office), and from prime contractors such as ALC, MBDA and Multipart Defence; academic research reports from, e.g., Cranfield University, i.e. the Defence Academy of the UK; and peer-reviewed articles from several journals in the field of defence acquisition, military logistics, logistics, Supply Chain Management (SCM), Operations Management (OM), etc. Data triangulation is desirable in order to have multiple sources of data contribute to converging lines of inquiry.

Since the interviews were conducted over a period of only a few days; and since the visits to DE&S did not include direct or participant observations; field notes (for observations, etc.) and record keeping (for documentation of performed interviews; keeping track of when sites were visited; etc.) were not deemed to be necessary. However, the author did keep a digital journal where thoughts and ideas, including

²⁶ In addition to data triangulation (multiple sources of evidence), there are also other forms of triangulation; investigator triangulation (multiple researchers), theory triangulation (multiple perspectives to the same data set), and methodological triangulation (Yin, 2009, p 116).

ideas for analysis of the individual cases, emergent cross-case patterns, etc., were documented as they surfaced as “*Eureka-moments*”.

There were no emerging research themes throughout the research. Consequently, changes of the research framework or the research design were not required for this reason. However, two of the original four Research Questions (RQs) had to be changed, since it became clear that the selected cases would not provide answers to these questions. The *original* RQs 3 and 4 were formulated as:

- Research Question 3: Which incentive mechanisms can be used in order to manage the fragmented military supply and support networks?
- Research Question 4: Which incentive mechanisms can be used in order to manage risk in the fragmented military supply and support networks?

Hence, based on the problem formulation (see Chapter 2), which in turn was based on the Swedish perspective, RQs 3 and 4 presupposed that there would be a fragmentation (see Section 4.8.7) of the military supply and support chains. However, in the UK, with the introduction of the Purple Gate (PG), the Coupling Bridge (CB), and the Joint Supply Chain (JSC), the UK no longer allows fragmentation of its supply chain, and with the introduction of Sponsored Reserves (SRs), the UK no longer allows fragmentation of its support chain (see Section 4.8.7). As a consequence, it soon became clear that it was impossible to answer RQs 3 and 4 in the UK context. Therefore, the original RQs 3 and 4 were exchanged for the current RQ 3 at a relatively late stage in the research project. In retrospect, the formulation of the new RQ 3 was not without problems, since it proved more difficult than anticipated to separate “*Business Model weaknesses*” from “*Business Model risks*” (see Section 1.6 or Section 3.5.2), i.e. to separate RQ 2 from the new RQ 3. While it proved difficult and time-consuming to gain access to the required site, i.e. DE&S, this did not require any changes of the research framework. Furthermore, no changes of the research design were necessary because of the changes of the original RQs 3 and 4.

3.5.4 Data Analysis

As illustrated in Figure 3.4, data analysis consists of eleven components: team based approach; narratives; transcription; organising raw data; reducing raw data; methodological triangulation; within-case analysis; cross-case analysis; alternative interpretations; project review; and chain of evidence. Data analysis in case based research is complex and “*The analysis of case study evidence is one of the least developed and most difficult aspects of doing case studies*” (Yin, 2009, p 127).

This thesis reports on a licentiate research project performed by the author. Consequently, there was no team based approach in the analysis of the data. In

order to mitigate the risk of inexperience, prior assumptions and biases negatively influencing the research results, project reviews were used in the research project. Consequently, the research design and preliminary research results were presented to colleagues at LTH, FOI, FHS, FMV, the Swedish Armed Forces, Dstl and CfDA in different stages of maturity. The feed-back from the participants at these presentations has substantially increased the quality of the written presentation of research design, data analysis and the research results. Another aspect of the project review has been that the respondents were offered to give feed-back on transcripts of interviews and draft reports. However, only one of the case descriptions (Case A) benefited through feed-back from the respondent. In addition, a number of representatives from LTH, FOI, FMV and the Swedish Armed Forces have been given monthly updates of the progress of the written findings, i.e. the progress of the thesis. On a couple of occasions this has resulted in improvements of the thesis, since errors and misinterpretations have been detected and subsequently corrected.

Yin (2009, pp. 130-134) describes four general strategies for telling the story of the case study: relying on theoretical propositions; developing a case description; using both qualitative and quantitative data; and examining rival explanations. In the reported research a combination of three of these strategies has been used: theoretical propositions are formulated; case descriptions are developed; and rival explanations to findings are examined. The case descriptions were based on a descriptive framework, where the theoretical propositions provided the essential structure. However, first of all, the author transcribed the interviews, and the respondents were offered to review the transcriptions, but they all declined. The author then used narratives, i.e. "*rich*", or "*thick*", descriptions, including quotations from the interviews, in the case descriptions, in order to provide a case context for the research themes. The respondents were offered to review the narratives, but only the respondent in Case A (C Vehicles) provided any feed-back (which was subsequently used to further increase the quality of the case description). The raw data was organised in accordance with the research themes in the case descriptions. In addition, the distribution channels were graphically displayed (see, e.g., Figure 6.2) and the sharing of responsibilities between the public and the private sector were tabulated (see Table 4.18) in the case descriptions. Some of the raw data that did not fit into the structure of the presentation, i.e. research themes, graphical displays and tabulation, was included in the case descriptions in order to ensure the "*rich*"/"*thick*" case context, while some data, with little or no bearing on any of the research themes, were excluded from the case descriptions.

Yin (2009, pp. 136-160) proposes five analytic techniques for analysing case study evidence: pattern matching, explanation building, time-series analysis, logic models and cross-case synthesis. In this thesis pattern matching, explanation building and

cross-case synthesis were used. The RQs were used to structure the within-case analyses. The analyses were then performed differently, depending on the RQs. For RQ 1, which is partially answered in Section 4.12 where the generic Public Private Business Model (PPBM, see Table 4.23) is created, the purpose of the within-case analysis was to test the proposed PPBM through an analysis of seven of its building blocks and an analysis of its applicability. Consequently, the PPBM was used as an analysis model. The analytic technique used in the within-case analysis for RQ 1 was pattern matching, in which the logic is to compare an empirically observed pattern with a theoretically predicted one (Yin, 2009, p 136). The predicted pattern was the hypothesis that the analysis would confirm propositions 1, 2 and 3 (see Section 4.13.1), and propositions 8 and 9 (see Section 4.13.2). In the within-case analyses, the BM configurations are tabulated (see, e.g., Table 7.4). Since several of the building blocks are configurations in themselves, the configuration of the four most differentiating building blocks is also tabulated (see, e.g., Table 7.5).

For RQs 2 and 3, the analytic technique used in the within-case analysis was explanation building, which is a special type of pattern matching, where *“the goal is to analyse the case study data by building an explanation about the case”* (Yin, 2009, 141). In order to analyse RQs 2 and 3, two different models for analysis were created. In Section 4.14 a model for analysis of acquisition project performance (connected to RQ 2) is presented, and in Section 4.15 a model for analysis of acquisition project risks (connected to RQ 3) is presented. In the within-case analyses, the model for analysis (see Table 4.24) of RQ 2 is used to analyse the acquisition project performance, i.e. the effectiveness (the specific availability target, and the more generic goals of reduced delivery time, reduced delivery cost, and increased delivery quality) and the efficiency (i.e. Value-for-Money, VfM), for each of the different cases, and to identify any particular strengths and/or weaknesses that are inherent in the utilisation of the underlying BMs. The predicted pattern was the hypothesis that the analysis would confirm propositions 4 and 5 (see Section 4.13.1). In the within-case analyses, the acquisition project performance is tabulated, using text to describe strengths and weaknesses (see, e.g., Table 7.6) and using the assessment of performance described below (see, e.g., Table 7.7). A summary of major strengths and weaknesses of the BM is also tabulated (see, e.g., Table 7.8).

Acquisition project effectiveness is evaluated on a three grade scale to be either *“High”*, *“Medium”* or *“Low”*. *“High”* effectiveness is defined as *“all four goals are achieved”*, *“Medium”* effectiveness is defined as *“two or three goals are achieved”* and *“Low”* effectiveness is defined as *“none or one of the goals are achieved”*. In order for a defence acquisition project to be 100% effective, there must be a 100% match between the actual output and the expected output. Similarly, acquisition project efficiency, or Value-for-Money (VfM), is evaluated on a three grade scale to be

either “*High*”, “*Medium*” or “*Low*”. “*High*” efficiency is defined as “*all four goals were achieved and could not have been achieved at a lower cost*”, “*Low*” efficiency is defined as “*none or one of the goals is achieved*” and “*Medium*” efficiency is defined as consisting of “*all other combinations of goal fulfilment and cost*”. In order for a defence acquisition project to be 100% efficient, there must be a 100% match between the resources expected to be consumed and the resources consumed. Performance is a combination of effectiveness and efficiency. Hence, acquisition project performance is evaluated on a five grade scale to be either “*Good*”, “*Above average*”, “*Average*”, “*Below average*” or “*Poor*”, which is illustrated in Table 3.2.

Table 3.2: A model for the evaluation of defence acquisition project performance.

Effectiveness	High	Average Performance	Above average Performance	Good Performance
	Medium	Below average Performance	Average Performance	Above average Performance
	Low	Poor Performance	Below average Performance	Average Performance
		Low	Medium	High
		Efficiency		

A prerequisite of the acquisition project performance being evaluated as “*Good*” is that both the acquisition project effectiveness and efficiency are evaluated as being “*High*” i.e. that all goals are met and that this could not have been done at a lower cost. Consequently, “*Good*” performance is not easily achievable for most defence acquisition projects, quite to the contrary; most acquisition projects are likely to be rated *above average*, “*Average*”, “*Below average*” or “*Poor*”.

In the within-case analyses, the model for analysis (see Table 4.25) of RQ 3 is used to analyse the acquisition project risks, supply chain risks and uncertainties are identified based on source (environmental, organisational, supply and demand risks) and on type (operational accidents, operational catastrophes and strategic uncertainties), for each of the different cases, and to identify any particular risks that are inherent in the utilisation of the underlying BMs. The predicted pattern was the hypothesis that the analysis would confirm propositions 6 and 7 (see Section 4.13.1). In the within-case analyses, the acquisition project risks are tabulated (see, e.g., Table 7.9). A summary of major BM risks are also the tabulated (see, e.g., Table 7.10).

In the ensuing cross-case synthesis, the objective is to ascertain whether or not there are any detectable patterns (similarities and differences) between the different BMs, i.e. the different configurations of the PPBM. Similarly as the structure of the within-case analyses, the RQs are used to structure the cross-case synthesis. The results of the analyses are then compared and synthesised in order to establish any existing common patterns among the four cases. However, in the cross-case

synthesis, corresponding to the Research Questions (RQs, see Section 1.6), it is the BM strengths, weaknesses and risks, separated from those of the contract and the context, that are compared and synthesised in order to establish common patterns among the BMs; whereas in the within-case analyses, the performance and risks of the overarching acquisition projects (see Figure 6.1) were decomposed and analysed in order to more easily identify the common denominators in the BMs in the ensuing synthesis. In the cross-case synthesis, the results regarding the BM configurations from the within-case analyses were cross-tabulated (see Table 7.32) in order to reveal patterns, i.e. in order to provide an answer to RQ 1. The configurations of the four most differentiating building blocks were also cross-tabulated (see Table 7.40). The major strengths and weaknesses for some of the different building blocks were cross-tabulated (see, e.g., Table 7.41) in order to provide an answer to RQ 2. The strengths and weaknesses for different building block configurations were then summarised and tabulated (see, e.g. Table 7.46). A similar procedure was used in order to provide an answer to RQ 3. Consequently, the major risks for some of the different building blocks were cross-tabulated (see, e.g., Table 7.51) and risks for different building block configurations were then summarised and tabulated (see Table 7.53).

The chain of evidence (Yin, 2009, p 122), also sometimes referred to as the logical chain, the audit trail or the confirmability trail, has been maintained by using the key constructs to structure the case descriptions in Chapter 6, by using the RQs to structure the within-case analyses and the cross-case synthesis in Chapter 7, by using the RQs and the propositions to structure the results with implications for theory in Chapter 8 and by using the RQs to structure the results with implications for practise in Chapter 9. The principle is to allow the reader *“to follow the derivation of any evidence from initial Research Questions to ultimate case study conclusions”* (Yin, 2009, p 122).

3.5.5 Dissemination

As illustrated in Figure 3.4, dissemination consists of six components: case quality; reflection; results and conclusions; limitations; future research; and enfolding literature. Traditional ways of evaluating research rigour have been based on quantitative, positivistic quality criteria concepts such as validity and reliability (Halldórsson and Aastrup, 2003). *“Whether quantitative or qualitative, good research design requires external validity, reliability, construct validity, and internal validity”* (Ellram, 1996). The validity in qualitative studies is *“often seen as a serious problem”* (Gammelgaard, 2004), and Halldórsson and Aastrup (2003) argue that the quality criteria should take the emerging qualitative, naturalistic approaches into account and that the quality criteria of correspondence (internal validity, reliability, external validity and objectivity) for quantitative research should be complemented with

quality criteria of trustworthiness (credibility, dependability, transferability, confirmability) for qualitative research. However, while acknowledging the existence of the logical tests of trustworthiness, credibility, confirmability, and data dependability, Yin (2009, p 40) argue that the four tests common to all social science methods, i.e. construct validity, internal validity, external validity, and reliability, are relevant also for case studies. This author has elected to use the case study tactics, see Table 3.3, as suggested by Yin (2009, pp. 41-45) for these four common tests. Table 3.3 also include answers to the question if the case study tactics have been used or not, and references to the sections where descriptions of the utilisation can be found.

Table 3.3: Case study tactics for four design tests (Source: Based on Yin, 2009, p 41).

Tests	Case study tactic	Reference to relevant section
Construct validity	Use multiple sources of evidence	Yes, see Section 3.5.3
	Establish chain of evidence	Yes, see Section 3.5.4
	Have key informants review draft case study report	Yes, see Section 3.5.4
Internal validity	Do pattern matching	Yes, see Section 3.5.4
	Do explanation building	Yes, see Section 3.5.4
	Address rival explanations	Yes, see Section 3.5.4
	Use logic models	No
External validity	Use theory in single-case studies	No, not single-case
	Use replication logic in multiple-case studies	Yes, see Section 3.5.2
Reliability	Use case study protocol	Yes, see Section 3.5.2
	Use case study data base	Yes, see Section 3.5.2

The results and implications for theory are presented in Chapter 8. In Section 8.2 a generic Public Private Business Model (PPBM) is presented and in Section 8.3, the results of testing the PPBM are presented. Through enfolding literature, the proposed frame of reference for PPBM for defence acquisition is compared to the proposed frame of reference for Procuring Complex Performance (PCP) in Section 4.16. In Section 8.4 and 8.5, the implications for Business Model (BM) theory and Public Private Participation theory are presented, whereas implications for other areas of theory, e.g. Performance Based Contracting (PBC) and PCP are addressed in Section 8.6. In section 8.7 RQs for future research are suggested.

The results and implications for practise are presented in Chapter 9. In Section 9.2, the results of the multiple case study are presented. In Section 9.3, limitations regarding generalisability, i.e. transferability, of the results and conclusions are addressed. The implications for Swedish defence acquisition are presented in Section 9.4, while the practical implications for future research are presented in Section 9.5. Finally, the conclusions and contributions to theory and practise are summarised in Chapter 10. The conclusions are summarised in Section 10.2, whereas the contributions to theory and practice are summarised in Sections 10.3 and 10.4.

4 Frame of Reference

“The misguided approach to competition that characterises business on the Internet has even been imbedded in the language used to discuss it. Instead of talking in terms of strategy and competitive advantage, dot-coms and other Internet players talk about “Business Models”. This seemingly innocuous shift in terminology speaks volumes. The definition of a Business Model is murky at best. Most often, it seems to refer to a loose conception of how a company does business and generates revenue. Yet simply having a Business Model is an exceedingly low bar to set for building a company. Generating revenue is a far cry from creating economic value, and no Business Model can be evaluated independently of industry structure. The Business Model approach to management becomes an invitation for faulty thinking and self-delusion.”

Porter (2001)

4.1 Introduction

As will become clear in Section 4.5, much has happened in the area of Business Models (BM) since the condemnation of the term (in the context of business on the Internet) by Porter (2001): BMs are *not* a substitute for business strategy; and BMs are *not* only for “dot-coms”.

In this chapter, the areas of theory that are relevant to the research are identified and described; a generic Public Private Business Model (PPBM) for defence acquisition is developed; and models for analysis of PPBM performance and PPBM risk are created. However, first of all, Section 4.2 describes what theory is, and what theory is not. The areas of theory that are relevant for the reported research are identified in Section 4.3, by analysing the research purpose in order to create the frame of reference. The theoretical areas thus identified are compared to the Research Questions (RQs, see Section 1.6) in Section 4.4 in order to establish one frame of reference for each of the three RQs:

- Research Question 1: How can a generic Business Model for a non-profit, governmental, Defence Procurement Agency be described?
- Research Question 2: Which strengths and weaknesses do different Business Models have in the context of defence acquisition?
- Research Question 3: Which risks are associated with different Business Models in the context of defence acquisition?

After these initial sections, six relevant areas of theory are described in Sections 4.5 to 4.10. In many of these areas there are neither universal, commonly agreed upon

definitions of the areas, nor any consensus of definitions of terms, concepts etc. in the areas. With the exception BMs, the author has refrained from venturing too deeply into these quagmires of academic debate and settled for including but a few of the plentiful definitions. The key constructs from these areas that are used in order to find answers to RQ 1 are presented in Section 4.11. In Section 4.12, using these key theoretical constructs and inspiration from defence acquisition practise, a frame of reference for a generic PPBM for defence acquisition is defined and a PPBM for defence acquisition is generated and presented. In Section 4.13 the theoretical research relevance for the reported research is defined. In Sections 4.14 and 4.15, models for the analysis of PPBM performance and PPBM risk are created. Finally, the emerging area of Procuring Complex Performance (PCP) is introduced in Section 4.16, and the proposed frame of reference for PPBM is compared to the proposed frame of reference for PCP.

4.2 What Theory is – And what Theory is not

“Building on the works of previous students of theory construction, researchers can define a theory as a statement of relationships between units observed or approximated in the empirical world. Approximated units means constructs, which by their very nature cannot be observed directly (e.g. centralisation, satisfaction or culture). Observed units mean variables, which are operationalised empirically by measurement. The primary goal of a theory is to answer the questions of how, when and why, unlike the goal of description, which is to answer the question of what. In more detailed terms, a theory may be viewed as a system of constructs and variables in which the constructs are related to each other by propositions and the variables are related to each other by hypotheses. The whole system is bounded by the theorist’s assumptions”.

Bacharach (1989)

The purpose of theory development *“is not to express our own ideas per se, but to advance research in a given area by making a theoretical contribution relevant to a community of scholars and the field”* Rindova (2011). There is little agreement regarding what it is that constitutes strong and weak theory in the social sciences; there is more consensus that references, data, variables, diagrams, and hypotheses are not theory; however, despite this consensus, *“authors routinely use these five elements in lieu of theory”* and even sometimes use references *“like a smokescreen to hide the absence of theory”* (Sutton and Staw, 1995). There is also more consensus that *“we should be aware of the value of theory”* and that *“there is nothing as practical as a good theory”* (Lewin, 1943). Regarding the question if too much is expected from a single attempt at theorising, it has been stated that *“if any explanation will always be deficient in one or more of the qualities of generalisability, accuracy, and simplicity, then the best we can hope for are trade-offs”* (Weick, 1995). As for the

difference between empery and theory, Sutton and Staw (1995) state that “*data describe which empirical patterns were observed and theory explains why empirical patterns were observed or are expected to be observed*”. According to Arlbjørn and Halldórsson (2002), research is primarily oriented towards theory testing or theory development, which can be referred to as research based on deduction and induction, respectively (see Section 3.3), and “*the prevailing wisdom has been that qualitative research is more useful for theory building than theory testing*” (Sutton and Staw, 1995). The density of the theory that is incorporated into the research can be “*solid*” or “*loose*” (Arlbjørn and Halldórsson, 2002), where “*solid*” theory is established theories such as Resource-Based View (RBV) and Transaction Cost Economics (TCE), and “*loose*” theory implies a description of what is going on. A combination of research orientation and density of incorporated research produces four approaches in knowledge creation, which is illustrated in Table 4.1.

Table 4.1: Four approaches in knowledge creation (Source: Arlbjørn and Halldórsson, 2002).

		Ambition	
Means	Loose theory base	Theory test	Theory development
	Solid theory base	Storytelling and/or quantitative test of known concepts Refining the existing knowledge base	Generating new concepts Expanding the knowledge base

According to Carter (2011), scholars have defined different levels of theory. A three-level classification of theories that has been proposed (reported in Halldórsson *et al*, 2007) consists of: *grand theories* (particular science with specific concepts, e.g. philosophy of science); *middle range theories* (worked connections between a set of concepts represented by socio-economic theories applied in various managerial disciplines); and *small-scale theories* (limited number of concepts presented as propositions). *Grand theories* are also referred to as “*all-inclusive systematic efforts to develop unified theory*” and “*all-encompassing theories which provide a complete picture of a phenomenon but which are often excessively complex*” (Carter, 2011). *Middle range theories* are what Arlbjørn and Halldórsson (2002) refer to as “*solid theory base*”. Halldórsson *et al* (2007) exemplify *middle range theories* with TCE, Principal-Agent Theory (PAT), RBV, and Network Theory (NT). *Small-scale theories* are what Arlbjørn and Halldórsson (2002) refer to as “*loose theory base*”. Bacharach (1989) explains the components of theory in a way that is useful in order to understand how *small-scale theories* are constructed, and states that constructs are approximated units, variables are observed units, which are operationalised empirically by measurement, and that a theory can be viewed as a system of propositions that relate constructs to each other and hypotheses that relate variables to each other. Such a system is illustrated in Figure 4.1.

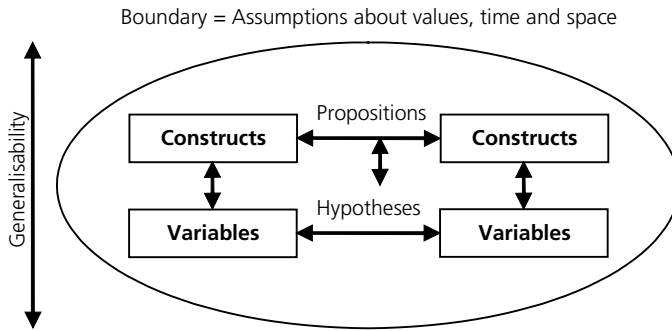


Figure 4.1: Components of a theory (Source: Bacharach, 1989).

The story of *operationalisation* and *operationalism* goes back to the scientific contributions by Dewey and Bridgman in the 1920s, and Samuelson in the 1940s (Bower and Scheidell, 1970). Dewey was a pragmatist, whereas Bridgman and Samuelson were logical positivists, and they consequently had different views on *operationalisation* (Wade, 2004). However, “*Although operationalism continues to receive a certain amount of ritual endorsement from practicing economists, few, if any, actually abide by (or even attempt to abide by) its methodological maxims*” (Wade, 2004). So, staying clear of the “*methodological maxims*”, this author interprets *operationalisation* as the process of transforming a complex theoretical concept into an operational concept, which is empirically observable and measurable; which corresponds to the transformation of a *theoretical definition* into an *operational definition*. Such an *operational definition* can be used to formulate an *operational proposition* and “*By an operational proposition, Samuelson means a proposition which implies an “operation” of some kind, whereby, in principle, at least, it can be tested; even though, for practical or financial reasons, it may be impossible to carry out such an operation in fact*” (Gordon, 1955).

According to Skilton (2011), there are three categories of action that are central to development and presentation of theory: clarification, differentiation and illustration, where “*clarification is the process of developing theoretical language with desirable rhetorical, aesthetic and logical characteristics*”; “*differentiation is the process of developing concepts and relationships that embody a challenge to the status quo ante of established theory and belief*”, and “*illustration is the process of connecting new theory with the reader’s experience of the world while preserving conceptual abstraction*”. Whetten (1989) describes the process of theorising and it “*consists of activities like abstracting, generalizing, relating, selecting, explaining, synthesizing, and idealizing. These on-going activities intermittently spin out reference lists, data, lists of variables, diagrams, and lists of hypotheses. Those emergent products summarize progress, give direction, and serve as place markers. They have vestiges of theory but are not themselves theories. Then again, few things are full-fledged theories*”. Having synthesised current

views on “*what constitutes a theoretical contribution*”, Corley and Goia (2011), state that “*a theoretical contribution rests in a scholar’s ability to produce thinking that is original (and especially revelatory or surprising) in its insight and useful (preferably in a scientific manner) in its application*” and that “*the originality and utility dimensions usually are treated as working together to produce varying levels of theoretical contribution*”, which is illustrated in Table 4.2.

Table 4.2: Current dimensions for theoretical contribution (Source: Corley and Goia, 2011).

Originality	Revelatory	Utility	
		Practically useful	Scientifically useful
	Incremental	Revelatory insight but without adequate scientific usefulness	Original, revelatory insight and scientific usefulness
		Without adequate originality and without scientific usefulness	Scientifically useful but without adequate originality

As a practitioner in the area of Operational Research, the serving-men of Kipling (see Chapter 3) have served this author well. Now it seems that they can also serve a good theorist. According to Whetten (1989), a complete theory must contain four essential elements, or building blocks: “*What*”; “*How*”; “*Why*”; and “*Who, Where, When*”. “*What*” concerns which factors (variables, constructs, concepts) that should be considered as part of the explanation for the phenomena of interest. “*How*” deals with how the factors are related (propositions and hypotheses), i.e. the “*arrows*” to horizontally connect the “*boxes*” (see Figure 4.1). In combination, “*What*” and “*How*” describe, and constitute the domain, or the subject, of the theory. “*Why*” explains, and constitutes the theory’s assumptions. Together, “*What*”, “*How*” and “*Why*” provide the essential ingredients of a simple theory: description and explanation. “*Who*”, “*Where*”, and “*When*” are the conditions, i.e. temporal and contextual factors, that place limitations on the propositions generated from a theoretical model and set the boundaries of generalisability (see Figure 4.1), and thus constitute the range of the theory. “*Although it is important for theorists to be sensitive to context, the Who, Where, and When of theory are typically discovered through subsequent tests of the initial, rudimentary theoretical statement (What, How, Why)*” (Whetten, 1989).

The author subscribes to the definition of theory suggested by Wacker (1998), who also makes good use of the serving-men of Kipling, and state that a theory has four components: “*definitions, domain, relationships, and predictive claims to answer the natural language questions of who, what, when, where, how, why, should, could and would*”. Based on this definition, Wacker (1998) proposes “*a general procedure for theory building and the empirical support for theory*”, which is presented in Table 4.3. According to Choi and Wacker (2011), the procedure in Table 4.3 contains three traits of good theory building practises: uniqueness, fecundity and integration; where “*uniqueness refers to the precision of definitions of constructs under clearly*

delineated conceptual boundaries”; “*fecundity means richness of new areas to explore*”; and “*integration conceptually connects multiple theories together for a purpose*”.

Table 4.3: A general procedure for theory building (Source: Wacker, 1998).

	Purpose of this step	Common question	“Good” theory virtues emphasised
Definitions of variables	Defines who and what are included and what is specifically excluded in the definition.	Who? What?	Uniqueness, conservation
Limiting the domain	Observes and limits the conditions by when antecedent event and where the subsequent event are expected to occur.	When? Where?	Generalisability
Relationship (model) building	Logically assembles the reasoning for each relationship for internal consistency.	Why? How?	Parsimony, fecundity, internal consistency, abstractness
Theory predictions and empirical support	Gives specific predictions. Important for setting conditions where a theory predicts. Tests model by criteria to give empirical verification for the theory. The riskiness of the test is an important consideration.	Could the event occur? Should the event occur? Would the event occur?	Empirical tests refutability

The reported research is about theory development, which builds on a loose theory base. Since the research was commissioned it is more practically useful than scientifically useful; and more revelatory than incremental. Hence, the research is about generating new concepts with revelatory insights. Another consequence is that the research has not made use of *Grand theories* or *Middle range theories*. *Small-scale theories* are used in the form of key constructs (see Section 4.11) that are borrowed from the areas of theory that are identified in Section 4.3. The theoretical contributions are not in the form of *Grand theories* or *Middle range theories*, but in the form of contributions to *Small-scale theories*, i.e. to some of the areas of theory that are identified in Section 4.3.

4.3 Identification of Relevant Areas of Theory

The research purpose was to “*Study, analyse, and evaluate Business Models regarding how they can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept*”. In Table 4.4, the research purpose is decomposed into six distinct parts, and for each part a relevant area of theory is identified.

That the areas of Business Models (BMs) and defence acquisition are central to the research is clear. Military Logistics and Public Private Participation are of interest because they are theoretical areas that are closely associated with the drivers for change, i.e. the new supply concept (how supply is delivered) and the new logistical interface (who delivers the supply). These areas of theory are of interest in order to create a frame of reference for Public Private Business Models (PPBMs), i.e. in

order to provide an answer to RQ 1. Performance Measurement and Supply Chain Risk Management (SCRM) are of interest in order to describe the strengths and weaknesses (RQ 2) and risks (RQ 3) of the different PPBMs when they are implemented. Hence, the following areas of theory are of particular interest to the reported research: BMs; Defence Acquisition; Public Private Participation; Military Logistics; Performance Measurement; and SCRM. While these areas are relevant for the different parts of the decomposed research purpose, the following areas could be relevant theories for the research purpose more directly: Procuring Complex Performance (PCP) and Performance Based Contracting (PBC). The emerging area of PCP is used in order to compare the frame of reference for the PPBM with a similar framework. PBC is used in the frame of reference, but only as one form of contract within the area of defence acquisition.

Table 4.4: The connection between the research purpose and different areas of theory.

Decomposed Research Purpose	Relevant area of theory
study, analyse, and evaluate business models	Business Models
regarding how they can handle	Performance Measurement
the new supply concept	Military Logistics
that a new logistical interface brings about	Public Private Participation
with a particular emphasis on the risk taking	Supply Chain Risk Management
that is part of the business concept	Defence Acquisition

Before proceeding, it is necessary to explain the term “*Public Private Participation*”. Rather than Public Private Participation, this area of theory could have been called Public Private Partnerships (PPPs) instead. For four reasons it was not. While realising and acknowledging the fact that many commentators use the concept of PPPs differently (rather generously and all-embracing), at least according to this author’s interpretation, the concept of PPPs presupposes a relatively *long-term partnership* between buyer and seller. Consequently, the concept of PPPs disqualifies any *short-term partnerships*. In addition, PPPs also disqualifies those relationships that are not *partnerships*, e.g. arms-length type relationships. Furthermore, PPPs also disqualifies public provision, traditional procurement, and outright privatisation, since these forms of procurement and provision are neither relationships nor partnerships. Building on the concept of the Private Finance Initiative (PFI), PPPs have, for many commentators, come to be synonymous with the provision of infrastructure, which disqualifies the delivery of such products and services which are not associated with infrastructure. Consequently, another title had to be sought out in order to encompass that which the author wanted to describe, i.e. the entire spectrum of possible forms of cooperation, from public provision to outright privatisation. Calling this area of theory Public Private Cooperation (PPC) showed some promise, and could have been selected for two reasons. *Pro primo*: in contrast to the relatively limiting word “*partnership*”, the word “*cooperation*” encompasses all forms of different ways in which a buyer and a

seller can do business together. If tweaked, it can even be considered to include the exaggerated options at either end of the spectrum, i.e. public provision and outright privatisation. *Pro secundo*: the Swedish Armed Forces strategy for these different types of cooperation between a public buyer and a private seller is, in translation to English, pertinently called Public Private Cooperation (PPC). However, in the end, the author settled for Public Private Participation, which is how the OECD (2008, p 20) differentiates between different modes of delivery that the public and private sector can engage in. Public Private Participation is, according to the author, better suited to describe the spectrum of possible degrees of Public Private Participation than what PPC, PPPs or PFIs are. The connection between Public Private Participation, Public Private Cooperation (PPC) and Public Private Partnerships (PPPs) is described in Section 4.7.

4.4 Frame of Reference and Research Questions

For the reported research it was necessary to create two frames of reference, since the Research Questions (RQs) are concerned with the theoretical description of Public Private Business Models (PPBMs) on the one hand (RQ 1) and with the performance and risk of such models once they are implemented on the other hand (RQ 2 and RQ 3). Figure 4.2 illustrates the connection between RQ 1 and the areas of theory used to create the PPBM, i.e. the areas of BMs, defence acquisition, military logistics and Public Private Participation.

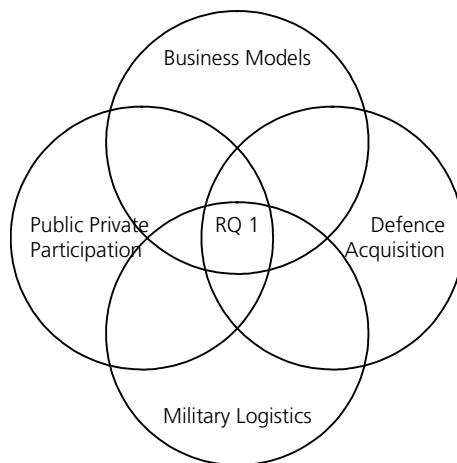


Figure 4.2: Frame of reference for the generic Public Private Business Model.

Figure 4.3 describes the links between RQ 2 and RQ 3 and the areas of theory necessary to include in the frame of reference for these RQs. The frame of reference

for RQ 2 and RQ 3 is basically the same as for RQ 1, but with the areas of Performance Measurement and SCRM added on to the framework.

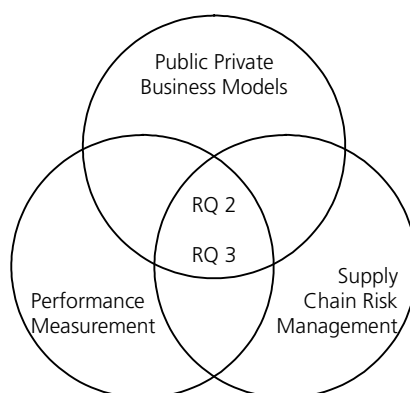


Figure 4.3: Frame of reference for evaluation of performance and risk for implemented Public Private Business Models.

Hence, for the reported research, there are two frames of reference. One is used to create a generic PPBM for a non-profit, governmental, Defence Procurement Agency (DPA). The other framework is used to create models for the analysis of which strengths, weaknesses and risks that are associated with PPBMs.

4.5 Business Models

“Simple models that provide useful insights are often to be preferred to models that get so close to the real world that the mysteries they intend to unravel are repeated in the model and remain mysteries”.

F W Lanchester

The Business Model (BM) concept is central to the reported research. Therefore it is necessary to trace its origins and describe its development. However, prior to the exploration of the concept itself, it is necessary to position the emerging concept of *Business Model* to the more traditional concepts of *business strategy*, *business idea*, *business process* and *business system*.

4.5.1 Business Strategy, Idea, Model, Process and System

“We are the blind people and strategy formation is our elephant. Each of us, in trying to cope with the mysteries of the beast, grabs hold of some part or other”.

Mintzberg and Lampel (1999)

As a relatively new concept in the portfolio of existing business concepts; e.g. strategy, idea, process, and system; a valid question is if the emerging concept is replacing one or more of the existing concepts, or if it is complementing them.

BM's are discussed in many domains, e.g. *e-business*, Information Systems (IS), strategy and management (Pateli and Giaglis, 2003); but often superficially and without understanding of its roots, role and potential (Osterwalder *et al*, 2005). The term BM is used with many meanings, which is partly due to the absence of consensus on a definition of the concept (Samavi *et al*, 2009). The concept of BM's is closely related to the concept of strategy. The two are so closely related that many authors use the terms interchangeably (Magretta, 2002). However, a common view is that BM's and strategy are linked but that they are not the same thing (e.g. Magretta, 2002; Osterwalder *et al*, 2005; Shafer *et al*, 2005). The distinction between BM and strategy is more than semantic; they are two different concepts that need to be distinguished between (Yip, 2004). One proposed distinction describes BM's as a system that shows how the pieces of a business fit together, while strategy also includes competition (Magretta, 2002). According to Mäkinen and Seppänen (2007), three key aspects for distinguishing business strategy from BM's have been proposed: the BM is *"based on value creation for the customer, whereas an emphasis on capturing that value and sustaining it lies within the scope of strategy"*; financing for value creation is *"implicitly assumed"* in BM's, whereas the strategy *"explicitly addresses issues concerning the financing of value creation"*; and BM's *"explicitly assume limited or distorted information and knowledge"*, whereas strategies are *"built on analysis and refinements in knowledge"*, thereby *"assuming the existence of reliable and plentiful information to be transformed into knowledge"*. According to Santos *et al* (2009), a business strategy *"is specified by the answers to the three questions: what is the offer, who are the customers, and how is the offer produced and delivered to the customers?"* where the *how* questions subsumes the firm's choice of BM.

Operational effectiveness, i.e. *"performing similar activities better than rivals perform them"*, and competitive strategy, i.e. *"deliberately choosing a different set of activities to deliver a unique mix of value"*, are both essential to superior performance, which is the primary goal of any enterprise (Porter, 1996). According to Afuah (2004, pp. 12-13), a diversified firm has three levels of strategy: corporate strategy (*"involves deciding what businesses the firm should be in and how the business should be managed as to ensure that the corporate whole is more than the sum of its parts"*); business strategy, also called competitive strategy (*"involves creating and offering better customer value than competitors do, with the objective of creating a competitive advantage for the firm in a particular business"*); and functional strategy (*"pertains to the set of functional activities that a firm performs ... in support of a business' goal of attaining and maintaining a competitive advantage"*).

According to Porter (1996), *“the quest for productivity, quality, and speed has spawned a remarkable number of management tools and techniques: total quality management, benchmarking, time-based competition, outsourcing, partnering, reengineering, and change management”* and such management tools have imperceptibly taken the place of strategy. Porter (1996) states that *“strategy is creating fit among a company's activities”* and goes on to state that *“the essence of strategy is in the activities – choosing to perform activities differently or to perform different activities than rivals”*. Normann (2001, p 25), describes three stages of an evolution of strategic paradigms: industrialism, customer base management, and reconfiguration of value-creating systems; and states that companies and other institutions that *“organise value creation beyond their own boundaries, thereby setting the rules for others by effectively creating not only new products and services but shaping a new business context”* (“ecogenesis”), are “Prime Movers”.

Mintzberg *et al* (1998, pp. 9-15) provide five answers, i.e. the “Five Ps” for strategy, to the question regarding what strategy is: Plan, Pattern, Position, Perspective, and Ploy; and identifies ten different schools of thoughts in the strategy formation process (Mintzberg *et al*, 1998, p 3): Design, Planning, Positioning, Entrepreneurial, Cognitive, Learning, Power, Cultural, Environmental, and Configuration. Mintzberg *et al* (1998) categorise Porter (1996) as belonging to the positioning school of thought and would presumably categorise Normann as belonging to the configuration school of thought. However, the finer aspects of business strategy are not the focal issue of this thesis, merely its relationship to BMs is of interest. Many frameworks for formulating business strategy have been proposed. These frameworks are used to devise a theory regarding how to compete. In sharp contrast, frameworks for the execution of strategy are relatively fragmented and idiosyncratic (Richardson, 2008). BM frameworks, however, show promise of being able to serve as vehicles for linking formulated strategy, i.e. theory of how to compete, to execution of strategy, i.e. implementation of the theory.

According to Kindström (2005, p 61), there is a limited discussion regarding the interrelatedness between the operational and strategic dimensions of an organisation. Many authors (e.g. Osterwalder, 2004, p 14; Richardson, 2008; and Andersson *et al*, 2009) agree that the BM concept has a place between business strategy and processes. *“The Business Model can be seen as the conceptual and architectural implementation of a business strategy and as the foundation for the implementation of business processes”* (Richardson, 2008). Hedman and Kalling (2003) see the concept of BMs as having promise, because *“it could integrate disparate strategic perspectives such as the Resource-Based View (RBV) and Industrial Organisation (I/O)”*. According to Kihlén (2007, p 38), the BM concept is *“more holistic to its nature than traditional strategy theory in that it incorporates views that at*

first sight might appear incompatible". Osterwalder (2004, p 14) sees strategy, BMs and processes models as addressing *"similar problems ... on different business layers"*.

According to Andersson *et al* (2009), *"a BM is made in order to make clear who the actors are in a business scenario and explain their relations, which are formulated in terms of values exchanged between the actors. At its core, all BMs capture the relations between resources, actors, and the events that result in the creation and distribution of resources among the actors. BMs and goal models are parts of a chain of models, together with process models, that have distinct purposes and describe different aspects of an enterprise"*. Figure 4.4 illustrates this chain of models.

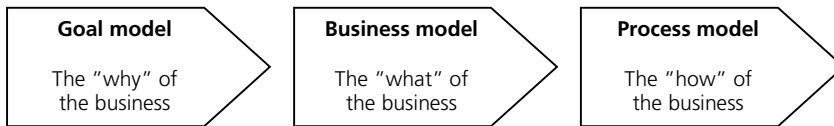


Figure 4.4: A chain of models (Source: Andersson *et al*, 2009).

According to Andersson *et al* (2009): *"Goal models are used in the earliest phases of business and information systems design, where they help in clarifying interests, intentions, and strategies of different stakeholders answering to the "why" of the business"*; *"BM's give a high-level view of the activities taking place in and between organisations by identifying agents, resources and the exchange of resources between the agents. So, a BM focuses on the "what" of a business"*; and *"Process models focus on the "how" of a business, as they deal with operational and procedural aspects of business communication, including control flow, data flow and message passing"*.

According to Pateli and Giaglis (2003), *"some researchers perceive the BM as a pure business concept that explains the logic of making business for a firm"*, while other researchers consider BMs as *"a link between strategy, business processes and Information Systems"*. The author belongs to the latter category. Petrovic *et al* (2001) position the BM in a hierarchical structure of business logic, depicting the BM above the business processes, which are above business systems. Osterwalder *et al* (2002) complete the pyramid by placing business strategy above the BM, which is above business process. Figure 4.5 combines these views and consequently illustrates the relationship between business strategy, BM, business processes and Information and Communication Systems, i.e. the *"Hierarchical structure of business logic"* (Petrovic *et al*, 2001).

Pateli and Giaglis (2003) also combine the concepts of business strategy, BMs, business processes and Information Systems (IS) in an analogous fashion, and produce a structure that is similar to the one presented in Figure 4.5, which they refer to as a *"BM Definition Framework"*. According to Pigneur and Werthner (2009), the IT revolution is accompanied by an on-going virtualisation of the

economy, where the value of companies is based on information and user networks, not on physical infrastructure or products, and where an “informatisation” of work, value chains, products and services can be observed. *“The focus is on flexible service design, implementation and delivery putting the customer at the centre, and the underlying issue is to link strategy, BMs, business processes and implementation”* (Pigneur and Werthner, 2009).

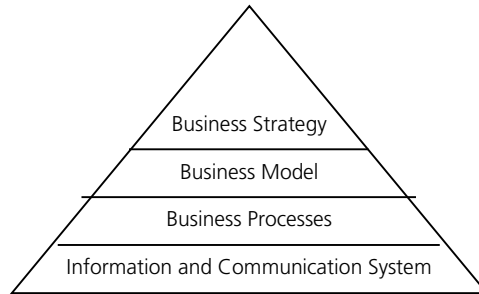


Figure 4.5: Hierarchical structure of business logic (Source: Adapted from Petrovic *et al*, 2001; and Osterwalder *et al*, 2002).

Figure 4.5 positions the concept of BMs as complementary to the concepts of business strategy, process and system in a hierarchy of business logic. Consequently, it remains for the BM to be compared against idea. According to Normann (1975, p 40), a business idea captures a company’s “*superior knowledge*” or “*superior ability*”, which is “*built into the corporate organisational structure or within the individuals that work within the company*”. Normann (1975, p 40) admits that the term “*idea*” can be misleading, since it is intended to capture abstract ideas and concrete conditions. Normann (2001) uses both the concept of business idea and BM, but he does not explicitly relate them to each other or compare and contrast them. Nevertheless, Hedman and Kalling (2003) regards the business idea and the BM as “*conceptually similar models*”, and Kindström (2005, p 52) sees the BM as an “*operationalisation*” (see Section 4.2) of the business idea.

4.5.2 Evolution of Business Model Research

The concept of BMs was one of the great buzz words of the “*Internet boom*” (Magretta, 2002) and became part of business jargon during the “*dot-com*” era of the 1990s (Richardson, 2008). However, it has only recently begun to receive attention from researchers (Morris *et al*, 2006), and the last decade researchers have adopted the term and worked to define and refine it for “*electronic (e-) commerce*” (e.g. Afuah and Tucci, 2003) and for business in general (e.g. Chesbrough and Rosenbloom, 2000). The field of BMs is in a state of continuous development, and Table 4.5 illustrates four proposed classifications of contributions to BM research.

Table 4.5: Classifications of Business Model research.

Author(s)	Classification of Business Model research
Gordijn <i>et al</i> (2005)	5 Phases of evolution: Define and classify BMs (definitions and taxonomies) – List BM components (“shopping list” of components) – Describe BM elements (Components as building blocks) – BM ontology (reference models and ontologies) – Apply BM concept (Applications and conceptual tools)
Lambert (2007)	6 Phases of research: Early conceptualisation of BMs (definitions, elements, typologies) – Deductive empirical research – Developed conceptualisation of BMs – Inductive empirical research – Generalisations – Develop BM theory
Osterwalder <i>et al</i> (2005)	5 Phases of evolution: Define and classify BMs (definitions and taxonomies) – List BM components (“shopping list” of components) – Describe BM elements (Components as building blocks) – Model BM elements (reference models and ontologies) – Apply BM concept (Applications and conceptual tools)
Pateli and Giaglis (2003)	6 Research sub-domains: Definitions (defining purpose, scope and primary elements; exploring relationships with other business concept) – Components (decomposition into fundamental constructs) – Taxonomies (categorisation into typologies) – Representations (representational formalisms for visualising the primary components) – Change methodologies (guidelines for adaptation of existing BMs, or selection of BM) – Evaluation models (criteria for evaluation of BMs)

Gordijn *et al* (2005) and Osterwalder *et al* (2005) identify five phases in this development (see Figure 4.6): definitions and taxonomies; lists of components; descriptions of components; ontologies; and applications and tools.

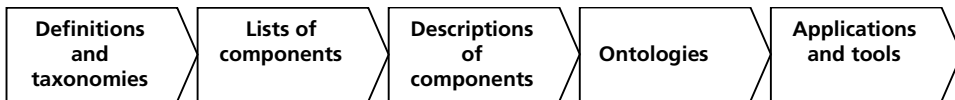


Figure 4.6: Evolution of the Business Model concept (Source: Building on Gordijn *et al*, 2005; and Osterwalder *et al*, 2005).

New definitions and taxonomies are contributed by new authors in the field, and many authors have yet to reach the stage of ontologies. The description of the evolution does, however, provide a useful means of categorising the different types of contributions that different authors have made over the last decade. Pateli and Giaglis (2003) propose a more elaborate framework (see Table 4.5) for structuring the sub-domains, and their inter-relationships, in BM research. The framework, depicted in Figure 4.7, is based on two criteria, integration and timeliness. The arrows in Figure 4.7 signify the interrelationships between the sub-domains based on an analysis of integration (i.e. sub-domains building on each other) and timeliness (i.e. sub-domains emerging after others).

Where Gordijn *et al* (2005) and Osterwalder *et al* (2005) use applications and tools, Pateli and Giaglis (2003) differentiate between change methodologies and evaluation models. Change methodologies include “*research efforts that focus on formulating guidelines, describing steps, and specifying actions to be taken for either changing BMs to adapt to a business or technology transformation, usually in terms of innovation, or choosing an appropriate BM, usually from a set of available ones*”, whereas evaluation models are concerned with identifying criteria for assessing the

feasibility and profitability of BMs or evaluating a BM against alternative or best practise cases (Pateli and Giaglis, 2003).

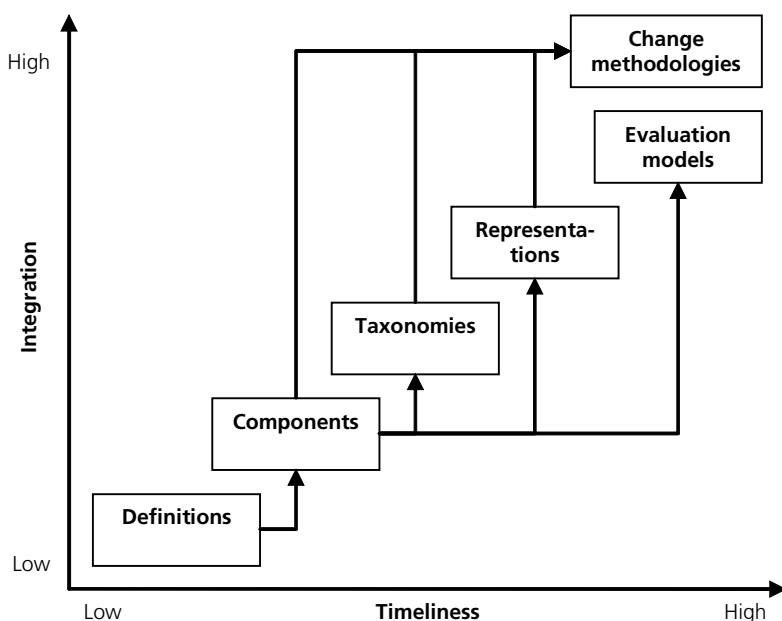


Figure 4.7: A framework for structuring Business Model research (Source: Pateli and Giaglis, 2003).

For categorisation of BM research contributions, the framework proposed by Pateli and Giaglis (2003) is more useful than the ones suggested by Gordijn *et al* (2005) and Osterwalder *et al* (2005), because of the differentiation in the final stages. While the classifications provided by Gordijn *et al* (2005), Osterwalder *et al* (2005) and Pateli and Giaglis (2003) are all descriptive in nature, i.e. describes what has been done, the classification proposed by Lambert (2007) takes as its point of departure a prescriptive view on how research should be conducted. According to Lambert (2007), relatively few researchers have left the early phases of development (see Table 4.5).

Based on the proposals illustrated in Figure 4.6 and Figure 4.7, this author's view on the development of BM research is that it consists of the following stages: definitions, decompositions (into, e.g., components), classifications²⁷ (e.g.

²⁷ Even though many authors use terminology such as taxonomy and typology interchangeably, they are not the same thing (Lambert, 2007). According to Baden-Fuller and Morgan (2010), the difference between *taxonomy* and *typology* can be understood by understanding the difference

taxonomies²⁸ and typologies²⁹), generic representations (modelling of BM components; including “*representations*” and “*ontologies*”), and specific configurations (contents of representations of BM components; corresponding to “*applications and tools*”, “*change methodologies*”, and “*evaluation models*”). This view is illustrated in Figure 4.8.



Figure 4.8: Evolution of the Business Model concept (Source: Building on Gordijn *et al*, 2005; Osterwalder *et al*, 2005; and Pateli and Giaglis, 2003).

With the exception of classifications, which are excluded since other researchers’ taxonomies and typologies, i.e. classifications of specific firms BMs, are not the focus of the reported research, the stages in Figure 4.8 are used to structure the next four sections. Even if BM taxonomies and BM typologies are thus not explicitly addressed, there is *one* classification of BMs that is of the utmost importance. Grimsey and Lewis (2004b, p 54) combine the concepts of Public Private Partnerships (PPPs) and BMs to describe an entire spectrum of what they refer to as “*public/private BMs*”³⁰, ranging from public provision of collective goods to outright privatisation. This spectrum of Public Private BMs (PPBMs) is presented in Section 4.7.4. The PPP aspect of PPBMs will be further explored in Section 4.7.9. However, the classification proposed by Grimsey and Lewis (2004b, p 54) is a classification of a part of a BM, rather than a classification of specific BM configurations (see Section 4.5.3).

between *kinds* and *types*: taxonomies are classes (kinds, or taxa) of things observed in the world that are developed from empirical work, bottom up; and typologies are types of things (events) where the types are decided theoretically or conceptually, top down.

²⁸ Taxonomies are general (natural) classifications and are generated (derived empirically through cluster analysis) from inductive research (i.e. reasoning by inference), where the researcher creates grounded theory by first collecting the data and then generalising to the abstract or the conceptual (Lambert, 2007).

²⁹ Typologies are specific (artificial, arbitrary) classifications and are a product (derived conceptually) of deductive research (i.e. reasoning by deduction), where the researcher conceptualises the types that are relevant to the research (Lambert, 2007).

³⁰ However, Grimsey and Lewis (2004b) did *not* introduce the acronym PPBM for the Public Private Business Model. The author assumes the full blame for introducing yet another acronym.

4.5.3 Business Model Definitions

The initial step in emerging fields of academic knowledge is to define the concept that is being developed. However, a universally accepted definition of the concept of BMs has yet to emerge and *“Diversity in the available definitions poses substantive challenges for delimiting the nature and components of a model and determining what constitutes a good model. It also leads to confusion in terminology, as BM, strategy, business concept, revenue model and economic model are often used interchangeably. Moreover, the BM has been referred to as architecture, design, pattern, plan, method, assumption and statement”* (Morris *et al*, 2005). Kihlén (2007, p 38) adds that BMs *“have been known as archetypes, configurations, schools, gestalts and in some cases as strategies and business ideas”*. After a comprehensive literature review, Zott *et al* (2010) observe that BMs have been referred to as a *“statement”*, a *“description”*, a *“representation”*, an *“architecture”*, a *“conceptual tool or model”*, a *“structural template”*, a *“method”*, a *“framework”*, a *“pattern”*, and as a *“set”*. The basic idea is, however, that a BM describes the way a firm delivers its products and services to customers and the way in which the firm makes money (Richardson, 2008).

The relationships between the BM concept and strategy, idea, process and systems have already been addressed in Section 4.5.1. However, as illustrated above there is more positioning to be done. There is, e.g., a difference between a BM and a *“revenue model”* (Amit and Zott, 2001; and Afuah, 2004, p 11). In line with Afuah (2004, p 11), this author sees a BM *“distinguished by how the firms earns a profit, not by how it generates revenues alone. Revenues are just one component of making money. Cost is the other”*. Consequently, a revenue model is part of a BM (Santos *et al*, 2009). In addition, the notion of a BM can be interpreted as a *taxonomy*, which enumerates a *finite* number of BM types, or as a *conceptual model* (i.e. a *meta-model* or a *reference model* for a specific industry) of the way business is done, which allows an *infinite* number of BMs (Gordijn *et al*, 2005). The stance taken is the latter one, thus enabling (potentially) infinite permutations of BM components of a *meta-model*, or a *reference model*, for defence acquisition. The *meta-model*, or *reference model*, for defence acquisition will be referred to as a generic Public Private Business Model (PPBM, see Section 4.12) for defence acquisition.

The confusion regarding what a BM is, as illustrated with the numerous interpretations above, is reinforced in the multitude of different definitions of BMs. In Table 4.6 and Table 4.7, a selection of these BM definitions is presented. These examples of definitions of the concept of BMs illustrate that there are several perspectives on what a BM is and that the definitions evolve over time. Osterwalder *et al* (2005) observe that there are two different viewpoints on BMs in the literature: authors that use the term *“simply to refer to the way a company does business”* and authors that *“emphasise the model aspect”*. The latter viewpoint refers to a conceptualisation of the way in which a company does business *“in order to*

reduce complexity to an understandable level” and proponents of this viewpoint *“propose meta-models that consist of elements and relationships that reflect the complex entities that they aim to describe”*. This is the perspective that will be used throughout this thesis. Furthermore, according to Osterwalder *et al* (2005), authors writing about BMs do not refer to the same phenomenon, but can refer to: parts of a BM, type of BM, concrete real world instances of BMs, or concepts (elements and relationships of a model). All these four aspects of the BM will be discussed.

Table 4.6: Selected Business Model definitions – Part I.

Author(s)	Selected Business Model definitions – Part I
Afuah (2004, p 9)	A BM is the set of which activities a firm performs, how it performs them, and when it performs them as it uses its resources to perform activities, given its industry, to create superior customer value (low-cost or differentiated products) and put itself in a position to appropriate the value.
Afuah and Tucci (2003, p 4)	A BM is about the value that a firm offers its customers, the segment of customers it targets to offer the value to, the scope of the products/services it offers to which segment of customers, the profit site it chooses, its sources of revenue, the prices it puts on the value offered its customers, the activities it must perform in offering that value, the capabilities these activities rest on, what a firm must do to sustain any advantages it has, and how well it can implement these elements of the BM.
Amit and Zott (2001)	A BM depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.
Casadesu-Masanell and Ricart (2010)	A BM is a <i>reflection</i> of the firm's <i>realised</i> strategy.
Chesbrough and Rosenbloom (2002)	A BM provides a coherent framework that takes technological characteristics and potentials as inputs, and converts them through customers and market into economic outputs. A successful BM creates a heuristic logic that connects technical potential with the realisation of economic value.
Johnson <i>et al</i> (2008)	A BM consists of four interlocking elements (customer value proposition – profit formula – key resources – key processes), which, taken together, create and deliver value.
Magretta (2002)	A BM is a story that explains how an enterprise works.
Morris <i>et al</i> (2005)	A BM is a concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets.
Osterwalder (2004, p 15)	A BM is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams.
Osterwalder <i>et al</i> (2005)	A BM is a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm. Therefore we must consider which concepts and relationships allow a simplified description and representation of what value is provided to customers, how this is done and with which financial consequences.

There are also other categorisations of definitions. Morris *et al* (2006) identify three general categories of definitions of BMs: strategic, operational and economic. Hence, there is variation in the contents of definitions of BMs, but there are also differences regarding their uses. Rosén (2008, p 39), identifies three different uses of BMs: as *“descriptions”* of the way a firm conduct their business; as *“simple formulas of business concepts”*; and as an *“analytical tool”* to investigate organisations. It is primarily the latter perspective on BMs that will be utilised throughout this

thesis. Furthermore, in line with Kihlén (2007, p 39), a BM is “*understood as a set of components which together depict the logic and functioning of the firm. This view of BMs is generic and can also be seen as a synthesis of the collective research on BMs*”.

Table 4.7: Selected Business Model definitions – Part II.

Author(s)	Selected Business Model definitions – Part II
Osterwalder and Pigneur (2010, p 14)	A BM describes the rationale of how an organisation creates, delivers and captures value.
Pateli and Giaglis (2003)	A BM is considered as the conceptual and architectural implementation (blueprint) of a business strategy and represents the foundation for the implementation of business processes and information systems.
Ramirez and Wallin (2000, p 77)	The BM of a firm defines value-creation priorities in respect to the utilisation of both the internal and external resources. It defines how the firm relates with stakeholders, such as actual and potential customers, employees, unions, suppliers, competitors, and other interest groups. It takes account of situations where its activities may affect the business environment and its own business in ways that could create conflicting interests, or impose risks on the firm; or develop new, previously unpredicted ways of creating value. The BM is in itself subject to continual review subject to actual and possible changes in perceived business conditions.
Samavi <i>et al</i> (2009)	A BM is a strategic modelling framework to help understand and analyse the goals, intentions, roles, and the rationale behind the strategic actions in a business environment.
Santos <i>et al</i> (2009)	A BM is a configuration of activities and of the organisational units that perform those activities both within and outside the firm designed to create value in the production (and delivery) of a specific product/market set.
Shafer <i>et al</i> (2005)	A BM is a representation of a firm’s underlying core logic and strategic choices for creating and capturing value within a value network.
Teece (2010)	A BM articulates the logic, the data, and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value.
Tikkanen <i>et al</i> (2005)	A BM can be conceptualised as the sum of material, objectively existing structures and processes as well as intangible, cognitive meaning structures at the level of a business organisation.
Timmers (1998)	A BM is architecture for the product, service and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors; and a description of the sources of revenues.
Zott and Amit (2008)	A BM is a structural template of how a focal firm transacts with customers, partners, and vendors. It captures the pattern of the firm’s boundary spanning connections with factor and product markets.

In a recent literature review, regarding *all* BM research papers published between January 1975 and December 2009, Zott *et al* (2010) identified 103 high-quality BM publications: 79 high-quality peer-reviewed research papers (including most of the references in Table 4.6 and Table 4.7); 10 books (two of which are included in Table 4.6 and Table 4.7); and 14 relevant working papers. The insights thus revealed included that: “*Despite the overall surge in the literature on BMs, scholars do not agree on what a BM is*”; “*researchers frequently adopt idiosyncratic definitions that fit the purposes of their studies, but that are difficult to reconcile with each other*”; and “*cumulative progress is hampered*” (Zott *et al*, 2010).

One thing that all definitions in Table 4.6 and Table 4.7 have in common is that they all define the BM from the point of view of a firm, i.e. from the point of view of making money, or other forms of creating value for the focal firm. Hence,

several definitions explicitly include the money-making aspect of a firm. However, the reported research is about a BM for a non-profit, governmental agency, which business is not about making money. Nevertheless, in an attempt to avoid contributing to the confusion as described by Zott *et al* (2010), i.e. inventing a definition to suit the purposes of the research, the author has adapted an already existing definition and modified it to fit the contextual purpose. Consequently, based on Osterwalder (2004, p 14), less the part of a company's logic of earning money, the author has defined the following working definition of a BM for a non-profit, governmental organisation:

“A Business Model for a non-profit, governmental organisation is a conceptual tool that contains a set of elements and their relationships. It is a description of the value the organisation offers to one or several segments of customers and the architecture of the organisation and its network of partners for creating and delivering this value and relationship capital”.

Having thus addressed BM definitions and established a working definition for a BM for a non-profit, governmental organisation, i.e. for a Public Private Business Model (PPBM), the attention is turned to BM decomposition.

4.5.4 Business Model Decompositions

Casadesus-Masanell and Ricart (2010) contend that BMs are composed of two different sets of elements: *“the concrete choices made by management about how the organisation must operate”*, and *“the consequences of these choices”*. Chesbrough and Rosenbloom (2000) and Chesbrough (2010) suggest that a BM fulfils the following functions: Articulates the *value proposition* (i.e., the value created for users by an offering based on technology); Identifies a *market segment* and specify the revenue generation mechanism (i.e., users to whom technology is useful and for what purpose); Defines the structure of the *value chain* required to create and distribute the offering and complementary assets needed to support position in the chain; Details the *revenue mechanism(s)* by which the firm will be paid for the offering; Estimates the *Cost Structure* and *profit potential* (given value proposition and value chain structure); Describes the position of the firm within the *value network* linking suppliers and customers (including identifying potential complementors and competitors); and Formulates the *competitive strategy* by which the innovating firm will gain and hold advantage over rivals. There are, however, several, more or less elaborate, contributions to answer the question what parts a BM is composed of. Shafer *et al* (2005) identified 42 different, unique BM components, building blocks, or elements. In Table 4.8, a selection of BM decompositions is presented.

Table 4.8: Selected Business Model decompositions.

Author(s)	Selected Business Model decompositions
Afuah (2004, p 10)	5 Components: Industry factors – Positions – Resources – Activities – Costs
Afuah and Tucci (2003, p 54)	10 Components: Profit site – Customer value – Scope – Pricing – Revenue source – Connected activities – Implementation – Capabilities – Sustainability – Cost structure
Chesbrough (2007)	6 parameters: Value proposition – Target market – Value chain – Revenue mechanism(s) – Value network or ecosystem – Competitive strategy
Hedman and Kalling (2003)	7 Components: Customers – Competitors – Offering (physical, price / cost, service) – Activities and organisation – Resources (human, physical, organisational) – Supply of factor and production inputs – Scope of management
Johnson <i>et al</i> (2008)	4 Elements: Customer value proposition – Profit formula (revenue model, cost structure, margin model, resource velocity) – Key resources (people, technology, products, facilities, equipment, channels, brand) – Key processes (e.g. training, planning, service)
Kihlén (2007, p 50)	6 Components: Strategy – Position – Offering – Activities and organisation – Resources – Cost and revenue
Kindström (2005, p 64)	3 Dimensions: Market segment (external environment) – Exchanges (offering) – Resources and internal environment (internal factors)
Morris <i>et al</i> (2006)	6 Components: Factors related to offering – Market factors – Internal capability factors – Competitive strategy factors – Economic factors – Personal / investor factors
Osterwalder (2004, p 43)	9 Building blocks: Value proposition – Target customer – Distribution channel – Relationship – Value Configuration – Capability – Partnership – Cost structure – Revenue model
Pateli and Giaglis (2003)	10 Components in 2 dimensions / frames: Horizontal frame (7 primary components: Mission (strategic objectives) – Target market (scope and market segment) – Value proposition (product / service offering) – Resources (capabilities, assets) – Key activities (intra- and inter-organisational processes) – Cost and revenue model (cost and revenue streams, pricing policy) – Value chain / net (alliances and partnerships) Vertical frame (3 underlying components): Market trends – Regulation – Technology
Petrovic <i>et al</i> (2001)	7 Sub-models: Value model (logic of core product(s) / service(s) / experience(s)) – Resource model (logic of necessary elements) – Production model (logic of combination of elements) – Customer relations model (logic of how to reach, serve and maintain customers) – Revenue model (logic of what, when, why and how compensation is received) – Capital model (logic of financial sourcing) – Market model (logic of selection of environment)
Santos <i>et al</i> (2009)	4 Components: A set of elemental <i>activities</i> – A set of <i>organisational</i> units that perform the activities – A set of <i>linkages</i> between the activities – A set of <i>governance mechanisms</i> for control
Shafer <i>et al</i> (2005)	20 Components: Strategic choices (customer, value proposition, capabilities / competencies, revenue / pricing, competitors, output (offering), strategy, branding, differentiation, mission) – Create value (resources / assets, processes / activities) – Value network (suppliers, customer information, customer relationship, information flows, product / service flows) – Capture value (cost, financial aspects, profit)
Yip (2004)	9 Elements: Value proposition – Nature of inputs – How to transform inputs (including technology) – Nature of outputs – Vertical scope – Horizontal scope – Geographic scope – Nature of customers – How to organise
Yunus <i>et al</i> (2010)	3 Components: Value proposition (customers; product / service) – Value constellation (internal value chain; external value chain) – Profit equation (sales revenues; cost structure; capital employed)

In the contributions presented in Table 4.8, a BM is decomposed into parts with different labels; different numbers of parts; and the different contents in the parts. The “*parts*” are referred to as “*components*” (Afuah, 2004, p 10; Afuah and Tucci, 2003, p 54; Hedman and Kalling, 2003; Kihlén, 2007, p 50; Morris *et al*, 2006; Pateli and Giaglis, 2003; Santos *et al*, 2009; Shafer *et al*, 2005; Yunus *et al*, 2010), “*parameters*” (Chesbrough, 2007), “*elements*” (Johnson *et al*, 2008; Yip, 2004), “*dimensions*” (Kindström, 2005, p 64), “*building blocks*” (Osterwalder, 2004, p 43), and “*sub-models*” (Petrovic *et al*, 2001). While “*components*” is the dominant term

for the parts of a BM, “*building blocks*” will be used in order to describe BM decomposition. The reason for this will become obvious in the next section. Despite the apparent differences among the descriptions in Table 4.8, there are also several similarities, which will be addressed in the next section (see Table 4.11).

4.5.5 Generic Business Model Representations and Ontologies

Several authors, e.g. Hedman and Kalling (2003), have represented BMs through a mixture of informal textual, verbal and *ad hoc* graphical representations (Pateli and Giaglis, 2003), while a few other authors, e.g. Osterwalder (2004), have provided formal Business Model Ontologies (BMOs), i.e. “*conceptualisations and formalisations of the essential components of a BM into elements, relationships, vocabulary, and semantics*” (Zott *et al*, 2010). According to Zott *et al* (2010), “*A BMO is structured into several levels of decomposition with increasing depth and complexity*”. The separation between informal representations and formal ontologies is in line with Kindström (2005, p 65), who states that depending on the purpose and perspective; “*it is possible to have both a finer and rougher granulation*³¹”. In order to address the research purpose (see Section 1.4) and answer the Research Questions (see Section 1.6), a finer granulation, i.e. a BMO, is required in the reported research, rather than attempts “*to represent BMs through a mixture of informal textual, verbal and ad hoc graphical representations*” (Zott *et al*, 2010), since a BMO is more likely to contain the necessary operationalisation (see Section 4.2) of the BM and its parts than an informal representation.

Even though there are several detailed decompositions of what a BM is (see Table 4.8), there are not that many informal BM representations, and even fewer formal BMOs. Gordijn *et al* (2005) and Zott *et al* (2010) only identify two fully developed BMOs: The “*Business Model Ontology*” (BMO³²) created by Osterwalder (2004) and the “*e3-value Ontology*” proposed by Gordijn and Akkermans (2001). In addition to these two BM ontologies, Andersson *et al* (2006) and Samavi *et al*

³¹ “*Granularity*” or “*resolution*” refers to the level of detail that is obtained; “*higher resolution would make trees appear as a relevant unit*” and “*lower granularity would mean that the forest as a whole appears*” (Ramirez and Wallin, 2000, p 60).

³² Zott *et al* (2010) use the term Business Model Ontology (BMO) to refer to BM ontologies in general, whereas Gordijn *et al* (2005) and Osterwalder (2004) use the term Business Model Ontology (BMO) as a label to refer to the specific BM ontology proposed by Osterwalder (2004). To minimise any confusion, in this thesis, the term BM ontology will henceforth be used to refer to BM ontologies in general, whereas the term Business Model Ontology (BMO) will be reserved for the specific contribution by Osterwalder (2004).

(2009) also identify the “*REA*³³ *Ontology*”. Andersson *et al* (2006) proceed to formulate a “*Common Ontology*” for BMs based on the three established ontologies. Samavi *et al* (2009) refers to the “*Common Ontology*” for BMs as the “*Reference Ontology*”, and proceed to develop the “*Strategic Business Model Ontology (SBMO)*”. According to Andersson *et al* (2006), the BMO is wider in scope than the “*e3-value Ontology*” and the “*REA Ontology*”, which seems appropriate for the reported research. Hence, this BM ontology was selected as a foundation for the creation of the generic PPBM for defence acquisition (see Section 4.12). Consequently, in line with Osterwalder (2004), the parts of the BM are called “*building blocks*” rather than “*components*” or any other suggested name for the BM elements.

Table 4.9: The Business Model Ontology (Source: Osterwalder, 2004, p 43).

Business model pillars	Business model building blocks	Description of business model building blocks
Product	Value proposition	The overall view of a company's bundle of products and service's that are of value to the customer.
Customer interface	Target customer	The segment of customers a company wants to offer value to.
	Distribution channel	The means of getting in touch with the customer.
	Relationship	The kind of link a company establishes between itself and the customer.
Infrastructure management	Value configuration	The arrangement of activities and resources that is necessary to create value for the customer.
	Capability	The ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer.
	Partnership	The voluntarily initiated cooperative agreement between two or more companies in order to create value for the customer.
Financial aspects	Cost structure	The representation in money of all the means employed in the business model.
	Revenue model	The way a company makes money through a variety of revenue flows.

Osterwalder (2004) belongs to the exclusive category of researchers who have reached the higher levels of complexity in their theoretical contributions to the area of BMs. Since Osterwalder introduced the BMO, which consists of four BM pillars and nine BM building blocks, this BM ontology has remained at the forefront of theoretical contributions in this field of knowledge. The four BM pillars and nine BM building blocks are described in Table 4.9. Osterwalder (2004) goes on to provide a finer granulation, or an additional level of decomposition, of the building blocks. The characteristics of each of the building blocks are described in the form of a table, based on a template (see Table 4.10) and thereafter described “*precisely, textually and graphically*” (Osterwalder, 2004, p 47). Every BM element can be decomposed into a set of defined sub-elements and “*This decomposition allows*

³³ According to Andersson *et al* (2006), REA stands for Resource-Event-Actor. However, according to Andersson *et al* (2009), REA should be interpreted as Resource-Event-Agent.

studying BMs on different levels of granularity in more or less detail and according to specific needs” (Osterwalder, 2004, p 47).

Table 4.10: Generic description of a Business Model element (Source: Osterwalder, 2004, p 47).

Name of BM element	Name
Definition	Gives a precise description of the Business Model element
Part of	Defines to which pillar of the ontology the element belongs to or of which element it is a sub-element
Related to	Describes to which other elements of the ontology an element is related to
Set of	Indicates into which sub-elements an element can be decomposed
Cardinality	Defines the number of allowed occurrences of an element or sub-element inside the ontology
Attributes	Lists the attributes of the element or sub-element. The allowed values of an attribute are indicated between accolades {VALUE1, VALUE2}. Their occurrences are indicated in brackets (e.g. 1-n). Each element and sub-element has two standard attributes which are NAME and DESCRIPTION that contain a chain of characters {abc}
References	Indicates the main references related to the Business Model element

In Table 4.11, the BMO building blocks are compared with other BM decompositions.

Table 4.11: A comparison between the BMO and other BM decompositions.

BMO building blocks	Author(s)	Afuah (2004, p 10)	Afuah and Tucci (2003, p 54)	Chesbrough (2007)	Hedman and Kalling (2003)	Johnson <i>et al</i> (2008)	Kihlén (2007, p 50)	Kindström (2005, p 64)	Morris <i>et al</i> (2006)	Pateli and Giaglis (2003)	Petrovic <i>et al</i> (2001)	Santos <i>et al</i> (2009)	Shafer <i>et al</i> (2005)	Yip (2004)	Yunus <i>et al</i> (2010)
Value proposition		X	X	X	X	X	X	X	X	X	X		X	X	X
Target customer			X	X	X					X	X		X	X	X
Distribution channel		X	X	X						X	X		X		X
Customer relationship											X		X		
Value configuration		X	X		X	X	X	X	X	X	X	X	X		X
Capability					X				X	X	X		X		
Partnership										X					
Cost structure		X	X	X	X	X	X		X	X	X		X		X
Revenue model		X	X	X	X	X	X		X	X	X		X		X

Since the BMO was created through an analysis of existing BM decompositions and “Basically, the nine elements of the ontology cover all the BM building blocks mentioned by at least two authors” (Osterwalder, 2004, p 44), it is to be expected that there is a strong agreement between the BMO building blocks and the other BM decompositions presented in Table 4.8. However, the agreements do not signify exact fits between the different elements, e.g. through identical nomenclature, even if exact fits are also a significant part of the comparison, but represent approximate fits, as interpreted by the author, between the descriptions of the elements. As demonstrated in Table 4.11, several building blocks of the BMO mirrors the BM components proposed by other authors to a large extent.

The strongest agreements are for value proposition, target customer, value configuration, cost structure and revenue model, which are included in most of the other BM decompositions. Customer relationship and partnerships, on the other hand, are sparsely represented in the other decompositions. Hence, the BMO is representative of many of the other proposed BM decompositions. However, in addition to the content of many other BM decompositions, the BMO also emphasises and embraces the importance of relationships with customers and partnerships with suppliers in a way that resembles the concepts of Customer Relationship Management (CRM) and Supplier Relationship Management (SRM) in the area of Supply Chain Management (SCM).

Table 4.12: The Business Model Canvas (Source: Osterwalder and Pigneur, 2010, p 44).

Key Partnerships "The network of suppliers and partners that make a business model work".	Key Activities "The most important things a company must do to make its business model work".	Value Propositions "The collection of products and services that create value for a specific customer segment".	Customer Relationships "The types of relationships that a company establishes with specific customer segments".	Customer Segments "The various groups of people or organisations that an enterprise aims to reach and serve".
	Key Resources "The most important assets required to make a business model work".			
Cost Structure "All costs incurred to operate a business model".			Revenue Streams "The cash a company generates from each customer segment".	

The BMO remained a relatively uncontested theoretical contribution, until it was ultimately challenged by Osterwalder and Pigneur (2010), from a practical point of view. According to Osterwalder (2011), it was necessary to make alterations to the BMO in order for it to better suit the practical requirements that organisations have in the *"real world"*. Consequently, the granulation of the BMO was too fine to be effectively used in practise. The practical challenges and requirements were addressed, and the theoretical, finely granulated, *"Business Model Ontology"* was adapted and consequently complemented by the more practical, more roughly granulated, *"Business Model Canvas"*. The adaptation of the BMO to the requirements of practise was not only one of *"re-granulation"*, but also involved letting the nine BM building blocks forming *"the basis for a handy tool"*, i.e. the *"Business Model Canvas"* (Osterwalder and Pigneur, 2010, p 42).

Table 4.13: Operationalisation of the BM building blocks – Part I (Source: Osterwalder and Pigneur, 2010, pp.20-41).

	Description	Problematisation / Explanation	Operationalisation
Customer Segments	Defines the different groups of people or organisations an enterprise aims to reach and serve	For whom are we creating value? Who are our most important customers? Customer groups represent separate segments if: Their needs require and justify a distinct offer; They are reached through different Channels; They require different types of relationships; They have substantially different profitabilities; They are willing to pay for different aspects of the offer	Different segment types: Mass market; Niche market; Segmented; Diversified; Multi-sided platforms (Multi-sided markets)
Value Propositions	Describes the collection of products and services that create value for a specific Customer Segment	What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? Which customer needs are we satisfying? What bundles of products and services are we offering to each Customer Segment? A Value Proposition creates value for a Customer Segment through a distinct mix of elements catering to that segment's needs	Values may be quantitative or qualitative and include: Newness; Performance; Customisation; "Getting the job done"; Design; Brand / Status; Price; Cost reduction; Risk reduction; Accessibility; Convenience / Usability
Channels	Describes how a contractor communicates and reaches its customers segments to deliver a value proposition	Through which Channels do our Customer Segments want to be reached? How are we reaching them now? How are our Channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?	Channel types: Sales force; Web sales; Own stores; Partner stores; Wholesaler Channel phases: Awareness; Evaluation; Purchase; Delivery; After sales
Customer Relationships	Describes the types of relationships that a contractor establishes with specific customer segments	What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How costly are they? How are they integrated with the rest of our BM? A company should clarify the type of relationship, ranging from personal to automated, it wants to establish with each Customer Segment. Customer Relationships may be driven by: customer acquisition, customer retention, boosting sales	Customer Relationship categories: Personal assistance; Dedicated personal assistance; Self-service; Automated services; Communities; Co-creation

The adaptation of the BMO into a "*Business Model Canvas*" is in line with Kindström (2005, p 65), who states that depending on the purpose and perspective; "*it is possible to have both a finer and rougher granulation*" and with Kihlén (2007, p 43), who states that "*to be used by practitioners it*" (referring to the three general dimensions of a BM, which were proposed by Kindström, 2005, p 64) "*needs to be further refined*", i.e. it needs to have a finer granulation. Coming from a simplified, "*coarse-grained division*", Kindström (2005, p 65) and Kihlén (2007, p 43) foresaw the necessity of finer granulations, i.e. further decompositions, of their BM concepts. In the case of the BMO, which is a "*fine-grained division*", what was required was the opposite, i.e. a rougher granulation, in order to better suit the practical requirements, since the finer granulation of the BMO (see Table 4.10) was impractical in practise. In Table 4.12, the "*Business Model Canvas*" is illustrated.

Table 4.14: Operationalisation of the BM building blocks – Part II (Source: Osterwalder and Pigneur, 2010, pp.20-41).

	Description	Problematisation / Explanation	Operationalisation
Revenue Streams	Represents the cash a contractor generates from each customer segment	For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues? Each Revenue Stream might have different pricing mechanisms: fixed (list price; product feature dependent; customer segment dependent; volume dependent) and dynamic (negotiation / bargaining; yield management; real-time-market; auctions) pricing	Ways to generate Revenue Streams: Asset sale; Usage fee; Subscription fees; Lending / Renting / Leasing; Licensing; Brokerage fees; Advertising
Key Resources	Describes the most important assets required to make a BM work	What Key Resources do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams?	Key Resource categories: Physical; Intellectual; Human; Financial
Key Activities	Describes the most important things a contractor must do to make its BM work	What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams?	Key Activities categories: Production; Problem solving; Platform / Network
Key Partnerships	Describes the network of suppliers and partners that make a BM work	Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform? There are three motivations for creating partnerships: optimisation and economy of scale; reduction of risk and uncertainty; acquisition of particular resources and activities	Partnership types: Strategic alliances between non-competitors; Coopetition: strategic partnerships between competitors; Joint Ventures to develop new businesses; Buyer-supplier relationships to assure reliable supplies
Cost Structure	Describes all costs incurred to operate a BM	What are the most important costs inherent in our business? Which Key Resources are most expensive? Which Key Activities are most expensive? There are two classes of BM Cost Structures: cost-driven and value-driven	Cost Structure characteristics: Fixed costs; Variable costs; Economies of scale; Economies of scope

While the pillars of the BMO have been eliminated (in line with a suggestion by Kihlén, 2007, p 48), the “*Business Model Canvas*” (Osterwalder and Pigneur, 2010) consists of nine building blocks, but some of their names and contents have been changed or redefined. The new names and content of the building blocks are presented in Table 4.12. While BM building block labels and content have changed in comparison to the BMO, the most dramatic change in the “*Business Model Canvas*” is the rougher granulation, or decomposition, i.e. the levels below the building blocks. The detailed descriptions, or the theoretically oriented decompositions, of the BMO elements (see Table 4.10) have been substituted for what can be regarded as a more practically oriented operationalisation (see Section 4.2) of the BMO. In Table 4.13 and Table 4.14, the BM building blocks are described, problematised, explained and operationalised.

4.5.6 Specific Business Model Configurations and Patterns

In a generic BM ontology, a BM *“is understood as a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm”* (Gordijn *et al*, 2005). The author regards generic BMs as concepts that can be used for different specific configurations of a number of specific components, which, e.g., describe actors, activities, resources, relationships, roles and responsibilities. Furthermore, specific BM configurations are used as concepts to describe the different ways in which a DPA can do business with its suppliers and customers. Based on these configurations; specific written contracts, which, e.g., also regulate information sharing, risk sharing and reward (gain) sharing, are the physical manifestations of the underlying specific BM configurations.

The configuration approach to BMs is in line with the configuration school of strategy, as identified by Mintzberg *et al* (1998, p 3). According to Kindström (2005, p 50), *“Configurations are constellations of elements designed to function together in the most effective and efficient way”*. Building configurations is about two things; *“making choices about what a company does and how it will do it”* and *“ensuring that the things a company does reinforce each other”* (Miller and Whitney, 1999). This reasoning is in line with Porter (1996), who state that *“strategy involves a whole system of activities, not a collection of parts”* and that *“competitive advantage comes from the way the activities fit and reinforce each other”*. Based on the configuration perspective, BMs can be regarded as an entire spectrum of different ways of doing business, which is in line with Grimsey and Lewis (2004b, p 54).

If configuration is regarded as the creation of a new BM, then the revision of an already existing BM can be regarded as a reconfiguration of a BM. Reconfiguration is about *“finding out new ways of doing business by reallocating roles among players that enhance value creation effectiveness”* (Ramirez and Wallin, 2000). According to Normann (2001, p 138) there is much reconfiguration in business today because: *“It is possible – therefore it will be done”* (which is referred to as the *“the vacuum principle”*). Normann (2001, p 27) considers reconfiguration to enable the mobilisation of the best combination of resources for a particular situation, to a particular customer, at a given time and in a given place; independent of location, *“to create the optimum value/cost result”* to be *“the principle of density”*³⁴. BM reconfiguration is defined as Business Model Innovation (BMI) by Santos *et al*

³⁴ *“Density expresses the degree to which such mobilisation of resources for a “time/space/actor” unit can take place” and “The ultimate expression of the density principle would mean that any economic actor at any time would have more or less a whole world of specialist knowledge and specialised assets at his or her disposal”* (Normann, 2001, p 27).

(2009). Zott and Amit (2010), use the term BM design to refer to BM configuration and BM reconfiguration. Osterwalder and Pigneur (2010, pp. 248-249) also use the term “*design*” and propose five phases of the BM design process: mobilise (prepare for a successful BM design project), understand (research and analyse elements needed for the BM design effort), design (generate and test viable BM options and select the best), implement (implement the BM prototype in the field), and manage (adapt and modify the BM in response to market reaction).

No differentiation will be made between using the BM concept for describing an existing BM, evaluating an existing BM, reconfiguration of an existing BM, or configuration of a new BM. However, the BM concept will be used to describe and evaluate already existing BMs. BM description, configuration, and reconfiguration will result in certain characteristics, certain arrangements of building blocks and/or certain behaviours. When similar characteristics, arrangements and/or behaviours are shared among a number of BMs, these similarities can be referred to as BM patterns (Osterwalder and Pigneur, 2010, p 55).

4.5.7 Business Model Alignment and Misalignment

For an organisation to be successful, in terms of financial performance or non-profit ideals, it is often argued that “*there needs to be a fit, consonance, or congruence, between the elements that constitute that organisation*” (Kindström, 2005, p 57). From a Systems Theory (ST) perspective, Normann (1975, p 28) regards a corporate structure as consisting of mutually dependent subsystems. Consequently, the relationships between the subsystems can be described as “*fits*” when the subsystems support, i.e. reinforces (see Section 4.5.6), each other’s functions; or “*misfits*” when they do not (Normann, 1975, p 29). According to Kindström (2005, p 53) “*Fit is one of the cornerstones of the BM concept*”. Porter (1996) states that there are three types of fit: “*First-order fit is simple consistency between each activity (function) and the overall strategy*”; “*Second-order fit occurs when activities are reinforcing*”; and “*Third-order fit goes beyond activity reinforcement to ... optimisation of effort*”. Magretta (2002) states that a BMs “*great strength as a planning tool is that it focuses attention on how all the elements of the system fit into a working whole*”. According to Miller (1992), there are two types of fit: environmental fit (“*fit with external environments*”) and internal fit (“*fit among ... elements of structure and process*”). Zott and Amit (2008) ask the question “*Which BM fits best with the firm’s choice of market strategy?*” and continue to state that “*the literature generally considers coherent configurations of design elements that manifest themselves as peaks in the performance landscape as good fit*”. The implications for the reported research are that there needs to be an internal fit within a specific configuration of the PPBM, i.e. between the different building blocks, and also an external fit between a specific

configuration of the PPBM and the deal for which it has been designed, or the strategy that it is intended to realise.

The terms “fit” and “misfit” are frequently referred to as “alignment” and “misalignment”. According to Lundin and Norrman (2010), in the context of supply chain alignment, “*One way of treating misalignments is incentive alignment, or risk and gain sharing*”. This is an aspect of external (environmental) fit (alignment) also for a BM. That alignment is of importance in defence acquisition (see Section 4.6), is reinforced by Johnsen *et al* (2009), who state that “*The shifting supplier responsibilities throughout the CADMID cycle*” (see Section 5.3.4) “*highlights the need for advanced and complex partnership arrangements including mechanisms for risk and reward sharing, strategic alignment, transparency, commitment and so on*”.

According to Osterwalder and Pigneur (2010, p 212), “*assessing a BM from a big picture perspective and assessing it from a building block perspective are complementary activities*” and “*a weakness in one building block ... may have consequences for one or several other building blocks – or for the entire model*”. Consequently, BM evaluation may lead to the revelation that different building blocks are “*moving in different directions*”, i.e. that there is a misfit, or a misalignment, between different building blocks. BM evaluation may also lead to the revelation that there is a misalignment between the BM and the business strategy.

4.5.8 Business Model in the Public and Non-profit Sectors

“The application of the Canvas is in no way limited to for-profit corporations. You can easily apply the technique to non-profit organisations, charities, public sector entities, and for-profit social ventures”.

Osterwalder and Pigneur (2010, p 264)

According to Osterwalder and Pigneur (2010, p 264), all organisations have a BM, even if the word “*business*” is not used to describe its activities; and in order to survive, “*every organisation that creates and delivers value must generate enough revenue to cover its expenses*”. Consequently, all organisations have BMs. The difference between for-profit BMs and non-profit BMs is that in the former focus is on maximising earnings and that in the latter focus is on ecology, social causes, and public service mandates (Osterwalder and Pigneur, 2010, p 264). Although Osterwalder and Pigneur (2010, p 264) subscribe to the notion that non-profit BMs, or beyond-profit BMs, should be referred to as enterprise models, the term BM will be used also for non-profit BMs. The area of non-profit BMs “*might well merit its own book*” (Osterwalder and Pigneur, 2010, p 263), and the BM concept has apparently already been used in the public sector, exemplified by the Public Works and Government Services of Canada (Osterwalder and Pigneur, 2010, p 15). However, as of yet, academic research in the area of non-profit BMs remains

to be conducted and reported. Hence, academic research in the area of BMs remains a “white space” and there is consequently a theoretical gap (see Section 4.13.1) when it comes to BMs for non-profit organisations.

4.5.9 Private Sector Theory versus Public Sector Practice

In public procurement practice, and consequently also in defence acquisition practise, at least in the UK, the concept of BMs includes licensing, contracting out and privatising (HMT, 2007, p 44). Public Private Partnerships (PPPs) are considered to be a particular form of public procurement BMs (HMT, 2007, p 53). According to Her Majesty’s Treasury (HMT), PPPs cover a range of business structures and partnership arrangements, from the Private Finance Initiative (PFI) to Joint Ventures (JVs) and concessions, to outsourcing, and to the sale of equity stakes in state-owned businesses (HMT, 2000a, p 8). These interpretations of the concept of BMs are very different from the conventional interpretation as described in Section 4.5. Consequently, in British public procurement practice, only one, i.e. “Key Partnerships”, of the nine building blocks from Table 4.12 is considered, thus reducing the concept of BMs to the equivalent of different forms of Public Private Participation, Public Private Cooperation (PPC, see Section 4.7.5), or different forms of PPPs (see Section 4.7.9), depending on the preferred terminology. This approach to the BM concept is similar to the aforementioned (see Section 4.5.2) classification proposed by Grimsey and Lewis (2004b, p 54), which is a classification of a part of a BM, rather than a classification of a specific BM configuration. The stance taken will be one in favour of the entire BM concept, thus regarding the classifications provided in British defence acquisition practise (e.g. HMT, 2007, p 44) and in British PPP theory (Grimsey and Lewis, 2004, p 54) as fragmented, and referring only to a part of a BM (see Section 4.5.3).

4.6 Defence Acquisition

“Defence procurement is the poor relation to a range of other policy issues located in the broader realm of defence. In general those who formulate British defence policy tend to follow the Clausewitzian tradition in which the focus of intellectual and material effort is placed on strategic art rather than the efficient preparation of the material base needed to realise these aspirations. In Clausewitz’s case this view arose as a reaction to the tendency of Eighteenth Century armies to indulge in over-meticulous preparation that became a substitute for strategy. More troublesome and less easy to explain is why, in the contemporary world, defence procurement is frequently an afterthought in the priorities of policy makers.”

Chin (2004, p 1)

4.6.1 Public Procurement

Public procurement³⁵ refers to the government's activity of purchasing the goods and services that it requires in order to carry out its functions, and there are three phases of the public procurement process (Arrowsmith, 2010a, p 1): Procurement planning (Deciding which goods or services that are to be bought and when); Contractor selection (The process of placing a contract to acquire those goods or services which involves, in particular, choosing who is to be the contracting partner and the terms on which the goods or services are to be provided); and Contract administration (The process of administering the contract to ensure effective performance). It is common to divide procurement into three categories, which illustrate the diversity of different types of procurement transactions (Arrowsmith, 2010a, p 2): Goods (Supplies or products); Works (Construction); and Services (Manual services).

Commentators have offered different accounts of the objectives of public procurement. Arrowsmith (2010a, p 4) contributes with the following list of eight objectives of public procurement systems: Value-for-Money (efficiency) in the acquisition of required goods, works or services; Integrity (avoiding corruption and conflicts of interest); Accountability; Equal opportunities and equal treatment for providers; Fair treatment of providers; Efficient implementation of industrial, social and environmental objectives (*"horizontal policies"*) in procurement; Opening of public markets to international trade; and Efficiency in the procurement process. The concept of Value-for-Money³⁶ (VfM, see Sections 4.7.2 and 4.9.9), or efficiency, is central in public procurement. According to Arrowsmith (2010a, p 6), there are three aspects to the objective of VfM: Ensuring that the goods, works or services acquired are suitable, i.e. that they can meet the requirements for the task in question and that they are not over specified (*"gold-plated"*); Concluding an arrangement to secure what is needed on the best possible terms (which does not always mean the lowest price); and Ensuring the contracting partner is able to provide the goods, works or services on the agreed terms. In order to implement these public procurement objectives, there are three key principles (Arrowsmith, 2010a, p 20): Transparency; Competition and Equal treatment.

³⁵ Public procurement is the phrase commonly utilised in the EU, since it is the terminology used in the EU legislation. For the same activity, the World Trade Organisation (WTO) refers to government procurement, and the US generally refers to government contracts, or public contracts (Arrowsmith, 2010, p 1).

³⁶ A major objective of most, perhaps all, procurement systems is to successfully acquire the goods, works or services concerned on the best possible terms. This is often referred to as Value-for-Money (VfM), efficiency or economic efficiency (Arrowsmith, 2010a, p 5).

There are three different basic methods of procurement for goods, works and services. According to Arrowsmith (2010b, p 33), these three methods are: Formal tendering (open tendering, two-stage tendering, and restricted tendering); Informal tendering (request for proposals, competitive negotiation and request for quotations); and Single-source procurement. The last decades, the procurement of privately financed infrastructure has become increasingly popular and adopted in many countries. According to Arrowsmith (2010c, p 127), in essence, the concept of a privately financed infrastructure project refers to the situation in which: The government is responsible for a service or facility which involves the use of significant buildings or other assets; The management of the service or facility for which the government is responsible is entrusted to the private sector; and The private sector provides the capital for the project. Traditionally, such infrastructure projects have been financed by the government. Under the Private Finance method, in the UK referred to as the Private Finance Initiative (PFI, see Section 4.7.7), the government lets a contract for a private contractor to, e.g., construct a bridge with the contractor's own financing, and then let the contractor recover its costs and profit by either levying tolls, or through periodic payments from the government. The contractor will often retain ownership of the asset throughout the contract period, and sometimes also after the contract period, thus also retaining the risk of the residual value of the asset. Other times, ownership of the asset will be transferred to the government at the end of the contract. According to Arrowsmith (2010c, p 128) the concept of the PFI must be distinguished from: Privatisation (which refers to the case where the whole responsibility for providing a service is given to the private sector, see Section 4.7.11); and Contracting out (outsourcing, which covers all cases where the private sector is given responsibility for the day-to-day carrying out of services previously carried out by the government, which does not always mean that the private contractor provides the financing for the project in question, see Section 4.7.6).

PFI is a method of organising the provision of services or facilities which falls somewhere between privatisation and contracting out. PFIs are often considered to be a special form of Public Private Partnerships (PPPs, see Section 4.7.9), which has no precise or universal meaning (Arrowsmith, 2010c, p 129). At its broadest, PPP is used to refer to any kind of arrangement in which the private sector becomes involved in providing public services and infrastructure, covering not only privately financed, but also many other forms of outsourced provision. More often than not, it is used to refer to arrangements that are long-term in nature, and often also covers non-contractual forms of cooperation between the public and the private sectors, such as setting up Joint Venture (JV) companies to provide public

services that are part public and part privately owned. There are two main reasons for the use of the PFI (Arrowsmith, 2010c, p 131): To enhance³⁷ Value-for-Money (improve service quality, lower costs, etc.); and the development of projects which otherwise might not have occurred³⁸.

4.6.2 Defence Procurement

According to some authors (see Section 4.6.3), procurement is another word for describing the activity of purchasing or acquisition³⁹, and defence procurement refers to the activities required in order to provide a country's national security (Markowski *et al*, 2010c, p 12). National security can be regarded as the final output, in the form of military responses to threats to the national security, of the defence production/value chain (Markowski *et al*, 2010c, p 14).

The provision of national security is a government monopoly. Many outputs that are produced by the Defence are *public goods*. According to Markowski *et al* (2010c, p 16) public goods are characterised by so called *non-excludability* (of non-payers from consumption/use) and *non-rivalry* (among users – so that one user's consumption does not reduce the availability of the good for other users). This may discourage the commercial, private market provision of such goods, which means that government may have to arrange to supply them if they are to be supplied at all. Through the procurement of goods and services, a National Defence Organisation (NDO), a publicly owned and government-controlled entity, contributes to the formation and sustainment of national military capabilities. The goods and services thus procured consist of military equipment, consumables, through-life support services and training (Markowski *et al*, 2010b, p 2).

³⁷ Borrowing money is generally cheaper for the public sector than for the private sector. Any benefits of private sector financing must generally outweigh the extra cost of financing which the private sector incurs, in order for the project to represent improved VfM (Arrowsmith, 2010c, p 131).

³⁸ If the PFI does not offer better VfM than the alternative, not only are future taxpayers or users paying for the project, but they are paying more than what is needed (Arrowsmith, 2010c, p 131).

³⁹ Some authors (e.g. Markowski *et al*, 2010c, p 12) are of the opinion that acquisition, procurement and purchasing are synonymous terms, which can be used interchangeably, while other authors (e.g. Lawrence, 2009, p 155) argue that these terms are not synonyms, and that acquisition encompasses more than merely procurement. The author subscribes to the notion that there *is* a need for new terminology, i.e. defence acquisition, in order to capture the development that defence procurement has undergone over the past couple of decades. This development will be further explored in Chapter 5. Until Chapter 6, the author will use defence procurement and defence acquisition interchangeably, in accordance with the preferences and habits of the referenced authors.

The expenditure on weapons⁴⁰ procurement does not include the cost of equipment use, i.e. operations, or the cost of sustainment, i.e. support. Figure 4.9 illustrates the components of Through-Life Costs (TLC). The TLC of a project is the total expenditure directly associated with it from concept to disposal (cf. CADMID, see Section 5.3.4). Platforms, i.e. ships, Main Battle Tanks (MBTs) and aircraft, have long in-service lives, typically several decades. Consequently, the costs for operations and support are likely to outweigh the initial procurement cost, even though procurement costs for platforms are usually relatively high. The costs of post-production support often exceed, by two or three times, the costs incurred during the Research and Development (R&D) and production phases (Randall *et al*, 2010).

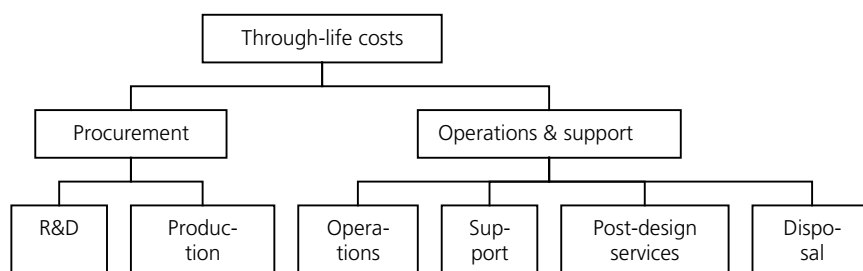


Figure 4.9: The components of through-life costs (Source: Hambleton *et al*, 2005, p 40).

The competition for military advantage has led larger nations, such as the US, to develop and procure increasingly complex materiel which is at the limits of both their capacity to absorb and the capacity of domestic and foreign suppliers to produce (Markowski *et al*, 2010d, p 55). However, most small countries are presumably referred to a choice between what they are able to develop in-country; importing, and perhaps adapting, technologically sophisticated, mature products as Military-Off-The-Shelf (MOTS) or Commercial-Off-The-Shelf (COTS) products; or enter into international cooperation in order to share the large development costs. Defence procurement policy has two general objectives, which are not always compatible and consequently may necessitate policy trade-offs (Markowski *et al*, 2010b, p 3): the supply dependability objective (which means to assess and/or form dependable supply chains to secure reliable and sustainable deliveries of goods,

⁴⁰ Traditionally, weapons systems have been platform-enabled with munitions and target acquisition equipment mounted on vehicles, ships and aircraft. The platform is envisaged as the long-lived “integrating” component of a weapons system, on which all other sub-systems are mounted and on which they depend for their effective functioning (Markowski *et al*, 2010d, p 54).

services and know-how to form and maintain defence capabilities in the required state of operational readiness); and the Value-for-Money (VfM) objective (which means to buy what is needed cost effectively (which should not be taken to mean “at least cost”) and in accordance with Defence’s quality and schedule requirements).

According to Markowski *et al* (2010b, p 3), in functional terms, defence procurement policy should guide a NDO, of which a Defence Procurement Agency (DPA) can be a part, in determining: Local content requirements (Which of the required capability inputs should be made in-country and which is best sourced from either local or overseas suppliers on a Best-Value-for-Money (BV/VfM, see Section 4.7.2) basis); Make-or-buy considerations (Which of the materiel required to be made in-country would be best made in-house, in government-owned and government-operated factories and shipyards, and which would best be sourced from external suppliers); Source selection requirements (How to go about selecting sources of supply, e.g., whether to rely on market competition or designate preferred suppliers, see Section 4.6.6); Contracting arrangements (Which type of contract to use to engage the chosen supplier, see Section 4.6.7); and Supplier Relationship Management (How to manage the delivery process and associated relationships with suppliers, SRM).

4.6.3 Defence Acquisition – More than Defence Procurement?

“It is a truth universally acknowledged that defence equipment acquisition is one of the most challenging of human activities. Space flight presents greater technical problems, childbirth is more painful and regeneration of an inner city involves more complex socio-political interactions, but defence equipment acquisition is a uniquely demanding bureaucratic morass littered with military, technological, economic and political pitfalls.”

Hambleton et al (2005, p 61)

Some authors (e.g. Markowski *et al*, 2010) intentionally use defence procurement and defence acquisition interchangeably. Other authors (e.g. Lawrence, 2009) are adamant that defence procurement is a subset of defence acquisition. According to Lawrence (2009, p 155), “*although acquisition includes the activity of procurement, a term generally used to refer to the purchasing of goods or services by governments from external suppliers; it is a much broader discipline. Modern weapons systems are complex, expensive and will often remain in service for many years. Decisions made in*

the early phases of an acquisition project⁴¹, in particular those which define what will actually be acquired, are likely to have significant downstream implications, which, if they have not been anticipated and recognised in planning, may result in the overall failure of the project. Acquisition attempts to take account of this by adopting a whole life approach, which views the project as a single undertaking across its entire lifecycle from identification of need through to disposal. Acquisition thus involves activities for identifying the requirements for equipment⁴² and/or services⁴³ to meet the needs of the user, procuring them, ensuring their support throughout their useful lifecycle and providing for their eventual disposal". However, "acquisition not only aims to provide equipment and/or services to meet the user needs but also to ensure that defence budgets are wisely spent and that the equipment and/or services thus represent Value-for-Money (VfM) for the taxpayer" (Lawrence, 2009, p 156). The obligation of VfM consequently requires the acquisition manager to identify the most balanced trade-off between the performance required by the user (Better), the cost of the project (Cheaper) and the project timescale (Faster). In order to achieve this, a prerequisite of the acquisition process is that it is objective, disciplined and transparent.

According to Lawrence (2009, p 155), acquisition is the process through which equipment and/or services sourced from external contractors are utilised in the creation of effective military capability. The external contractors are normally defence industry suppliers from whom the required equipment and/or services are procured through contractual agreements that regulate the supply chain. Defence acquisition can be broken down into three broad areas of activity (Lawrence, 2009, p 156): Deciding what to acquire; deciding how to acquire it; and acquiring it.

Military tasks and defence planning assumptions are derived, at the strategic planning level, from defence policy. This is then translated to, in general terms, descriptions of what the Armed Forces should be capable of achieving. Further analysis will subsequently lead to capability requirements and the comparison of these requirements with the existing capability inventory, which will reveal capability gaps, which will, in turn, lead to the requirement for a new acquisition project. Capability gaps may arise due to any of the following reasons (Lawrence,

⁴¹ An acquisition *project* is a set of activities aimed at providing equipment and/or services to meet agreed performance, cost and time targets (faster, cheaper, better), while the defence *programme* is the entire range of projects being executed or planned (Lawrence, 2009, p 157).

⁴² "*Equipment*" refers to weapons systems or other war-like materiel. However, equipment may also refer to non-warlike materiel required by the defence establishment (Lawrence, 2009, p 155).

⁴³ "*Services*" refers to non-physical items that are required in the building of military capability and may be externally sourced, e.g. various forms of consultancy, logistics support and training (Lawrence, 2009, p 155).

2009, p 160): Policy has changed (new military tasks may be added, requiring new sets of capabilities); The threat has changed (new threats may arise or the character of an existing threat may change); Technology has advanced (technological developments may create new and better ways of carrying out military tasks); and/or Doctrine has changed (Armed Forces will learn from each other's approaches to the application of forces and tend to evolve in similar directions).

There are many ways in which to acquire the equipment and/or services necessary to address a capability gap. The preferred acquisition option may be arrived at by considering the problem from several different perspectives, including (Lawrence, 2009, p 167): Does new equipment need to be acquired? (Leasing may be an option in some instances); is the equipment/service available Off-The-Shelf (OTS), or does it need to be developed? (Appropriate COTS or MOTS may be available, either directly, or after some degree of adaptation); what is the scope of the acquisition? (Rather than acquiring sub-systems, such as sensors, weapons and Command and Control (C2) systems, it may be practical to transfer responsibility for the production of the whole system to a prime contractor, who will subsequently be required to contract sub-contractors and to deliver the equipment or services to specification, cost and time. Furthermore, when acquiring a complex defence system, it may well be worthwhile to acquire support elements, such as spares, technical and maintenance support, and a training programme); Are the required equipment and/or services available from more than one supplier? (If there are more than one supplier, cost, performance and timescale comparisons of the available solutions and selection of the most suitable option will usually be best achieved by running an acquisition competition, which is widely considered to be a key means of ensuring best VfM in public procurement); Are other states interested in a similar acquisition project? (An international cooperation may be possible); and Does the capability need to be acquired in one go? (Evolutionary or incremental acquisition may be possible, see Section 5.3.4).

Defence acquisition and management are complex activities. Taylor and Tatham (2008) suggest that there are five key challenges facing the management of UK defence: *"What is the appropriate balance between Empowerment and Coherence?"*; *"What should the governmental sector do for itself, and what should be outsourced to others?"*; *"How should support for equipment be arranged in a time of frequent and surprising operations?"*; *"In an era of rapid progress in civil technology, how does a Ministry of Defence assure its optimum inclusion into defence systems?"*; and *"How to develop a whole life and pan-organisation cost mentality?"* The following four *"Laws of Equipment Procurement"*, based on a UK MoD perspective, sums up the intricate complexity of defence acquisition rather succinctly, even though conceivably exaggerated: *"All cost estimates are wrong"* (Kincaid, 1997, p 88); *"All major equipment projects take twice as long as envisaged originally"* (Kincaid, 1997, p 90);

“Despite increasing numbers and power of financial scrutineers, no effective scrutiny ever takes place” (Kincaid, 1997, p 50); and *“Contracts negotiated by MoD with industry always leave MoD in a weak legal position”* (Kincaid, 1997, p 91). Defence acquisition in the UK will be further explored in Chapter 5.

To summarise what defence acquisition is all about, *“Procurement of military equipment is a most complex business, aimed at the uncertainties of future warfare, harnessing advanced (often immature) technology to gain a leading edge, and paid for by the country’s tax-payers, to whom Value-for-Money (however that is defined) must be demonstrated”* (Kincaid, 1999, p 19).

4.6.4 The Defence Procurement Agency

Defence procurement of military materiel can be undertaken by a single, specialised organisational unit, or dispersed between larger organisational elements such as the services, or delegated to a detached specialised procurement agency. Nowadays, the latter is the case in many countries, such as in the UK (the Ministry of Defence Equipment & Support, MoD DE&S; see Section 5.4), Australia (the Australian Defence Materiel Organisation, DMO) and in Sweden (the Swedish Defence Materiel Administration, FMV; see Section 2.5). Even though the author is well aware that the national incarnations of such a procurement agency comes in many guises, the generic detached specialised procurement agency will henceforth be referred to as *“the Defence Procurement Agency”* (DPA) throughout this chapter⁴⁴. In addition to the domestic alternatives, there is also the option, particularly for smaller countries, to cooperate with allies and other partners in a large, multinational DPA. The NATO Maintenance and Supply Agency (NAMSA), Organisation Conjointe de Coopération en matière d’Armement (OCCAR), the European Defence Agency (EDA) and the Nordic Armaments Cooperation (NORDAC) are examples of such co-operations (see Section 1.2.4).

The products that are procured in the defence production/value chain travel along the supply chain as the result of transactions among the agents, including the DPA, that comprise the supply chain. According to Markowski *et al* (2010c, p 30), each procurement transaction between the DPA and its suppliers consists of three components: The deal (which defines the content of deliverable, particularly its scope (the description of what is being acquired, including product performance/quality), scale (how many units) and schedule (delivery date or dates), the nature of the exchange involved (e.g. goods for money or barter), and the

⁴⁴ When specific, national DPAs are referred to, they will be referred to accordingly, e.g. as *“The British DPA”*, *“DE&S”*, *“The Swedish DPA”* or as *“FMV”*.

associated consideration (the price which the buyer agrees to pay the seller for the deliverable)); The contract (which is a formal agreement between the buyer and the seller that is normally legally enforceable, and which provides the formal description of the deal and the assignment of associated property and decision-making rights between the parties to frame the deal under the relevant legal system. The contract may also specify the nature of the relationship to be forged by the parties, the assignment of adjudication and enforcement rights, and other rules, vetoes and restraints); and The relationship between the buyer and the seller (the nature of interaction between them during the procurement process and, often, after the product is delivered. Contract-governed relationships along the supply chain may take a variety of forms; ranging from closely collaborative to arm's length and potentially even adversarial, see Section 4.7.8).

The organisations that operate defence production capabilities may be exposed to actual or potential alternative sources of supply, which is critical for a DPA in order to be able to derive VfM in procurement. Such competition is of particular importance in instances when government insists on a high degree of "*Local content*" (see above). For larger countries, such as the US, there may well be several domestic sources of supply. For smaller countries, such as Sweden, there is probably either one or no such source at all. In instances when the smaller country has a domestic source of supply, this is often due to a high preparedness by the government to pay a significant premium in order to ensure domestic production. According to Markowski *et al* (2010c, p 32), the relationship between the buyer, i.e. the DPA, and the sellers, i.e. the defence industry suppliers, will be shaped by market structure, which can be characterised by: Monopsony (which is when the DPA is the only customer for goods and services produced by local defence-dependent suppliers and, thus, may have market power to impose on these suppliers price limits, product specifications, and delivery schedules); Monopoly (which is when there is only one source of supply and no close substitutes so that the supplier has market power over prices, product specifications and delivery schedules); Bilateral monopoly (which is when monopoly (or market power) on the supply side confronts the demand side monopsony. This creates conditions for an essentially "*strategic*" bargaining relationship between supplier and defence customer); Oligopoly (which is when there is a small number of rival sources of supply, which are well aware of each other's market power over prices, product specifications and delivery schedules, and where suppliers act "*strategically*" in anticipation of rival responses); Monopolistic competition (which is when there is a number of specialised suppliers of partially differentiated but largely generic products who each compete for a market niche for their particular product variant but, given the presence of reasonably close substitutes, have relatively little market power to fix prices); and Atomistic competition (which is when there are many suppliers, who produce substitutable products and act as price-takers).

4.6.5 Traditional Procurement

In Section 4.16, the novel concept of Procuring Complex Performance (PCP) will be introduced. In order to differentiate their novel approach to procurement from the existing approach to procurement, the authors (Howard and Caldwell, 2011, p 6) refer to the existing variety as “*traditional procurement*”. Since PCP will be introduced later in this chapter, the term “*traditional procurement*” will be used in this section in order to briefly account how the inventors of PCP perceive the existing approach to procurement. Howard and Caldwell (2011, pp. 6-9) also make a case for why traditional procurement methods cannot buy complex performance. This argument is also relevant for the reported research.

According to Howard and Caldwell (2011, p 6), “*Procurement is an odd field or discipline where concepts such as Kraljic’s matrix are generally accepted by academics and practitioners, yet the originator of this popular tool was a consultant*”. Kraljic (1983) stated that “*In many companies, purchasing, perhaps more than any other business function, is wedded to routine. Ignoring or accepting countless economic and political disruptions to their supply of materials, companies continue to negotiate annually with their established networks of suppliers or sources. But many purchasing managers’ skills and outlooks were formed 20 years ago in an era of relative stability, and they haven’t changed. Now, however, no company can allow purchasing to lag behind other departments in acknowledging and adjusting to worldwide environmental and economic changes. Such an attitude is not only obsolete but also costly*”.

According to Kraljic (1983), a company’s need for a supply strategy depends on two factors: The strategic importance of purchasing in terms of the value added by product line, the percentage of raw materials in total costs and their impact on probability; and The complexity of the supply market gauged by supply scarcity, pace of technology and/or materials substitution, entry barriers, logistics cost or complexity, and monopoly or oligopoly conditions. These two factors are the two dimensions which in combination constitute Kraljic’s famous two-by-two matrix, referred to as “*the purchasing product portfolio-approach*” by van Weele (2002, p 146). According to Kraljic (1983), by assessing the company’s situation in terms of these two factors, “*top management and senior purchasing executives can determine the type of supply strategy the company needs both to exploit its purchasing power vis-à-vis important suppliers and to reduce its risk to an acceptable minimum*”. Furthermore, attractive new options and/or serious vulnerabilities may be discovered as the assessment explores questions such as: Is the company making good use of opportunities for concerted action among different divisions and/or subsidiaries?; Can the company avoid anticipated supply bottlenecks and interruptions?; How much risk is acceptable?; What make-or-buy policies will give the best balance between cost and flexibility?; To what extent might cooperation with suppliers or even competitors strengthen long-term supply relationships or

capitalise on shared resources? According to van Weele (2002, pp. 148-149), every segment in the portfolio, represents different product groups: Strategic products; Leverage products; Bottleneck products; and Routine products, which correspond to different possible strategies: Partnership (for strategic products); Competitive bidding (for leverage products); Securing continuity of supply (for bottleneck products); and Systems contracting (for routine products).

According to Howard and Caldwell (2011, p 6), Kraljic's matrix has been, and is, "*a powerful tool used by most procurers (whether acknowledged or not) to analyse the purchasing portfolio of a firm and to divide how procurement resources should be allocated*"⁴⁵. However, as will be outlined in Section 4.16, Howard and Caldwell (2011, p 7) make a case for why traditional procurement is outdated, and why there is a need for a new approach, i.e. Procuring Complex Performance (PCP), for the procurement of Complex Product-Service (CPS).

4.6.6 Sourcing Arrangements

According to van Weele (2002, p 160), considerations regarding the sourcing strategy should include: Global versus local sourcing; Single versus multiple sourcing; and Partnership or competitive bidding? According to Markowski *et al* (2010e, p 121), a DPA can choose between three types of sourcing arrangements: Multiple sources of supply with active competition in and for the market (allows the buyer to switch (substitute) suppliers, relatively costless, before and after contracts are let); Parallel (dual) sources of supply with active competition *for* the market, but limited competition *in* the market (Many suppliers are invited to tender for the status of preferred/designated supplier. Two (dual sourcing) or a handful (parallel sourcing) of suppliers are selected for each procured product or product group. Once the buyer has identified which two or more suppliers it prefers, it can switch order between them at a relatively low cost; and Sole source of supply with limited competition for and no competition in the market.

4.6.7 Contracting Arrangements

The contract is the legal document in which the NDO, through the DPA, stipulates what its supplier is to deliver, on what schedule, and at what price (Markowski *et al*, 2010e, p 121). According to van Weele (2002, p 161), developing a contract strategy requires a decision on two aspects: Buying on

⁴⁵ The utilisation of Kraljic's ideas for Swedish defence acquisition has been discussed in the form of Kraljic's *product portfolio matrix* (Berthelson *et al*, 2007, p 22), and in the form of the discipline of *category management*, which is derived from Kraljic's ideas (Nilsson *et al*, 2009, p 8).

contract or buying on spot basis; and Price agreement vs. performance agreement. Buying under contract means that the buyer pays a previously agreed price and that the buyer has a certainty of delivery. However, the buyer simultaneously loses contact with the market. Buying on spot basis means that the buyer has to pay the current market prices (van Weele, 2002, p 161). For standard quality Off-The-Shelf (OTS) products, price agreements are often sufficient, but when buying services, so called Service Level Agreements (SLAs), a form of performance agreement, have become increasingly popular (van Weele, 2002, p 162).

Price agreements

When a public sector organisation signs a contract with a private sector company, there are two major types of price agreements that have traditionally been the most routinely used, i.e. Fixed-Price Contracts and Cost-Plus Contracts, which are also called Cost-Reimbursement Contracts.

In a Fixed-Price Contract, monetary transactions are not dependent on the amount of resources that the contractor has used to deliver the goods or services. A previously negotiated price, the fixed-price, is paid to the contractor, regardless of the costs that the contractor has had. The contractor's profit is built into the fixed-price. There are many different types of Fixed-Price Contracts, but the Firm Fixed-Price (FFP) is one of the most commonly used for support of systems (Sols *et al*, 2007). The advantages and disadvantages of Fixed-Price Contracts, from the point of view of the buyer, are presented in Table 4.15.

Table 4.15 Advantages and disadvantages with Fixed-Price Contracts (Source: van Weele, 2002, p 56).

Advantages	Disadvantages
The buyer knows the price in advance	Difficult to get insights into supplier costs
The supplier carries the risk	Time consuming to prepare detailed specifications
There is a predetermined completion time	Time consuming to have a formal bidding procedure
There is an incentive for the supplier to deliver as quickly as possible	Unknown which supplier will turn out to be the best

A Cost-Plus Contract is intended to cover the actual cost that the supplier has for delivering the goods or services, up to an agreed limit, plus an additional payment, the fee, which constitutes the profit for the contractor. There are many different types of Cost-Plus Contracts, but Cost-Plus Fixed Fee (CPFF) is one of the most commonly used for support of systems (Sols *et al*, 2007). In all of these Cost-Plus Contracts, the government pays the actual cost (up to the agreed limit) that the supplier has, plus an additional fee. In Cost-Plus Contracts the activities to be performed are not established in advance and the buyer orders the supplier to perform the required activities at a predetermined hourly rate. The advantages and disadvantages of Cost-Plus Contracts, from the point of view of the buyer, are presented in Table 4.16.

Table 4.16: Advantages and disadvantages with Cost-Plus Contracts (Source: van Weele, 2002, p 56).

Advantages	Disadvantages
The buyer knows the cost structure	The buyer does not know the price in advance
The buyer is free to choose supplier	The supplier has no incentive to work faster
The buyer knows what supplier he will be dealing with	The buyer has to take all extra costs
	There is no predetermined completion date

In a CPFF contract, the additional fee is fixed, and agreed before the contract is signed. In a CPIF contract, the additional fee is larger for a contract in which the contractor meets or exceeds the performance targets, including system availability, increasing speed of service, reducing cost of service, and increasing quality of service.

As demonstrated in Table 4.15 and Table 4.16 each of these types of contracts has their advantages and disadvantages. According to Sols *et al* (2007), FFP and CPFF contracts have, in practise, turned out to be reasonable approaches when uncertainties were low, *“although the client will never have full assurance of fulfilment of objectives if there are significant uncertainties associated with the contract”*. The next step in the development of price agreements was the introduction of incentive mechanisms, which generated Fixed-Price Incentive (FPI) and Cost-Plus Incentive Fee (CPIF) type contracts. FPI and CPIF of contracts, with built-in incentive mechanisms, were a step in the right direction, but *“none of them were entirely satisfactory to either party”* (Sols *et al*, 2007).

Performance agreements

In addition to Fixed-Price and Cost-Plus Contracts, which have hitherto been the two primary categories of Public Private Contracts, there are also several other contract types. Of particular interest to the focus of this thesis is the emergence of Performance Based Contracts (PBCs). *“PBC converge the interests of the public buyer and the private supplier. PBC enable the public buyer to ensure fulfilment of performance and support objectives and the private supplier to make a reasonable profit”* (Sols *et al*, 2007). In Table 4.17, the advantages and disadvantages with FFP, CPFF, CPIF, FPI and PBC contracts are summarised.

Doerr *et al* (2005) argue that performance agreements, just like outsourcing and privatisation initiatives, are consequences of New Public Management (NPM, see Section 4.7.1) reforms, which have led to the disaggregation and decentralisation of public sector services and an emphasis on the adoption of private sector management practices within the public sector. Ng and Nudurupati (2010), state that PBC is too narrow and advocate the wider concept of Outcome-Based Contracts (OBC), since PBC infers an *“inside-out”* view, with a provider focus, whereas OBC denotes an *“outside-in”* approach without explicitly stating the responsibility for the outcomes. According to Kim *et al* (2007), PBC, known as

“power-by-the-hour” in the private sector and Performance Based Logistics (PBL) in defence contracting, is “reshaping service support supply chains in capital-intensive industries such as aerospace and defence” and it “aims to replace traditionally used Fixed-Price and Cost-Plus Contracts to improve product availability and reduce the Cost of Ownership (COO) by tying a supplier’s compensation to the output value of the product generated by the customer (buyer)”. PBC should “embody the expected results, primarily system availability, based on the service-directed operational tempo level of resources. The performance contracts with integration contractors must include not only the particular performance metrics for the system, linked to incentives and penalties, but also other unique service contracting facets, to include the involvement of government entities as sub-contractors” (Tuttle, 2005, pp. 309-310).

Table 4.17: Advantages and disadvantages with different types of contracts (Source: Sols *et al*, 2007).

	Advantages	Disadvantages
FFP	Most efficient for customer when uncertainty is low and risks are controllable by the contractor	Not appropriate when uncertainties are high
CPFF	Most efficient for customer when uncertainty is high	Not appropriate when uncertainties are high. High risk to customer of inefficient contractor management
CPIF	Risks are shared in light of uncertainties. Risk sharing is based on relative levels of risk aversion by customer and contractor. In general the customer takes higher risk	Neither party is totally ensured that own goals will be fulfilled
FPI	Risks are shared in light of uncertainties. Risk sharing is based on relative levels of risk aversion by customer and contractor. In general the contractor takes higher risk	Neither party is totally ensured that own goals will be fulfilled
PBC	Customer has maximum assurance of system performance and achievement of operational and support goals, and contractor has highest motivation to perform and earn fair profit	Contract negotiation and follow-up require considerable resources to both parties

Even if the concept itself is somewhat older, the name Performance Based Logistics (PBL) was introduced by the US Department of Defense (DoD) a decade ago, in the second Quadrennial Defense Review (QDR) report, in order to *“compress the supply chain and improve readiness for major weapons systems and commodities”* (US DoD, 2001, p 56). In the US, PBL is defined as *“the purchase of support as an integrated, affordable, performance package designed to optimise system readiness and meet performance goals for a weapons system through long-term support arrangements with clear lines of authority and responsibility. Simply put, performance based strategies buy outcomes, not products or services”* (US DAU, 2005). PBL is an extension of its precursor, Performance Based Service Acquisition (PBSA), aimed at improving support for major weapons systems such as ships, aircraft and vehicles (Doerr *et al*, 2005). *“PBL 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 (e.g. having 95% of trucking or aircraft fleet fully operational) instead of being paid to overhaul parts or provide replacement components”* (Randall *et al*, 2010).

According to Selviaridis (2011) there are several synonyms to PBC, including Performance Based Logistics (PBL) and Procuring Complex Performance (PCP, see Section 4.16), a theoretical concept that has been developed in the UK in order to enable, e.g., research on acquisition of complex military systems, specifically Complex Product-Service (CPS) (Howard and Caldwell, 2011, p 2). The definitions of the different synonyms to PBC differ in their emphasis on certain aspects of PBC, but *“a common thread across all used definitions is the emphasis on specifying and managing performance and outcomes rather than inputs, resources and processes/activities”* (Selviaridis, 2011). This condensation of definitions is in line with the ideas behind the UK MoD concepts of *“Contractor Logistics Support (CLS)”*, *“Contracting for Availability”* (CfA) and *“Contracting for Capability”* (CfC), which will be introduced in Section 5.3.7. This observation is in line with Datta and Roy (2011); *“Availability-based contracting, a variant of performance-based contracting, is increasingly being used in UK defence equipment service procurement. An availability-based contract is a type of contract in which the end customer contracts out through-life support of equipment based on availability levels, as opposed to the traditional model where assets and services are purchased on demand. Such contracts are beneficial for both customers and providers. The customer eliminates maintenance infrastructure and inventory costs. On the other hand, the provider assures a long-term revenue stream through long-term contracts”*.

Figure 4.10 illustrates Sols *et al* (2007) view on to what extent FFP, FPI, CPIF, CPFF, and PBC type contracts motivate the contractor to perform, and what degree of assurance regarding achievement of effectiveness goals that is provided to the client by these types of contracts.

The dimensions on the axes (if not the *abscissa*, then the *ordinate*) in the diagram in Figure 4.10 are controversial and counterintuitive⁴⁶. The dimension on the ordinate implies that Cost-Plus Contracts would incentivise (motivate) the contractor more than Fixed-Price Contracts. The common view is exemplified by Glas *et al* (2011), who state that Fixed-Price Contracts transfer risks to the supplier, whereas in a Cost-Plus Contract the buyer assumes the risk and the supplier is not incentivised to reduce costs or improve performance. Building on Straub and van Mossel (2005), Glas *et al* (2011) choose another approach than Sols *et al* (2007) in order to relate PBC to traditional Fixed-Price and Cost-Plus Contracts. Figure 4.11 provides a combination of the contributions of Straub and van Mossel (2005) and Glas *et al* (2011).

⁴⁶ However, since it is the only reference found that explicitly positions FFP, FPI, CPFF, CPIF and PBC to each other, it will be used for that purpose also in this thesis.

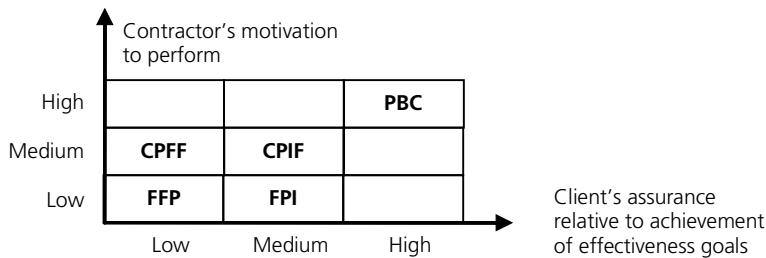


Figure 4.10: Client’s assurance and contractor’s motivation per contract type (Source: Based on Sols *et al*, 2007).

According to Straub and van Mossel (2005), a performance based Fixed-Price Contract should be called a result based contract, whereas a performance based Cost-Plus Contract should be called an incentive Service Level Agreement (SLA), which is referred to as a PBC in Figure 4.11. However, Straub and van Mossel (2005) acknowledge the fact that in practise this distinction is rarely made. Consequently, performance based Fixed-Price Contracts and performance based Cost-Plus Contracts are both referred to as Performance Based Contracts (PBC).

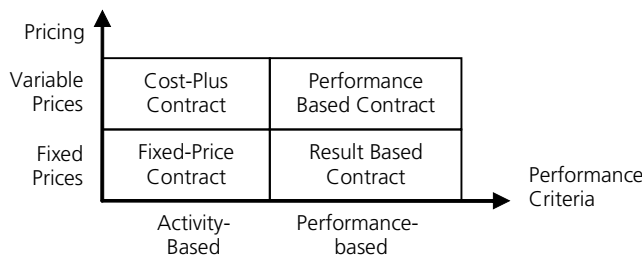


Figure 4.11: Contracting and pricing alternatives (Source: Building on Straub and van Mossel (2005); and Glas *et al* (2011).

In Principal-Agent Theory (PAT), the buyer is referred to as the principal while the supplier is referred to as the agent. Using PAT terminology, Logan (2000) state that Outcome-Based Contracts (OBC), i.e. performance agreements, “align the goals of the agent with the principal so rewards for both depend on the same action, thus shifting the risks involved in the contract to the agent”, whereas Behaviour-Based Contracts (BBC), i.e. price agreements, “shift the risk to the principal since the agent is paid for the behaviour regardless of the results”.

4.7 Public Private Participation

“Public Private Partnerships (PPPs) can be seen as one component of a rearrangement of the public sector with a management culture that focuses on the centrality of the citizen

or customer, accountability for results, investigation of a wide variety of alternative service delivery mechanisms, and competition between public and private bodies for contracts to deliver services, consistent with cost recovery and achievement of Value-for-Money (VfM). Partnerships are part of a broad shift in the workings of government and the search for new forms of governance. In this reorientation, the image of government as the direct provider of services is transformed to one in which government is the enabler, coordinating provision and actions by and through others. The emphasis is on “the task rather than the actor”, “outcomes rather than inputs”. Government becomes “more about steering and less about rowing”.

Grimsey and Lewis (2004b, p 52-53)

As demonstrated in Section 4.5, goods and services can be delivered by governments in different ways. Governments that previously both produced and provided services now tend to rely increasingly on the market for either inputs to government production and provision, or for direct provision of goods and services. According to the OECD (2008, p 3), this move has been made for ideological reasons (see Section 4.7.1) and in the pursuit of VfM (see Section 4.7.2), i.e. how to improve the use of resources (efficiency, see Section 4.9.9), and Public Private Partnerships (PPPs, see Section 4.7.9) are a part of this trend.

According to Grimsey and Lewis (2004b, p 52), in the “*endeavour to use private sector resources in tandem with government, the evolution of the Public Private Partnership (PPP) concept has been aided by developments in a number of fields that have coalesced to inform the arrangement*”, and they trace the intellectual origins of PPPs to three influences: The changing market for public services (Attitudes to the ways in which public services are produced and delivered to the public are changing. “*A PPP is simply a method of procurement*”, although of infrastructure services rather than the infrastructure itself, and as such it is seen as an extension of a liberalisation agenda that has become known as the New Public Management (NPM) of the public sector. These terms embrace the “*corporatisation, privatisation, commercialism, managerialism, outsourcing and downsizing of public sector activities*”. PPPs are one exemplification of these trends, and of changing markets for public services, in that they allow for public services to be provided by public and private sector bodies working in partnership); The private financing model (Another instrumental factor in the growth of PPPs over the past decades is the refinement of the private financing model and the development of project financing techniques to engineer the finance to suit PPP structures (see Section 4.7.7)); and The concept of partnering (PPPs have been shaped by concepts of partnering developed in the engineering construction industry that lie on the border between engineering and management. The partnering concept has provided an intellectual backdrop to the organisation of PPPs).

In the area of PPPs, there is no consensus regarding terminology and definitions. The term PPP can be taken to mean any type of cooperation between the public and the private sector, or a strict long-term partnership between the public and the private sector or a public private project for the delivery of infrastructure, depending on the writer. In addition, there are distinct regional and cultural differences when it comes to different countries' perspectives on and interpretations of PPPs. In the reported research, the author has decided (see Section 4.3) to regard: Public Private Participation as a spectrum from public provision to privatisation; Public Private Cooperation (PPC, see Section 4.7.5) as a subset of Public Private Participation, consisting of the spectrum from public procurement to concessions; and Public Private Partnerships (PPPs) as a subset of PPC, consisting of long-term partnerships between the public and the private sector. This perspective is illustrated in Figure 4.12. Furthermore, the perspective is inspired by the Anglo-Saxon, predominantly the British, perspective on PPPs, rather than, e.g., the German perspective, where PPPs are apparently equated to Joint Ventures (JVs).

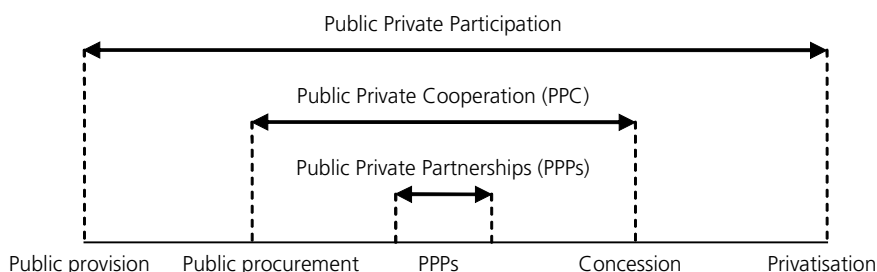


Figure 4.12: The relations between Public Private Participation, Cooperation and Partnerships.

In addition, Public Private Participation, PPC, PPPs and Private Finance Initiative projects (PFIs) are not regarded as being restricted to the provision of infrastructure or infrastructure services, regardless of what a significant portion of extant theory has to contribute in this respect. Quite to the contrary, PPPs are considered as partnerships between the public and the private sector through which any products or services can be delivered to the public sector, or, more specifically, equipment and support to the Armed Forces. In addition, the author subscribes to the notion that PPPs are long-term partnerships, rather than an umbrella term that encompasses all different forms of PPC and Public Private Participation. Moreover, the author does not consider PFIs and PPPs to be synonyms. Instead, PFIs are regarded as a subset of PPPs, i.e. a PPP which involves private finance. A central component in PPC, PPPs and PFIs, i.e. projects that involve public and private participation, are the activities that are to be performed and the responsibility for

performing them. A notion from PPP theory is the concept of *bundling* (see Section 4.7.3), which refers to: “*the integration in a PPP of functions such as design, construction, financing, operations and maintenance of a facility, often in the form of a Special Purpose Vehicle (SPV)*” (Grimsey and Lewis (2004b, p x). An SPV is an organisation that can be established as a distinct legal entity to bring together the companies involved in a PPP in order to manage the project and share the risks and rewards (Grimsey and Lewis, 2004, p xv). The author considers the concept of bundling to be applicable to all different forms of Public Private Participation.

Having thus conveyed the author’s standpoint concerning several important aspects of concepts and terminology, the rest of the section will be devoted to descriptions of the driving forces for change, i.e. NPM and VfM, the concept of bundling and the different forms of Public Private Participation.

4.7.1 New Public Management – The Ideological Driving Force

In the 1980s, there was a move in many OECD countries towards what has retroactively been labelled the New Public Management (NPM). Hood (1995) states that most commentators have associated NPM with seven dimensions of change: A shift towards greater *disaggregation* of public organisations into separately managed “*corporatised*” units for each public sector “*product*” (each identified as a separate cost centre, with its own organisational identity); A shift towards greater *competition* both between public sector organisations and between public sector organisations and the private sector; A move towards greater use within the public sector of management practises which are broadly drawn from the private corporate sector, rather than public-sector-specific methods of doing business; A move towards greater stress on *discipline and parsimony* in resource use and on active search for finding alternative, less costly ways to deliver public services, instead of laying the emphasis on institutional continuity, the maintenance of public services which are stable in “*volume terms*” and on policy development; A move towards more “*hands-on-management*” (more active control of public organisations by visible top managers wielding discretionary power) as against the traditional style of “*hands-off*” management in the public sector, involving relatively anonymous bureaucrats at the top of public-sector organisations, carefully fenced in by personnel management rules designed to prevent favouritism and harassment; A move towards more *explicit and measurable* (or checkable) *standards of performance* for public sector organisations, in terms of the range, level and content of services to be provided, as against trust in professional standards and expertise across the public sector; and Attempts to control public organisations in a more “*homeostatic*” style according to pre-set *output measures* (particularly in pay based on job performance rather than by the traditional style of “*orders of the day*” coming on an *ad hoc* basis from the top. According to Grimsey and Lewis (2004b, p 53), the

implementation of these elements of NPM has “spawned a number of different public sector BMs, and widened the interface between public and private agencies”, which they refer to as “public/private BMs”, ranging from complete public provision (“collectivisation”), through service provision contracts and outsourcing, to outright privatisation. This spectrum of BMs is presented in Section 4.7.4.

4.7.2 Value-for-Money – The Economic Driving Force

According to OECD (2008, p 133), Value-for-Money (VfM) must be the primary objective in PPP design. VfM means finding solutions which achieve the best mix of quality and effectiveness for the least outlay, which does not always mean choosing the immediately cheapest option since, for instance, it may be more cost effective to buy a more reliable service or a better quality asset with lower maintenance cost and a longer operating life (HMT, 2007, p 24). “VfM⁴⁷ is the optimal combination of quality, features and price, calculated over the whole of the project’s life. A PPP project yields higher VfM compared to traditional procurement of government in-house production if it provides better features, higher quality or lower whole-of-life cost. Higher VfM is mainly obtained through risk transfer, competition and the use of private sector management skills”. VfM has been defined as “the optimum combination of Whole Life Cost (WLC) and quality (or fitness for purpose) to meet the user’s requirement”. According to Grimsey and Lewis (2004b, p 135), based on experience with Private Financing Initiative (PFI) projects in the UK, there is an acceptance among public service project managers that there are six main determinants of VfM: Risk transfer (see Section 4.10); The long-term nature of contracts (including whole-of-life cycle costing); The use of an output specification; Competition; Performance measurement (see Section 4.9) and incentives; and Private sector management skills. Of these six determinants of VfM, competition and risk transfer are considered to be the most important ones. Accordingly, what is required to achieve VfM is that (Grimsey and Lewis, 2004, p 135): Projects are awarded in a competitive environment; Economic appraisal techniques, including proper appreciation of risk, are rigorously applied, and that risk is allocated between the public and private sectors so that the expected VfM is

⁴⁷ According to MacDonald *et al* (2012), “the association between VfM and lowest cost is considered to be almost inevitable given the specific reference to the word “money” within the term”, and that therefore, in recent UK literature in particular, there appears to be “a conscious move away from the term VfM to the expression “Best Value”, BV, to convey the message that there is a broader meaning to the concept of value”. Nevertheless, while recognising this emerging development, VfM will still be used throughout this thesis, rather than BV. However, VfM is used with the broader meaning to the concept of value in mind. Consequently, VfM is not intended to infer the selection of lowest cost, but the selection of the Best-Value-for-Money (BV/VfM).

maximised; and Comparisons between publicly and privately financed options are fair, realistic and comprehensive.

Competition creates an environment that encourages the bidders to be innovative in their design of the offering and efficient in the delivery of the service. In the UK, it has been recognised that *“a considerable degree of competitive tension was needed in the bidding process, so that the private sector provides its most efficient bids”* and *“a deep and competitive market of capable bidders is needed to get the benefits of the PPP procurement process”* (Grimsey and Lewis, 2004, p 135). Competition and contestability are key elements to ensure the effective transfer of risk to the private partner. Aspects include competition for the market (i.e. in the bidding process) and competition in the market once the contract is concluded and in operation. *“In the absence of competition, effective risk transfer will not occur, which in turn means that the intended VfM will not be realised”* (OECD, 2008, p 134).

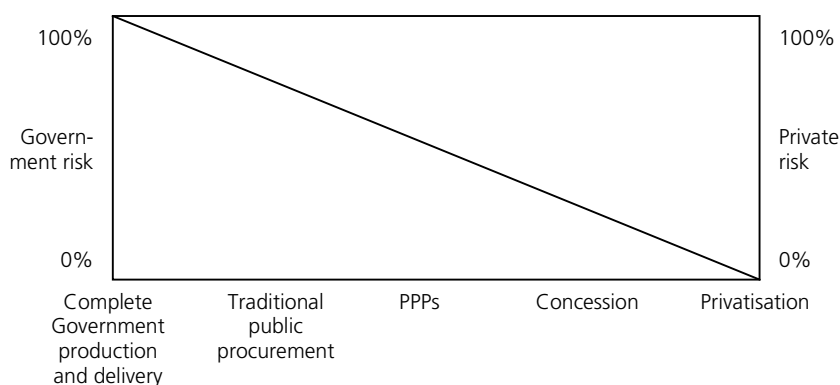


Figure 4.13: Spectrum of public and private participation (Source: OECD, 2008, p 20).

According to Grimsey and Lewis (2004b, p 136), the PPP programme has raised awareness of project risks in ways that public procurement has not been able to do previously, which has resulted in that the identification, allocation and management of risks have grown to become an essential part of PPP processes. Risk sharing plays a fundamental role in whether or not a PPP will yield VfM. As risk is an important part of the incentive mechanism for the private partner to be as efficient as possible, risk sharing is a key feature for a successful PPP. *“In general, risk must be carried by the party best suited to carry it, i.e. the party that can carry the risk at least cost; thus, efficiency improves through adequate risk sharing”* (OECD, 2008, p 133). The way risk is shared between the government and the private sector is also a key feature when classifying a project as a PPP or as traditional procurement. In Figure 4.13, the spectrum of public and private participation is classified according to risk and mode of delivery.

According to the OECD (2008, p 20), “*the distinguishing feature that determines whether a project is defined as traditional public procurement or as a Public Private Partnership (PPP) should be whether or not a sufficient amount of risk has been transferred*”. Consequently, as private participation increases, and the mode of delivery moves towards privatisation in Figure 4.13, more and more risk should also be transferred to the private sector. While competition and risk allocation are necessary prerequisites⁴⁸ of VfM, they do not guarantee VfM (Grimsey and Lewis, 2004, p 136). The possibility of achieving extra VfM through the implementation of a PPP can be estimated in a two-step analysis. The first step is to calculate the benchmark cost, which is called the Public Sector Comparator (PSC), of providing the specified service under traditional procurement. A PSC is constructed on the assumption that the procurement is undertaken through conventional funding and that significant managerial responsibility and exposure to risk is retained by the public sector (UK MoD, 2009c, p 54). The second step is to compare this cost with the cost of providing the specified service through a PPP. The PSC is closely related to risk transfer. For this reason the PSC is described in Section 4.10.3, and depicted in Figure 4.29. According to the OECD (2008, p 69), different countries use different methods to assess VfM. The most complex method, which is used in Germany, is a complete Cost-Benefit Analysis (CBA). The second most complex method is to use a PSC *prior* to undertaking the bidding process. This is done in several countries, e.g. the UK. The third method is to use a PSC *after* the bidding process. This method is employed in Australia. The simplest method does not involve a comparison between the public and private alternatives at all. Instead, it relies on the competitive bidding process to ensure VfM. This method is widespread and utilised in, e.g., the US and France.

To summarise, VfM is of the utmost importance in the design and implementation of PPPs, or PPCs (Public Private Cooperation, see Section 4.7.5). Competition and risk transfer are universally considered to be necessary, but in several developed countries not considered to be sufficient, prerequisites of VfM. In order to ensure VfM, in addition to competition and risk transfer, these countries are of the opinion that a CBA can be performed, or a PSC can be calculated and compared against the estimated cost of a PPP.

⁴⁸ Since alliances do not involve competition or risk transfer, but are still considered by some commentators to deliver VfM, the issue of VfM in alliances has led to the creation of expressions such as the “VfM paradox” and the “VfM puzzle” (see Section 4.7.8).

4.7.3 The Notion of Bundling

PPPs typically encompass a series of activities such as design, build, operate, and finance, but all PPPs will not have to address all of these activities. *“A defining characteristic of PPPs is the integration within the private sector party of all (or most of) the functions of designing, building, financing, operating and maintenance of the facility in question, often in the form of a Special Purpose Vehicle (SPV) created for a specific project”*. This integration of functions, or activities, is referred to as *“bundling”* in PPP theory (Grimsey and Lewis, 2004, p 129). The functions, or activities, that are integrated, i.e. bundled, within the private sector party, or retained within the public sector, include: Design (D), Construct (C), Build (B), Finance (F), Lease (L), Renovate (R), Own (O), Operate (O), Remove (R), Maintain (M) and Manage (M). In combination, if applicable, with Transfer (T), the appropriate functions/activities are used in order to construct PPP acronyms, where the letters in the acronym signify those functions/activities for which the private sector party assumes responsibility. There are many descriptions of different forms of bundling in the literature (see, e.g., Grimsey and Lewis, 2004b, p 54; and OECD, 2008, p 22).

Table 4.18: Activities that can be handled by the private or the public sector.

	Design (D)	Finance (F)	Buy (B), Rent (R), Lease (L)	Construct (C), Build (B)	Develop (D)	Own (O)	Operate (O)	Manage (M)	Maintain (M)	Transfer (T)
Private sector										
Public sector										

From the point of view of reported research, the most interesting is not the proposed permutations themselves, but rather their building blocks, i.e. the different activities for which responsibility is either assumed by the private sector, or retained by public sector. Consequently, the activities of Design, Finance, Buy/Rent/Lease, Construct (Build), Develop, Own, Operate, Manage, Maintain and Transfer are of central interest to the reported research. In Table 4.18, these activities are presented in a format that will be useful in the case descriptions in Chapter 6. Buy/Rent/Lease have been clustered since they are interpreted as being mutually exclusive alternatives. Similarly, Construct and Build are joined together, since they are interpreted as synonyms, rather than different activities.

4.7.4 A Spectrum from Public Provision to Outright Privatisation

There is no clear definition of what constitutes a Public Private Partnership (PPP). *“The lack of definitional clarity may result from the fact that PPPs fill a space between traditionally procured government projects and full privatisation. This is a broad space to fill. In addition, PPPs represent cases where the private sector provides services that have traditionally been provided by the public sector. PPPs are not the only type of relationship to fill this space. The space between traditional procurement and full-scale privatisation may include, in addition to PPP contracts, short-term management and outsourcing contracts, concession contracts and Joint Ventures (JVs) between the public and private sectors”* (OECD, 2008, p 16).

Grimsey and Lewis (2004b, p 54) combine the concepts of PPPs and BMs to describe an entire spectrum of what they refer to as *“public/private BMs”*. The range of the spectrum is from public provision, via different forms of PPC, to outright privatisation, similar to the spectrum depicted in Figure 4.13. The proposed spectrum of public/private BMs simultaneously constitutes the entire spectrum of possible forms of Public Private Participation, from public provision, via PPC, to outright privatisation. In Figure 4.14, the three spectra of Public Private Participation, Public Private Cooperation (PPC) and Public Private Partnerships (PPPs) are illustrated and related to each other. PPPs are exemplified by one of numerous possible permutations.

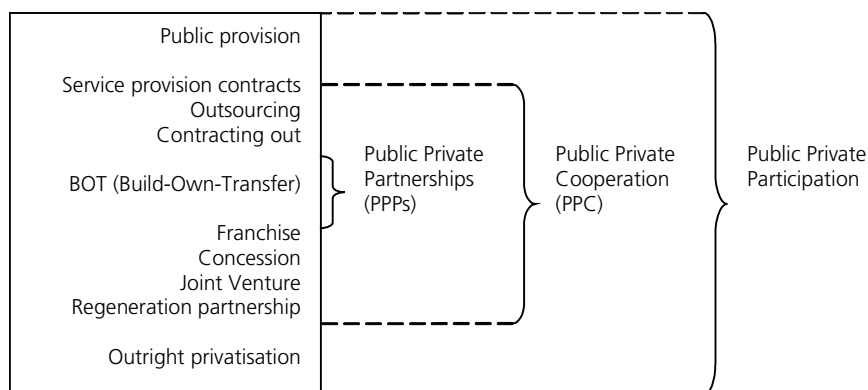


Figure 4.14: The spectra of Public Private Participation, Cooperation and Partnerships.

The spectrum is also closely connected to the make-or-buy and sourcing questions in public procurement, including defence acquisition (see Section 4.6). Placing BMs on an equal footing with different forms of PPCs is in line with public procurement in the UK, as has been demonstrated in Section 4.5.9. In the spectrum of Public Private Participation, as illustrated in Figure 4.13 and Figure

4.14, public provision and traditional public procurement have already been described in Section 4.6. Different forms of Public Private Cooperation (PPC), including the more renowned Public Private Partnerships (PPPs) and Private Finance Initiative projects (PFIs) are described in Sections 4.7.5 to 4.7.9, whereas the characteristics of concessions and outright privatisation are described in Sections 4.7.10 and 4.7.11.

4.7.5 Public Private Cooperation

Public Private Cooperation (PPC) refers to different forms of cooperation and partnerships between the public sector and private contractors, concerning services, supplies or facilities (The Swedish Armed Forces, 2006a, p 3). PPC is an umbrella term which encompasses “*Contracting out of services*”, “*Alternative financing solutions*” and “*Partnership solutions*” services, supplies or facilities (see Figure 4.15).

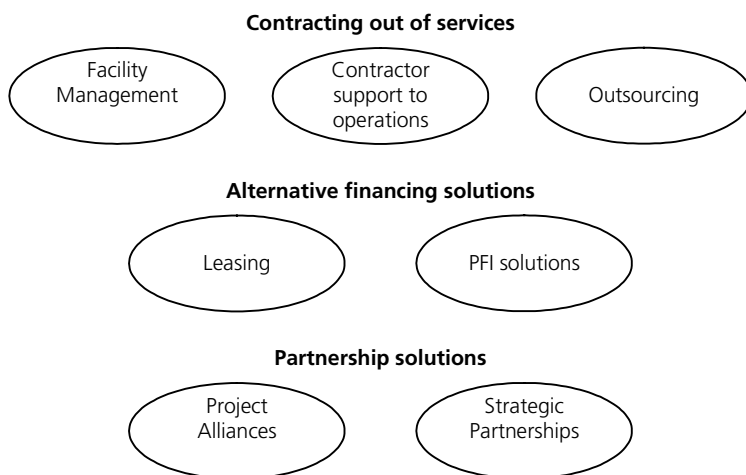


Figure 4.15: Public Private Cooperation (Source: The Swedish Armed Forces, 2006a, p 3).

The three categories of PPC consist of different PPC solutions. “*Contracting out of services*” is made up of facility management, Contractor Support to Operations (CSO) and outsourcing. “*Alternative financing solutions*” include leasing and Private Finance Initiative (PFI) solutions. “*Partnership solutions*” are project alliances and strategic partnerships, including Public Private Partnerships (PPPs). It is, however, not trivial to distinguish between these solutions. Some commentators would probably argue that outsourcing encompasses everything in Figure 4.15, whereas other commentators would presumably assert that Public Private Partnerships (PPPs, see Section 4.7.9) include all these different forms of PPC. Hence, the author is well aware that there are a multitude of different opinions. However, in

the author has decided to regard the connection between the different concepts as illustrated in Figure 4.13, Figure 4.14 and Figure 4.15.

4.7.6 Contracting out of Services

“For public-sector, government outsourcing, there is also a whole set of hidden costs. Drafting, negotiating, and monitoring compliance with contracts may require a whole new layer of government bureaucracy. Because these processes usually lead to lay-offs and loss of pay and benefits, taxpayers will face the hidden burden of unemployment compensation and public-assistance programs. As good paying government jobs are often replaced with low paying contract jobs, the government will collect fewer tax dollars in revenue. This viewpoint, shared by a number of trade union members, serves to set the stage for another recent consideration of privatization and outsourcing – the use of civilian contractor personnel in support of complex defense and weapon systems used by front line troops.”

Cardinali (2001)

Contracting out is normally associated with saving money. According to Grimsey and Lewis (2004b, p 57), there is substantial evidence that suggests that governments can save in the order of 20% of expenditures on services by putting them through a competitive tendering process. *“Contracting out of services”* is not a new phenomenon, particularly not in the military sector. Quite to the contrary, it has been a natural part of military activity since time immemorial. *“Military logistics has always been more or less dependent on the private sector; the only things that have changed are the degree of the dependency and the vicinity to the fighting military unit”* (The Swedish Armed Forces, 2006b, p 5). There are three basic alternatives for supporting military units; get the necessary resources on the battlefield, let the troops carry the necessary resources with them and transport the necessary resources to the troops on the battlefield (see Section 4.8.2); even if Host Nation Support (HNS), private sector supplies and support have nowadays replaced the beleaguering, looting and pillaging of the wars in, e.g., the 17th century.

Facility management

Facility management is one of the simpler forms of PPC. Facility management comprises support services to some sort of facility. The services provided through facility management can either be maintenance and improvement of the facility itself, or services such as surveillance, reception, cleaning or IT support (The Swedish Armed Forces, 2006b, p 6).

Contractor Support to Operations

Contractor Support to Operations (CSO) deals with “*Contracting out of services*”, supplies and/or facilities for a specific military operation⁴⁹. Consequently, CSO is specifically a military form of Public Private Participation, in order to provide support to a particular military operation. An operation is demarcated in time and in scope and is most frequently conducted abroad. Consequently, CSO will often have similar limitations in time and scope. However, CSO can also be a part of a larger commitment, e.g. outsourced maintenance of a particular system, in the form of, e.g., Contractor Logistics Support (CLS, see Section 5.3.7) or Contracting-for-Availability (CfA, see Section 5.3.7), which has been contracted out to the private sector (The Swedish Armed Forces, 2006b, p 6). CSO can either supplement or replace military activities. CLS and CfA for maintenance of a military system are examples of supplement, whereas, e.g., a service such as a military restaurant can be replaced by a private contractor. “*CSO enables competent commercial entities to provide a portion of deployed support so that such support ensures the most efficient and effective use of resources*” (NATO, 2007, p 101). According to NATO (2007, p 101), CSO offers a useful force-multiplier that can be particularly valuable when: The military manpower strength in a national contingent in a Joint Operations Area (JOA, see Section 4.8.6) is limited by a political decision; The required capability is not available from military resources; The required capability has not been made available for an operation; The military capability is not available in sufficient number to sustain an operation; The military capability is required for other missions; The use of local contractors supports an agreed Civil-Military Cooperation (CIMIC) plan; The use of contractors (civilians of local labour) for certain functions, and at certain times, may be more cost-effective; and/or There is an operational need for continuity and experience that cannot be provided by using military manpower on a rotational basis. In the UK (see Section 4.8.7), CSO consists of three different components: Sponsored Reserves (SRs), Private Military and Security Companies (PMSCs) and Contractors on Deployed Operations (CONDOs).

Outsourcing

Outsourcing has become one of the dominant practises in commercial businesses, particularly in logistics (Cardinali, 2001). Outsourcing is the contracting out of non-core activities, and according to Logan (2000), the Resource-Based View

⁴⁹ An operation is defined as: “*A military action or the carrying out of a strategic, tactical, service, training, or administrative military mission; the process of carrying on combat, including movement, supply, attack, defence and manoeuvres needed to gain the objectives of any battle or campaign*” (UK MoD DCDC, 2006, p O-3).

(RBV) “directed most corporations to focus on core competencies”, since “it is most profitable to focus resources on those thing they do uniquely well”, whereas Transaction Cost Economics (TCE) guided decisions regarding what to outsource, by helping organisations to “determine which of their supportive, non-core functions they should buy and which they should produce in-house”. “The widespread use and promotion of outsourcing in the government and business sectors has been the subject of much debate over recent years. The proponents of outsourcing claim that it saves money and creates greeted efficiencies through streamlining business processes. The critics say that outsourcing costs jobs for American citizens and causes the loss of employee benefits for those allowed to stay in their jobs while employed under the new contractor” (Dickens Johnson, 2008). However, according to Logan (2000), corporations have been successful in reducing costs and improving effectiveness through outsourcing, and “the question is no longer whether outsourcing makes strategic or financial sense, but how to develop mutual beneficial relationships”.

Outsourcing is often confused with off shoring. They are, however, not the same thing. Outsourcing is when an organisation decides to let an external supplier perform a service, whereas off shoring is when the performance of a service is moved abroad. Consequently, off shoring can be performed by the company itself, with resources that are internal to the organisation, or it can be performed by an external supplier, in which case the service is an example of both off shoring and outsourcing. Another consequence of this distinction is that most different forms of Public Private Participation, except for the extremes, i.e. public provision and outright privatisation, on the Public Private Participation continuum as presented in Figure 4.13 and Figure 4.14 could be interpreted as being different forms of outsourcing. This is also how many commentators regard outsourcing, i.e. as an umbrella term for all different forms of Public Private Participation. Since many commentators also consider Public Private Partnerships (PPPs) as an umbrella term for the same thing, outsourcing and PPPs could be used interchangeable for the entire spectrum of Public Private Participation. However, as demonstrated in Figure 4.15, outsourcing is considered to be one form of “Contracting out of services”, whereas a PPP is considered to be one form of “Partnership solutions”.

According to Dickens Johnson (2008), outsourcing started when small businesses embraced the concept as a way to acquire specialised services in fields such as Human Resources (HR), legal services and computer technology. In these cases outsourcing was considered to be cost effective for price. The next step was that medium sized businesses realised that they could benefit from outsourcing as well, by focusing on their core specialty and outsource areas outside their core specialty, such as Information Technology (IT), to other businesses. When the larger companies became involved in outsourcing, it was found that by outsourcing portions of their business functions to other companies, “precious capital inflow

could be obtained". Later, *"the scope of functions being outsourced increased to include previously thought internal functions only"*, including the procurement function itself. *"The primary motivation for outsourcing in most cases is the cost-savings to the business, however, improved services and access to technology often result, and figure into the equation"* (Dickens Johnson, 2008).

Through the outsourcing of non-core activities, new companies have evolved *"whose sole objective is to be outsource service providers"*, and these companies use their expertise in their core competency to provide services to other organisations (Logan, 2000). The delivery of the product is, for most companies, not part of the core competencies, which makes it a suitable candidate for outsourcing. According to Logan (2000), certain types of transportation outsourcing are referred to as Third Party Logistics (TPL or 3PL). Consequently, the providers of such transportation services are referred to as TPL providers. However, Skjøtt-Larsen (2000) state that TPL is a broader, more flexible cooperative arrangement than outsourcing, which was based on *"simple make-or-buy considerations"* and had *"arm's length"* relationship with a minimum of information exchange; and that TPL is also known as *"logistics alliances"*, *"logistics partnerships"*, and *"dedicated contract distribution"*. TPL can include all or part of a company's logistics function, and *"often includes both warehousing and distribution and usually involves a long-term plan with the logistics firm bringing the skills; process, technology and can also include assets"* (Logan, 2000).

After the multinational companies, the governments of many OECD countries have followed suit and turned their attention to outsourcing. The manifestations of these national initiatives differ to a large extent between these different nations. In the US, outsourcing began already in 1955 when the government passed a bill stating that *"the government would rely on the private sector for the provision of goods and services and thereby not compete with the private sector economy"*. Since 2003, the US government describes *"outsourcing"* as *"competitive sourcing"*. According to Dickens Johnson (2008), *"the agencies employ catchy phrases to rally the workforce around new concepts that management is promoting"*. In the early 1990s, the US government introduced slogans such as *"better, cheaper, faster"*⁵⁰.

⁵⁰ As will be seen in Chapter 5, this US political rhetoric made its way to the UK a decade later, albeit in reverse order after having crossed the Atlantic. Consequently, the UK political rhetoric was presented as *"faster, cheaper, better"*. More than 20 years down the line from its initial inception in the US, this far-reaching and influential rhetoric still has a major impact on current transformation of the Swedish defence acquisition and defence logistics. In fact, the research presented in this thesis has been conducted in the wake of this powerful and enduring rhetoric.

According to Dickens Johnson (2008), in 2003, cost-saving was the primary reason behind outsourcing initiatives among governments worldwide. However, five years later, the primary reason for outsourcing was improved speed or quality of services. The current thinking of governments, and businesses, is that there can be cost-savings, efficiencies and economies of scale to be achieved through concentrating on core processes and outsourcing all other functions. *“Performance monitoring and measurement of results is necessary to achieving maximum benefit”* (Dickens Johnson, 2008). For TPL this development is confirmed by Skjøtt-Larsen (2000), who states that *“the purpose of engaging in third party relations is seldom cost reduction alone, but a combination of service improvements and efficient operation”*.

According to Skjøtt-Larsen (2000), Fourth Party Logistics (FPL or 4PL) is a new outsourcing concept that can be regarded as a *“comprehensive supply chain solution which combines the capabilities of management consulting, IT and TPL providers”*.

4.7.7 Alternative Financing Solutions

According to the Swedish Armed Forces (2006b, p 7), the concept of *project finance* is the foundation for the development of *“Alternative financing solutions”*.

Leasing

Leasing is a form of rental of property or an asset. Leasing is an agreement between the owner of the property and the leaser of the property through which the leaser, under agreed terms and under an agreed time period, is given the right to use the asset in exchange for payment (Swedish Armed Forces, 2006b, p 8).

Private Finance Initiative solutions

During the 1990s, New Public Management (NPM, see Section 4.7.1) and market-based philosophies further influenced public management in many countries (Bult-Spiering and Dewulf, 2006, p 7). In 1992, under the label Private Finance Initiative (PFI), the UK began involving the private sector in the provision of public services (Grimsey and Lewis, 2004, p 145), i.e. to finance, build, manage, and operate, some of the investments previously undertaken within the public sector (Wettenhall, 2007). PFIs require private sector consortia to raise private finance to fund the project, which must involve investment in assets, and the long-term delivery of services to the public sector (UK MoD, 2009c, p 54). PFIs are arrangements under which a public sector organisation contracts with a private sector entity to construct a facility and provide associated services of a specified quality over a sustained period (HMT, 2007, p 61). Because the private sector contractor puts its own funds at risk, it has powerful incentives to deliver to time and cost, and can thus offer VfM. PFI procurement is a flexible, versatile and often effective technique, but it is not appropriate for every project (HMT, 2007, p 53).

The programme was re-launched in 1997 under the banner of Public Private Partnerships (PPP), and the UK has dominated in Europe in terms of the number of PPPs, and the total value of these PPPs (Parker and Hartley, 2003). Consequently, many commentators, especially in the UK, consider PFIs and PPPs to be different names for the same phenomenon and use the terms interchangeably, whereas others are of the opinion that PFIs are a subset of PPPs. As illustrated in Figure 4.15, PFIs are considered to be one form of “*Alternative financing solutions*”, which is a subset of PPC, whereas PPPs are considered to be one form of “*Partnership solutions*”, which is another subset of PPC. PPPs are, however, described briefly in Section 4.7.9, whereas “*Partnership solutions*” in general are described in Section 4.7.8. What truly separate a PFI from a PPP according to the stance taken by the author is that a PFI involves banks as one specific actor that provides the necessary financing, whereas any private financing in a PPP is supposed to be provided by the private sector, but not always directly from banks. Hence, PFIs are considered to be a special case of PPPs.

4.7.8 Partnership Solutions

“The extensive use of terms such as partnership and alliance in the trade and academic press can lead to an inference that all firms should seek close relationships with all suppliers. However, extensive management time and commitment is required to strengthen and maintain these closer relationships. It is important for firms to identify those relationships that should be moved into a more partnership style from those that should remain more arms’ length or vertically integrated into the firm.”

Cooper et al (1997)

“There is a relatively broad spectrum of relationship contracting models, including various forms of partnering and different styles of alliances. Unfortunately, the terms partnering and alliancing are often used interchangeably, when they really describe procurement approaches which are quite different, particularly in the manner in which they address the distribution of both risk and reward” (MacDonald, 2005).

Two broad forms of purchasing arrangements have been asserted; partnership sourcing and adversarial competition, but the terms collaborative partnerships and collaborative strategic alliances are sometimes used as an alternative to partnership sourcing (Parker and Hartley, 1997). Partnership sourcing is said to be the superior form because it creates long-term collaboration based on trust between buyer and supplier. “*Partnership solutions*” imply that contents and forms of cooperation differ compared to traditional buyer-supplier relationships (Swedish Armed Forces, 2006b, p 10). MacDonald (2005) emphasises that “*it is instructive to examine the spectrum of relationship agreement contract arrangements through the lens of dispute*

resolution to clearly understand the critical differences between the relationships that exist in “traditional”, “partnering” and “alliance” models”.

Partnerships include buyer-supplier relationships for products and user-provider relationships for services. There are similarities between outsourcing as viewed from the user's point of view and supplier partnerships, but *“the outsourcing provider is a new and unique entity”* (Logan, 2000). According to MacDonald (2005), relationship contracting ranges from basic preliminary charter *“in which parties commit their best endeavours to creating a cooperative working relationship”* to formal alliance agreement; and can be defined as *“a process to establish and manage the relationships between the parties that aims to remove all barriers; encourage maximum contribution and allow all parties to achieve success”*. Tangible relationships between companies can be regarded as *“quasi-organisations”* and are likely to be complex, long-term and dependent on previous interactions (Håkansson and Ford, 2002).

Relationships are not only output-oriented but also learning-oriented (Halldórsson *et al*, 2007). According to Stock (1997), there are four general categories of relationship marketing: supplier partnerships (exchanges between manufacturers and their goods or service suppliers); lateral partnerships (strategic alliances between competitors; alliances between firms and non-profit organisations); buyer partnerships (long-term relationships between firms and ultimate customers; partnerships between intermediaries in the channel of distribution); and internal partnerships (relational exchanges and relationships within a company). Successful relationships include: joint planning, joint operating controls, open communication, risk/reward sharing, high levels of trust and commitment, contracts that are needed only for legal purposes, increasing scope, and reciprocal financial investment (Lambert *et al*, 2000).

Strategic partnerships

Understanding of partnering has been growing, *“but it is still difficult to define partnering in a clear and unambiguous manner”* (Walker *et al*, 2002). According to MacDonald (2005), partnering is considered to originate from the US, where it has been defined as: *“... a long-term commitment between two or more organisations for the purpose of achieving specific business objectives by maximising the effectiveness of each partner's resources ... This requires changing traditional relationships to a shared culture without regard to organisational boundaries. The relationship is based upon trust, dedication to common goals, and an understanding of each other's individual expectations and values”* (Thompson and Sanders, 1998). Partnering is generally understood to mean: *“a commitment by those involved in a project or outsourcing to work closely or cooperatively, rather than competitively and adversarial”* (MacDonald, 2005). Partnering has also been described as *“putting the handshake back into business”* and involving *“a return to the old way of doing business based on trust,*

respect and good faith rather than suspicion, contempt and scepticism” and *“when a person’s word was their bond and people accepted responsibility”* (MacDonald, 2005).

According to Walker *et al* (2002), there appears to be a “*Partnering continuum*” ranging from “*pseudo-partnering*” (where the rhetoric prevails but little effort is invested to make the principles work), through “*project partnering*” (where partners may come together for a specific project and where strong but sporadic investment in relationship building may be made), through to “*strategic partnering*” (where long-term futures of the relationship are valued). According to Thompson and Sanders (1998), the “*Partnering continuum*” illustrates the benefits expected from different levels of alignment. As demonstrated in Figure 4.16, the “*Partnering continuum*” can be divided into four general stages, each of which represents a new level of alignment: “*competition*” (the traditional approach in the absence of partnering), “*cooperation*” (an approach focused on reaching agreement through compromise), “*collaboration*” (achieving process improvements through teamwork), and “*coalescence*” (reengineering processes to fit the application).

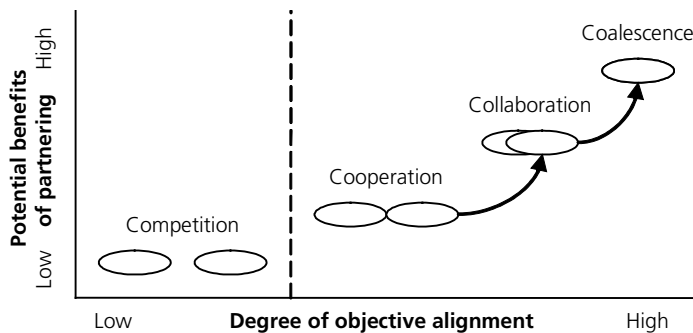


Figure 4.16: Partnering continuum (Source: Thompson and Sanders, 1998).

Since competition is focused on pursuing separate agendas, whereas cooperation, collaboration, and coalescence focus on utilising partnering techniques to achieve common objectives, there is a discontinuity between competition and the other three stages on the continuum presented in Figure 4.16 (Thompson and Sanders, 1998). Each of the three partnering approaches has a specific application, based on strategic objectives and business drivers, and existing partnering relationships can therefore not be copied to a new situation with the expectation to achieve the same benefits (Thompson and Sanders, 1998). Partnering can be seen as “*a tailored business arrangement based on mutual trust, openness, shared risks and rewards that leverages the skills of each partner to achieve competitive performance not achieved by individual partners*” (Humphries and Wilding, 2001). In a partnering arrangement, partners may make varying profit levels and some partners in partnering arrangements may well make a substantial financial loss. Consequently, “*within*

partnering projects there can be winners and even bigger winners or winners and losers. Gains and losses are severally but not jointly allocated” (Walker et al, 2002).

MacDonald (2005) regards the “*Partnering continuum*” in Figure 4.16 as “*four levels of partnering and Alternative Dispute Resolution (ADR)*” and proposes the following terminology: Level 1 – Traditional (Competition; Adversarial Arms-length Contractual); Level 2 – Basic Partnering (Cooperation; Collaborative Team Oriented); Level 3 – Full Partnering (Collaboration; Value added Integrating Team); and Level 4 – Alliancing (Coalescence; Synergistic Strategic Partnership). According to MacDonald (2005), the term “*strategic*” in “*strategic partnering*” refers to the longer term in which there is “*a broader development of a relationship*”.

Project alliances

Grimsey and Lewis (2007) regard alliancing as a “*hybrid approach*”, which is between traditional procurement and PPPs. The origin of the concept of project alliances is a British Petroleum (BP) initiative from the mid-1990s (Scheubelin, 2001), which was called “*The Andrew Alliance*”. In order to increase profitability, BP left the previous way of selecting suppliers, adversarial competition, in favour of a project alliance with the suppliers. The alliance was structured in such a way that all participants would either win or lose together. Even though the concept was initiated in the UK, the further development of it has predominantly been conducted in Australia, where it has been called “*alliance contracting*” and “*project alliancing*”. Alliancing can be defined as “*a method of procuring (and sometimes managing) major capital assets, where a state agency (the Owner) works collaboratively with private sector parties (Non-Owner Participants). All parties are required to work together in good faith, acting with integrity and making best-for-project decisions. Working as an integrated, collaborative team, they make unanimous decisions on all key project delivery issues*” (MacDonald et al, 2012).

According to Scheubelin (2001): a “*project alliance*”, unlike a “*strategic alliance*”, only binds the parties together for the duration of one project; partners in the project alliance do not select each other, it is the client that puts the alliance together; a company could simultaneously participate in more than one project alliance at a time; and partners in a project alliance may be competing separately for another project, a situation that is unlikely to occur between long-term strategic alliance partners. According to MacDonald (2005), a “*strategic alliance*” is a “*framework agreement*” or a “*framework contract*” which has been reached between the parties in order to undertake project of a similar nature over an extended period, usually years, but where the exact requirements of the work concerned are unknown at the outset of the alliance.

“Project alliancing is different from partnering in that it is more all-embracing in its means for achieving unity of purposes between project teams”, and can be seen as

occupying the position of coalescence in Figure 4.16 (Walker *et al*, 2002). According to Walker *et al* (2002), alliance partners are selected on the basis of their expertise and ability to meet stringent performance criteria before price is considered; trustworthy, committed and competent firms are invited to join in the development of the project; resources are pooled to achieve the project goal; and the project price target is developed with agreed risk and reward sharing arrangements. Consequently, *“benefits and risks are treated as a whole-of-alliance concern”* (Walker *et al*, 2002). The sharing of all the risks between the public sector and the contractor under an alliance contract is a relationship that *“encourages a no blame, solutions based culture”* (Grimsey and Lewis, 2007). The expected cost savings are derived from improved Value-for-Money (VfM, see Sections 4.7.2 and 4.9.9) through *“leverage of skills and expertise of the alliance partners in developing the project concept through to delivery”*, and the concept relies on *“best value”* outcome rather than, e.g., a least expensive or quickest project outcome (Walker *et al*, 2002). However, whereas those who have been closely involved in project alliances tend to be of the opinion that this procurement approach delivers VfM, others, with limited involvement in alliances, tend to be more sceptical of the potential commercial benefits of such contracts and often *“question whether an approach, that lacks price competition in the selection process, can result in VfM”*; which has led to a conundrum which has been described as the *“VfM paradox”* or the *“VfM puzzle”* (MacDonald *et al*, 2012).

According to Grimsey and Lewis (2007), an alliance contract: is based on an open book approach in which the contractor is generally paid for direct costs, with allowances for corporate overheads and a normal profit margin; involves a target cost being established; and if delivery of the project is at a cost lower than the target amount that will result in a sharing of the benefits, just as cost overruns will also be shared. Alliance contracting is generally understood to describe *“an arrangement where parties enter into an agreement to work cooperatively and to share risk and reward, measured against the performance indicators. The owner and service providers work as a single integrated team to deliver a specific project under a contractual framework where their commercial interests are aligned with actual project objectives”* (MacDonald, 2005). According to MacDonald (2005), *“many of the arrangements described in the literature as strategic alliances are, in fact, strategic partnerships because they do not provide for the full sharing of risk between parties and often maintain arrangements where one party can take action against the other if they consider that the other party has failed to perform in some regard. For that reason they fail to meet the most critical test of a true alliancing arrangement”*.

4.7.9 Public Private Partnerships

Public Private Partnerships (PPPs) are considered to be a form of “*Partnership solutions*”. “*Partnership solutions*” deal with relationships in general, in which one of the participants *can be* a representative of the public sector. PPPs deal with the special case when one of the participants *is* a representative of the public sector. However, since PPPs is a term that is frequently used to encompass more, PPPs are briefly described in a separate section, complementary to the descriptions in Section 4.7.8. According to Parker and Hartley (2003), Public Private Partnerships (PPPs), including the British PFI, are part of a wider “*privatisation*” based on the expectation that the private sector provides services more efficiently and more effectively than the public sector. According to Grimsey and Lewis (2007), “*PPPs need to be viewed as one form of public procurement, supported by many hybrid approaches that blur the lines between them and conventional procurement methods*”.

The concept of PPPs has existed for centuries in the US and in Europe (Li and Akintoye, 2003, p 3). It was, however, not until the 1980s, when private sector thinking was introduced and used in the public sector, and market-based criteria were applied to the delivery of public products and services, that PPPs grew more popular (Bult-Spiering and Dewulf, 2006, p 7). There is no consensus regarding a single definition of what a PPP is. Depending on the country concerned, the term can cover a variety of transactions where the private sector is given the right to operate, for an extended period, a service traditionally the responsibility of the public sector alone, ranging from relatively short-term management contracts (with little or no capital expenditure), through concession contracts (which may encompass the design and building of substantial capital assets along with the provision of a range of services and the financing of the entire construction and operation), to joint ventures where there is a sharing of ownership between the public and private sectors. Generally speaking, PPPs fill a space between traditionally procured government projects and full privatisation, although some authors consider PPPs to be nothing more than a new version of privatisation (Minow, 2003). According to Grimsey and Lewis (2007), what separates PPPs from traditional procurement is that separate arrangements, which were previously handled separately by the public sector, are combined (bundled, see Section 4.7.3) into one contract and a private sector entity is charged with providing a continuous flow of services, rather than, e.g., a single piece of infrastructure.

PPPs are a rapidly spreading idea in the current debate about public governance (Greve and Hodge, 2005). Like many other fashionable policy ideas some mean that it is also an ambiguous concept (Vonortas and Spivack, 2006). The earlier definitions focused on PPP from the point of view of the purchasing function. Fuelled by the growth of the Supply Chain Management (SCM) paradigm and the understanding of the importance of relationship building, numerous definitions

have also been presented discussing partnership development within the PPP context (Lambert *et al*, 2004). PPPs can be regarded as an umbrella term for different forms of cooperation between the public and the private sector. With different forms of financing, risk sharing, reward sharing, etc., theoretically, there are numerous different possible varieties of PPPs, where the public and private sectors assume responsibilities for different activities in the project (see Section 4.7.3). PPPs are about creating Value-for-Money (VfM) for the taxpayers by letting the public and private sectors do what they do best (see Section 4.7.2). In order to assure VfM, a Public Sector Comparator (PSC, see Section 4.7.2 and Figure 4.29) is often used. The PSC should include the entire Life Cycle Cost (LCC) and should describe the cost the government would face without the PPP, i.e. if the government had to produce the product or service by itself, rather than by inviting a private company. PPPs are intended to harness the incentives of private markets to the public interest criteria of the state. Private capital and private sector companies finance and operate infrastructure that previously was publicly funded and managed. In principle, PPPs involve clarity in specification and requirement, clear and enforceable contracts with proper cost efficiency incentives, and transparency in the bidding process. The intention is that the government sets either the general objectives or specific outputs and leaves the private sector to design and manage the project, including the input mix. Typically, the private sector becomes responsible for the initial design and construction and operation and maintenance, thereby aligning incentives for low-cost construction while minimising life-time costs of operation.

According to Grimsey and Lewis (2007), there are three characteristics of PPPs that differentiate them from conventional procurement: ownership, bundling and risk transfer. However, as previously stated, the author does not regard PPPs as an all-embracing concept that fills the void between public and private sector provision. Instead, PPPs are regarded to be the special case of “*Partnership solutions*” when the public sector is one of the partners.

4.7.10 Concessions

According to Grimsey and Lewis (2004b, p xi), concession-based approaches are the oldest form of PPC, and “*a variety of arrangements are based on the concept of a fixed-term concession, using various combinations of private sector resources to design, construct, renovate, operate and maintain facilities. Ownership of the facility may remain with government or be transferred to the government on completion of the construction or at the end of the concession period*”.

In France, cooperation between the public and private sectors goes back several hundred years, particularly in the form of concessions. The first concession contracts were awarded for the construction of channels, bridges and tunnels

already in the 1600s (Grimsey and Lewis, 2004, pp. 47-48). According to the OECD (2008, p 23), the following features defines a concession: A concession grants the right to a private firm to operate a defined infrastructure service and to receive revenues from it; The concessionaire usually pays the concession-granting authority a fee to obtain this right; The concessionaire carries the bulk of the risk; The asset involved in the delivery of the service remains the legal property of the government, though the private firm has the right to operate it and use it to generate income. The private firm is also typically responsible for the maintenance of the asset; and according to the *sensu stricto* definition of concessions, the asset must be transferred to the government at the end of the contract term. Concessions differ from privatisation in that the asset remains the legal property of the government and the contract has a limited duration.

4.7.11 Outright Privatisation

According to Grimsey and Lewis (2004b, p 56), in the US, privatisation has generally come to mean two things: Any shift of activities or functions from the state to the private sectors (including all reductions in the regulatory and spending activity of the state); and Any shift of the production of goods and services from public to private (excluding deregulation and spending cuts except when they result in a shift from public to private in the production of goods and services). Consequently, particularly in the US, privatisation and contracting out are often used synonymously. Especially in the UK and Australia, on the other hand, privatisation refers to the transfer of ownership of physical assets from public to private hands.

4.8 Military Logistics

"I don't know what the hell this "logistics" is that Marshall is always talking about, but I want some of it."

Fleet Admiral E. J. King (NATO, 2007, p 3)

"You will not find it difficult to prove that battles, campaigns and even wars have been won or lost primarily because of logistics."

General Dwight D. Eisenhower

Perhaps everybody will not endorse that wars have been won or lost primarily because of logistics, but most may agree that wars have been lost because of bad logistics. Experiences from throughout military history have demonstrated that logistics is one of the most important aspects of warfare. Despite these experiences, logistics has often been given a lower status and priority than what has been the

case with tactics and strategy. Two of the perhaps greatest military theoreticians were Carl von Clausewitz and Antoine Henri Jomini (Rutner *et al*, 2012). A possible explanation for the lower status of logistics could be the impact that Clausewitz has had on the development of military theory in Western Europe, since Clausewitz, as opposed to the contemporary Jomini, did not pay logistics as much explicit attention as he did tactics and strategy, whereas Jomini put these three disciplines on a somewhat more equal footing. In the writings of Clausewitz, a concept of logistics can be implicitly derived from the distinction between “*the use of the fighting forces by tactics and strategy*”, and all “*else that is needed so that fighting forces can be taken as a given for tactical and strategic purposes*” (Proença Júnior and Duarte, 2005). In the writings of Jomini, the term logistics is used, defined and even explicitly used for a dedicated chapter (Rutner *et al*, 2012). With Jomini, “*logistics assumed a much more important role in fighting and in the organisation of modern armies*” (Prebilič, 2006). To summarise the relationship between strategy, tactics and logistics: strategy is “*what we would like to achieve*”; tactics are “*ways of doing it*”; and logistics “*define what we can actually do in any given situation*” (Page, 2007, p 165).

Logistics is said to emanate from the Greek word *logisticos* or the French word *logistique* (Kress, 2002, p 3). *Logisticos* has to do with logic and means “*good at calculation or estimation*”. *Logistique* supposedly comes from the word *loger*, which means to lodge (soldiers). Some authors are of the opinion that logistics has arisen as a combination of the two meanings. The Greek origin would suggest a quantitative science, whereas the French origin would indicate a more qualitative art. The advocates of the dual origin could therefore be regarded as being of the opinion that logistics contains elements of science, and elements of art. Kress (2002, pp. 8-10) belongs to the latter category and consequently makes an exposition of the scientific and the artistic aspects of logistics. The scientific, or quantitative, aspects of logistics are tangible and can be illustrated by parameters such as amount of fuel, amount of ammunition, number of spare parts and the time that is required for transportation. These factors are well suited for mathematical modelling and computation. There are also several artistic, or qualitative, aspects of logistics, which do not submit themselves quantification. Qualities such as creativity, intuition, insight, determination and flexibility are important components of the mental decision process. These qualities assist the decision-maker in situations where uncertainties on the battlefield are paramount. Thorpe (1986, p 5) makes a similar distinction between the scientific and the artistic aspects of logistics, but labels them pure logistics and applied logistics. The first of these categories is devoted to the study of the theoretical aspects of logistics and its role in military theory. The insights and conclusions that have been made and drawn through the studies within pure logistics are then implemented within applied logistics.

4.8.1 Definitions over Time and Space

One of the earliest authors in the field of logistics, the Swiss general, Baron Antoine Henri Jomini, in 1838 defined logistics in the following way in his book *“Précis de l’Art de la Guerre”* (*“The Art of War”*):

“Logistics is the art of moving armies. It comprises the order and details of marches and camps, and of quartering and supplying troops. In a word, it is the execution of strategic and tactical enterprises.”

Van Creveld (1977, p 1) elaborates on Jomini’s idea when he in the following clear and concise manner establishes that:

“Logistics is the practical art of moving armies and keeping them supplied.”

By making an analogy between warfare and a production process, Kress (2002, p 7) states that logistics has to do with the inputs, i.e. means and resources, of a *“production process”* that is called combat or military operation, and consequently defines logistics as:

“Logistics is a discipline that encompasses the resources that are needed to keep the means of the military process (operation) going in order to achieve its desired outputs (objectives). Logistics includes planning, managing, treating and controlling these resources.”

Modern military logistics involves a wide range of activities and services required to support operations. Logistics and administration, i.e. the managing and execution of all military matters not included in tactics and strategy, are closely allied and interdependent and in combination they constitute Combat Service Support (CSS), which is the support provided to combat forces (UK MoD DCDC, 2007, p 1-1), primarily in the fields of administration and logistics (NSA, 2010, p 2-C-8). Modern military logistics is the bridge between deployed forces and the Defence Industrial Base (DIB) that produces weapons and materiel that the forces need to accomplish their mission, and NATO (2007, p 4) and EU (2011b), therefore defines logistics as:

“Logistics is the science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, the aspects of military operations which deal with: Design and development, acquisition, storage, transport, distribution, maintenance, evacuation, and disposal of materiel; Transport of personnel; Acquisition or construction, maintenance, operation, and disposition of facilities; Acquisition or furnishing of services; and Medical and health service support.”

In this thesis, the all-embracing definition established by NATO (and also endorsed by many nations and organisations such as EU) will be used. As is demonstrated by this definition, acquisition is considered to be an important part of contemporary military logistics.

4.8.2 Functions, Principles and Alternatives

Foxton (1994, p 11) states there are a number of functions and principals in military logistics that are generic: Supply; Transportation and movements; Maintenance and repair; Medical services; and Smaller functions, including post. Two of these functions are of particular interest to the reported research; supply and support (Maintenance, Repairs and Overhauls, MRO).

NATO (2007) divides supply into five classes. Class I supplies are *“items of subsistence, e.g. food and forage, which are consumed by personnel or animals at an approximately uniform rate, irrespective of local changes in combat or terrain conditions”*. Class II supplies consist of *“supplies for which allowances are established by tables of organisation and equipment, e.g. clothing, weapons, tools, spare parts, vehicles”*. Class III supplies include *“Petroleum, Oil and Lubricants (POL) for all purposes, except for operating aircraft or for use in weapons such as flame-throwers, e.g. gasoline, fuel oil, greases coal and coke”*. Class III a supply is aviation fuel and lubricants. Class IV supplies comprise *“supplies for which initial issue allowances are not prescribed by approved issue tables. Normally includes fortification and construction materials, and additional quantities of items identical to those authorised for initial issue (Class II) such as additional vehicles”*. Class V supplies encompasses *“ammunition, explosives and chemical agents of all types”*.

MRO is carried out at a number of different levels termed; first line repair (unit level), second line repair (brigade and divisional level), third line repair (Corps level), fourth line repair (Service level) and base line repair (military strategic depots and national industrial base level) (Foxton, 1994, p 12-15). First line (L1) repair is the maintenance and preparation for use of complete systems or equipment, normally to a depth necessary to keep them in day-to-day order. Second line (L2) repair is the maintenance support provided to first line where the item concerned is in an unacceptable condition, or requires preventive maintenance. Third line (L3) repair encompasses all other service maintenance. Fourth line (L4) repair is maintenance carried out by industry.

Foxton (1994, pp. 3-7) states that military logistics rests on the following, generic principles: Foresight; Economy; Flexibility; Simplicity; and Co-operation. However, all nations and organisations do not subscribe to these generic principles. As an example, NATO uses ten principles: Collective Responsibility; Authority; Primacy of Operational Requirements; Cooperation; Coordination; Assured provision; Sufficiency; Efficiency; Flexibility; and Visibility and Transparency (NATO, 2007, pp. 83-84). EU utilise no less than twelve principles, formulated as: Primacy of Operational Requirements; Collective Responsibility; Authority; Cooperation; Coordination; Assured Provision and Sufficiency; Flexibility; Simplicity; Timeliness; Effectiveness/Efficiency; Visibility and Transparency;

Synergy; and Multinationality (EU, 2007b); thus adding Timeliness, Synergy; and Multinationality to the NATO list.

According to Kress (2002, p 10), military logistics has always confronted the following three basic logistical alternatives: Obtain the necessary resources on the battlefield; Carry the necessary resources with the troops; and Transport the necessary resources from the rear area to the troops in the battlefield. The choice between the alternatives has throughout history been dictated by the nature of war, the logistical needs and the available resources. Before warfare gradually became more and more technically sophisticated, advancing armies could often support themselves by the utilisation of natural resources, through pillaging of civilian resources and sometimes by appropriating the opponent's resources. Consequently; to support armies at this time was easier when they were moving. If they had to stay on one location for a longer period of time, there was a risk that they would consume all of the local resources. Van Creveld (1977, pp. 7-8) state that logistical considerations, e.g. regarding where necessary resources could be obtained, often were decisive for military decisions concerning, for example, what city to siege, or liberate, next. According to Kress (2002, pp. 14-15), modern military logistics must be a combination of all the three logistical alternatives. Today, the first alternative does not entail looting, but being partly dependent on the resources of Host Nation Support (HNS). Armies partly utilise the second alternative by bringing food, fuel, ammunition and spares with the units. The third alternative is, however, the only alternative that can support a modern army over time. Regardless of the mission, an army cannot perform its task over time if the logistical function does not guarantee a continuous flow of essential resources, at the right speed and at the right time, i.e. an appropriate supply and support chain.

4.8.3 Strategic, Operational and Tactical Levels

"Experts who deal with modern logistics have a similar role to managers in the economic systems. The position of logistics, as a link between the civilian environment and the Armed Forces, initiates discussion of the qualifications of the people who work in logistics and who exercise control over the logistic system. Military-historical experiences indicate that military commanders often do not acknowledge the direct control of the logistic system and its military experts. In planning they especially concentrate on the amounts of the needed military material and they express their demands for it, but the problem is in co-operation with the civilian environment, which often supervises the production of the military material. Principles of free economy, competition and rational consumption are standards or norms which do change with production of the military material, but military commanders do not seem to understand them. Demands for production are often extremely high and cannot possibly be realized."

Prebilič (2006)

In an analogous way as warfare is referred to as having strategic, operational and tactical levels, Kress (2002, p 17) states that military logistics can be subdivided into strategic, operational and tactical logistics. At the strategic logistical level, long-term defence related decisions are made. These decisions can pertain military infrastructure, i.e. technology, defence related industry, storage and resources for transportation. In NATO, the term production logistics, or acquisition logistics, is used as a synonym to strategic logistics (NATO, 2007, p 4). Production logistics is that part of logistics concerning the process of and procedures of research, design, development, manufacture and acceptance of materiel (NSA, 2010, p 2-P-9).

Strategic logistics, which generates the logistics infrastructure and constitutes the national resources needed for defence, is mostly utilised during peacetime (Kress, 2002, p 42). It should consequently be planned and implemented well in advance of any military contingency. In the systematic and methodological planning process that is required, multiple criteria may be examined. Many of these multiple criteria are likely to be economical considerations, which examine cost-effectiveness relations. Hence, an important factor in the planning of strategic logistics is efficiency (cf. Section 4.9.9), i.e. the ratio between the inputs invested in logistics capabilities and the estimated outputs in the battlefield (Kress, 2002, p 42).

At the tactical logistical level, questions relate to the on-going combat. At this level, troops are supplied with food, ammunition, fuel and maintenance of the units' equipment; and the activities are quantifiable. They must, however, be performed in an environment that comprises hostile activities and where the units that are going to be supported at short notice can change their activities and location. Consequently, tactical logistics is measured in terms of effectiveness (cf. Section 4.9.8), and the considerations are focused on the successful execution of the mission and at attaining the operational objectives, since the dominant factor at the tactical level is the effect of the action, not its cost (Kress, 2002, pp. 42-43). The aim of logistics at the tactical level is to deliver the right supplies and maintenance, in the right quantities and at the right time to the units.

Between the strategic and the tactical logistical level lies the operational logistical level (see Section 4.8.6). In NATO, the term consumer logistics is used as a synonym to operational (and, implicitly, tactical) logistics (NATO, 2007, p 4). Consumer logistics is that part of logistics concerning the reception, storage, transport, maintenance and disposal of materiel, and the provision of support and services (NSA, 2010, p 2-C-13). Generally, operational logistics is connected to a theatre of operations. The task of operational logistics is to set up a logistics system in the theatre of operations, operate the system and to predict, analyse and prioritise future requirements for logistical efforts, in accordance with the operative objective. The logistical system at the operational level can be compared to a network, which is composed of nodes (terminals) and links (Lines of

Communication, LOCs). The nodes are places where logistical activities take place. The nodes therefore include sources (suppliers, i.e. for example depots or bases in the native country), intermediate bases, depots or stores, together with destinations (customers, i.e. the end-consuming units). The LOCs are routes that connect the different nodes to each other. Along these LOCs supply, support and troops are transported to the units that are engaged in military action. During the operation, injured personnel and damaged equipment are transported in the reverse direction. NATO (2007, p 4) inserts an additional level of logistics between production (strategic) logistics and consumer (operational) logistics: in-service logistics, which is defined as *“that part of logistics that bridges production and consumer logistics and comprises those functions associated with procuring, receiving, storing, distributing and disposing of materiel that is required to maintain the equipment and supply the force”*.

According to Kress (2002, p 30), the cyclic sequences of processes and events that take place in the outlined network, can conceptually be regarded as the Logistics Support Chain. This chain consists of two parts, Demand and Supply. The units in combat convey their requirements (Demand), which are subsequently forwarded to the right source. The supply chain then transports the required resources through the network, from the source to the destination of interest. The evacuation of injured personnel and damaged equipment is also a part of this support chain and consists of a flow from the tactical nodes, backwards in the system.

4.8.4 Peace, Crises and War

“Logisticians are a sad, embittered race of people, very much in demand in war, who sink resentfully into obscurity in peace. They deal only with facts but must work for men who traffic in theories. They emerge during war because war is very much fact. They disappear in peace, because in peace, war is mostly theory. The people who trade in theories and who employ logisticians in war and ignore them in peace are generals. Logisticians hate generals.”

Admiral Isaac Campbell Kidd

That military logistics in reality is not just one type of logistics, but rather two relatively different types of logistics, should be clear judging by the above quotation. The distinction is between peacetime military logistics and logistics in times of war. The two variants are naturally closely interconnected and therefore influence each other to a large extent. Nowadays, a third variety, crises (requiring Peace Enforcement, PE, according to UN *“Chapter VI ½”*, have emerged in between peace and war, and paved the way for Operations-Other-Than-War (OOTW), Peace Support Operations (PSOs), etc. (see Section 1.2.2). Thus, military logistics depends on whether a country is in a state of peace, crisis or war. In peacetime, the primary focus of military logistics is strategic logistics, i.e.

acquisition of materiel, transportation of personnel and materiel, storage and maintenance of materiel. Naturally enough, logistical planning for different types of military contingencies must also be performed. Peacetime military logistics shows signs of several similarities with the civilian variety of logistics. However, there also exist a significant number of distinct differences between the two forms of logistics. The fundamental difference lies in the fact that the peacetime form of military logistics must be influenced by the fact that it must have a preparedness to be transformed into wartime military logistics at relatively short notice. The potential transformation of peacetime military logistics to its wartime counterpart exerts a strong influence on the peacetime variety of military logistics. Peacetime military logistics must, e.g., make certain that strategic materiel is acquired, that spare parts are stored in sufficient numbers in the event of war. Thus, the focus of peacetime (strategic, production, acquisition) logistics is on: Strategic materiel; Production; Storage; Maintenance; Education and training; and Preparations for military operations.

In case of war, the focus of military logistics is shifted. The activities of peacetime military logistics, i.e. acquisition, distribution, storage of ammunition and spare parts, must continue also in times of war. In times of crises and war, however, military logistics must also focus on operational and tactical logistics, i.e. include strategic lift, operative regrouping of military units, handling of a substantially increased amount of resources that need to be transported, etc. In war, military logistics primarily deals with efficient transportation, control and support of units. The prerequisites for a successful realisation of wartime military logistics must have been created by the peacetime variety of military logistics. In times of war, the focus of military (operational, consumer) logistics is primarily on: Strategic lift and operative regrouping of military units; Storage and flow of personnel, equipment, spare parts, ammunition, fuel etc.; and Maintenance and medical attendance. A prominent example of the significance of military logistics in war was enacted by the US during the three phases of the Gulf War in 1991, i.e. during Operation Desert Shield (ODS I), Operation Desert Storm (ODS II) and Operation Desert Farewell. From a logistical point of view, ODS I and ODS II have gained fame as *"Moving mountains"*, whereas Operation Desert Farewell, has not gained the much deserved fame for *"Removing mountains"*. The staggering and unprecedented metrics during ODS I include the movement, within only a few months, of more than half a million soldiers by air transport, more than half a million tonnes of equipment and supply by air transport and another 2.3 million tonnes of equipment that was transported by sea (Pagonis, 1992, pp. 95-158).

4.8.5 Distribution Channels

“Throughout history, military leaders have constantly been reminded of the necessity of adequate supply lines so that their troops might achieve victory on the battlefield. That has been particularly true in offensive and geographically expansive warfare when the aggressor’s early successes have often given way to humiliating defeat. Their overextended forces, though usually more experienced and greater in number, could often not hold the day against a smaller, less capable, but fully supplied enemy operating on its own turf. Thus, the ability of a general to deliver the essentials of war to his forces in the field in terms of food, clothing and equipment came to be a critical and definitive consideration in assessing the likelihood of success if a military campaign were to be undertaken. Valour and skill were of little value without the supplies to back them up, and the greater the distance between those engaged in battle and the source of their supplies, the less certain the victory”.

(Wong et al, 2000).

As described in Section 4.8.2, there are five separate functions in military logistics: supply; transportation and movements; Maintenance, Repairs and Overhauls (MRO) (i.e. support); medical services; and smaller functions, including post. The focus of the reported research is on two of these functions: supply and support (MRO). The focus is also on defence acquisition and on how defence acquisition can affect military activities, i.e. how production logistics, or strategic logistics, may affect consumer logistics, or operational and tactical logistics.

Table 4.19: Overseas operations, overseas training and exercises, domestic operations, and domestic training and exercises.

	Operations	Training and exercises
Far away (overseas – requires strategic lift)	Overseas operations (PSOs)	Overseas training and exercises
Near (domestic – does not require strategic lift)	Domestic operations (outright war)	Domestic training and exercises

There are three dimensions with which to define the military distribution channels: type of function (i.e. what is distributed?); type of military activity (i.e. why is it distributed?); and type of distance (i.e. where is it distributed, and therefore; how is it distributed?). There are two types of functions (supply and support); two types of activities (operations and training/exercises); and two types of distances (far enough to require strategic lift and near enough not to require strategic lift). Hence, theoretically, there are two to the power of three (2^3), i.e. eight, potential military distribution channels. In practise, however, this potential number of distribution channels is currently cut in half. The reasons for this reduction are twofold. First of all, since the ending of the Cold War, the planning assumptions in the Western countries do not include the scenario that war will have to be fought domestically,

thus enabling the “*peace dividend*” (see Section 1.2.1) to be consumed in other sectors of society. Consequently, operations (predominantly PSOs) will (normally) be conducted “*overseas*”, which means that strategic lift will be required. Secondly, because of economic restrictions (“*doing more with less*”; “*faster, cheaper, better*”), military units will not (under normal⁵¹ circumstances) be sent overseas for training and exercises. Consequently, training and exercises will normally be conducted “*domestically*”, which means that strategic lift will not be required. The consequences of these political planning assumptions and economic restrictions are illustrated in Table 4.19.

Table 4.20: Supply and support chain distribution channels for overseas operations, and for domestic training and exercises.

	Overseas operations	Domestic training and exercises
Supply chain	Flow of products (equipment and spares) to overseas operations	Flow of products (equipment and spares) to domestic training and exercises
Support chain	Flow of services (maintenance and repair) to overseas operations	Flow of services (maintenance and repair) to domestic training and exercises

In practise, the political planning assumptions and economic restrictions reduce two dimensions (type of activity and type of distance) into one, type of destination, which can take two values: overseas operations and domestic training and exercises. This is a simplification, and as recent operations on the Balkans and UK training and exercises as far afield as the Falkland Islands have demonstrated; operations that do not require strategic lift and training and exercises that do require strategic lift are more than theoretical possibilities. However, these occasions are an exception to the rules and the simplification is considered to be justifiable, and, consequently, there are two dimensions that define the distribution channels. When combined, these two dimensions contribute to create a two-by-two matrix, which is illustrated in Table 4.20. Consequently, there are four distribution channels in operation: a supply chain for overseas operations, a supply chain for domestic training and exercises, a support chain for overseas operations and a support chain for domestic training and exercises.

⁵¹ While military units can conduct training and exercises on overseas locations *if they are already there*, i.e. stationed abroad or preparing for a mission, military units that require strategic lift will not be sent overseas *only* for training and exercises. Consequently, a company of MBTs will not be sent on overseas training and exercises, since they would require strategic lift to get there, while a squadron of fighters or a division of destroyers, which could reach the destination without the assistance of strategic lift, may well participate in overseas training and exercises. This observation highlights some of the different requirements of the three services (army, navy and air force). There are differences in the requirements for strategic lift and for the distribution channels, i.e. the supply and support chains.

4.8.6 Operational Logistics

This section could have been given any number of labels and collected its references from a myriad of different sources. The term “*Operational Logistics*” has been borrowed from Kress (2002). However, since the problems and solutions are universal, any national or organisational (UN, NATO, EU) concept would have sufficed. The NATO concept would, e.g., have provided this section with the name Operations Logistics Chain Management (OLCM).

A logistics node, or a terminal, is a location where logistics activity takes place. Lines of Communication (LOCs) are routes that connect the logistics nodes, from the source nodes, via intermediate nodes, to the destination nodes, i.e. the combat units at the front of the theatre of operations. The strategic level source (supply) nodes, the operational level intermediate nodes and the tactical level destination (demand) nodes constitute a logistics network, i.e. an ordered set of logistics nodes and LOCs (Kress, 2002, p 29 and p 220). Figure 4.17 illustrates the forward flow of units, supply and support in a generic operational logistics network. There is also a corresponding reverse flow, which also includes the evacuation of injured personnel and damaged equipment.

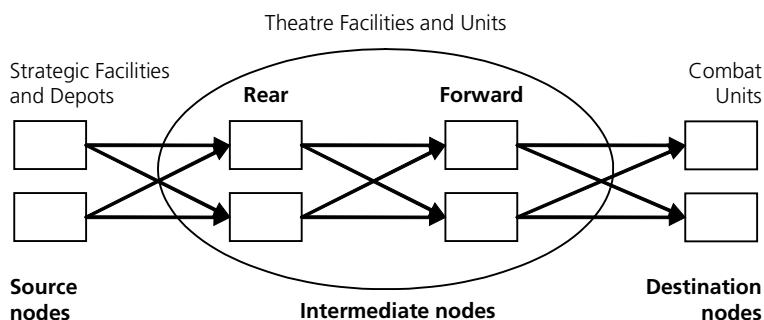


Figure 4.17: A generic operational logistics network (Source: Kress, 2002, p 29).

The source nodes include home bases, strategic bases and Ports of Embarkation (POE). The intermediate nodes are theatre facilities that include Ports of Debarkation (POD), support bases and supply storage. The destination nodes, which are also called tactical logistics nodes, are the Combat Service Support (CSS) units of the tactical combat forces (Kress, 2002, p 29). The “*theatre*” refers to an area or a place where military activities are transpiring. As illustrated in Figure 4.17, the theatre facilities can be divided into two subsets; rear and forward theatre facilities. The rear theatre facilities are typically PODs, whereas the forward theatre facilities are Corps level logistics centres in the theatre of operations.

In a Peace Support Operation (PSO), the distance to the theatre of operations is typically thousands of kilometres from the Home Logistics Base (HLB). In order to move the units to the theatre, i.e. the Joint Operations Area (JOA), strategic airlift capability and strategic sealift capability has to be utilised. According to Kress (2002, p 202), the process of moving the units from the HLB to the JOA comprises five main stages: Moving (tactical transport) the military units from their home bases to POEs, Sea Ports of Embarkation (SPOEs) and Air Ports of Embarkation (APOE); Loading the military units on board ships and airplanes; Transporting (strategic transport) the military units along the LOCs by air, Air Line of Communication (ALOC) or by sea, Sea Line of Communication (SLOC) from the POEs to the PODs; Unloading the military units at the PODs, i.e. at the Air Port of Debarkation (APOD) or at the Sea Port of Debarkation (SPOD); and Moving (operational transport) the military units from the PODs to the Reception, Staging and Onwards Movement (RSOM) area.

A generic process for moving military units from the HLB to the JOA is depicted in Figure 4.18, which also illustrates that the JOA can be divided into a Joint Rear Area (JRA) and an Area of Responsibility (AOR). Figure 4.18 also illustrates “*manoeuvre logistics*”, which is the last link, i.e. “*the last mile*”, through which supplies and support to a military unit is distributed to its final destination.

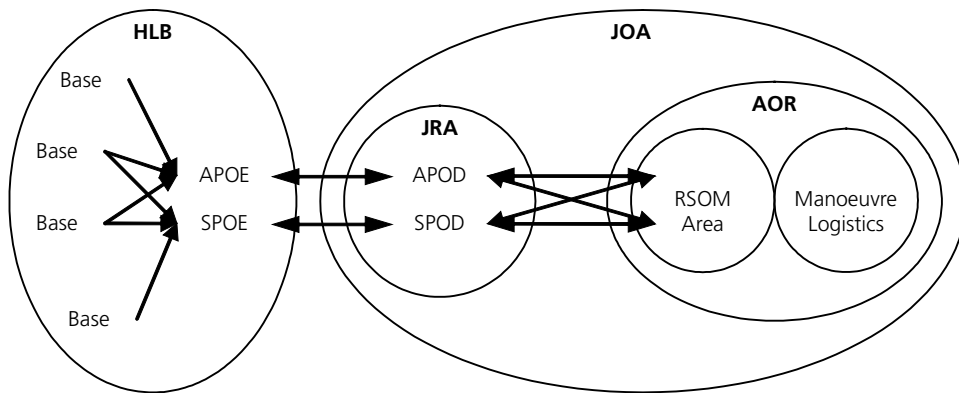


Figure 4.18: A generic process for movement of units and supplies from the home logistics base to the theatre of operations (Source: Based on Kress, 2002, pp. 202-203).

In an international mission, i.e. a PSO, with many participating countries, one Lead Nation will assume the lead responsibility for planning and execution of the operation, and will also provide the Force Commander. Operational Command (OPCOM) and/or Operational Control (OPCON) of a military unit will normally be handed over to the Force Commander by way of Transfer of Authority (TOA) when the military unit approaches the RSOM in the AOR. Logistics Command

(LOGCOM) and Logistics Control (LOGCON) are, however, not necessarily transferred, but may remain a national responsibility. At least some parts of the responsibility for supplies and support services will normally remain a national responsibility. Spares to, and Maintenance, Repairs and Overhauls (MRO) of, e.g., a Combat Vehicle (CV), are examples of such national responsibilities.

NATO (2007, p 155) classify medical support capability as a system of four Roles. Role 1 provides primary health care, specialised first aid, triage, resuscitation and stabilisation. It is a national responsibility and is integral or allocated to a small unit. Role 2 provides an intermediate capability for the reception and triage of casualties, and being able to perform resuscitation and treatment of shock to a higher technical level than Role 1. It routinely includes Damage Control Surgery (DCS) and may include a limited holding facility for the short-term holding of casualties. Role 2 is a national or lead nation responsibility, usually allocated at Brigade or larger size units. Role 3 is deployed hospitalisation and the elements required to support it. This includes a mission-tailored variety of clinical specialties including primary surgery and diagnostic support. It is a national or a lead nation responsibility, and it may be multinational. It provides medical support at Division level and above. Role 4 provides the full spectrum of definitive medical care that cannot be deployed to theatre or is too time consuming to be conducted there. It is normally provided in the country of origin or the home country of another Allied. Role 4 is often provided for within the national civil health system.

4.8.7 The UK Defence Logistics Support Chain

While military logistics in general is the setting for the reported research, the British military logistics is the particular setting for the case based research that is reported. Consequently, some of the specifics of the British military logistics are presented in this section, in order to serve as a background to the case descriptions in Chapter 6. Military logistic in the UK can be divided into three main segments of activity: “*static logistics*”, which is normal peacetime operational supply chains and infrastructure; “*transit or coupling bridge logistics*”, which involves moving equipment and stores into a theatre of operations; and “*deployed logistics*”, which involves supporting operational units in theatre (Chappell and Peck, 2006).

As presented in Section 4.8.2, military logistics have by many been considered to rest on five generic principles; Foresight, Economy, Flexibility, Simplicity and Co-operation. Until relatively recently, the UK used this exact classification (UK MoD

JDCC, 2004b, p 2-1). However, economy has now been exchanged for efficiency⁵² and flexibility has been exchanged for agility⁵³ (UK MoD DCDC, 2007, p 1-5). Consequently, the UK Defence Logistics Support Chain (DLSC) and the Joint Supply Chain (JSC) is based on the five key principles of logistics: Foresight, Efficiency, Co-operation, Simplicity and Agility (UK MoD, 2009b, pp. 2-3). The DLSC is the MoD supply and support engineering chain from acquisition to disposal (UK MoD, 2009c, p 17), and is defined as *“the in-service operation of Support Solutions, including the physical flow of materiel, people, services and information”*, whereas the JSC is defined as *“that element of the Support Chain that covers the policies, end-to-end processes and activities associated with the receipt of stocks from trade to their delivery to the demanding unit and the return loop for all three services”* (UK MoD, 2009b, p 1), or *“the MoD supply and support engineering chain from acquisition to disposal”* (UK MoD, 2009c, p 17). Figure 4.19 illustrates the connection between the British Defence, logistics, support chain, supply chain and the delivery of military effect.

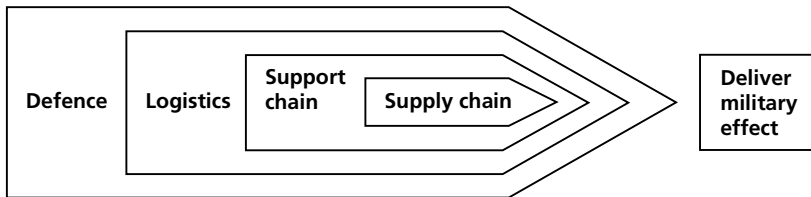


Figure 4.19: The Joint Supply Chain process is a core enabling capability for Defence (Source: UK MoD, 2005b, p 6).

“The end-to-end JSC stretches from requirements of operational commanders and Front Line Commands (FLCs) back to industry. The JSC is the Defence controlled network of nodes comprising resources, activities and distribution options that focus on the rapid flow of information, services and materiel between end users and the Strategic Base to generate, sustain and redeploy operational capability” (UK MoD, 2009b, p 2). The JSC consists of the Forward Supply Chain (FSC) and the Reverse Supply Chain (RSC). The FSC is defined as *“a supply chain that is dedicated to the flow of products and materials from the manufacture, depot or issuing unit to the end user”* (UK MoD, 2009c, p 26). The RSC is defined as the process by which surplus, repairable, damaged or waste materiel is returned for reallocation, reclamation, repair or

⁵² Previously, the requirement to make efficient use of finite resources has been termed economy, but efficiency is a more appropriate term (UK MoD DCDC, 2007, p 1-5).

⁵³ Agility is a more appropriate term than flexibility since it encompasses the attributes of responsiveness, resilience, acuity and adaptability and flexibility (UK MoD DCDC, 2007, p 1-5).

disposal. The process begins when a return item is identified and ends when that item is receipted onto the account from which retention, reallocation, repair or disposal takes place (UK MoD, 2009b, p 2). The JSC process in support of an overseas operational theatre is conducted by a number of organisations, which interact to form an integrated and two-way supply chain. The JSC must aim to balance effectiveness with efficiency and also has to be able to react quickly to ensure that urgently required logistic support is delivered to the right place and on time with cost subordinate to need. The organisations in the JSC include: the Permanent Joint Headquarters (PJHQ), the Defence Supply Chain Operations and Movements (DSCOM), the Coupling Bridge (CB), the FLCs, Contractors in Support of Operations (CSO) and the Strategic Base (UK MoD, 2009b, pp. 3-5).

The logistics section⁵⁴ within the Permanent Joint Headquarters, i.e. PJHQ J4, is responsible for the logistics aspects of planning, deployment, sustainment and recovery of joint, potentially joint and multinational operations. The DSCOM consist of the operational and policy elements of Movement operations and the Defence Logistics Operations Centre (DLOC), which coordinates the operational output of the MoD Defence Equipment and Support (DE&S) (UK MoD, 2009b, p 4). The FLCs are customers of the JSC but also provide much of the manpower and resources required to establish and run the JSC, particularly in the JOA.

The Coupling Bridge (CB), see Figure 4.20, is the strategic link between the HLB and the JOA through which materiel and Force Elements (FEs) flow into and out of the JOA, utilising air and surface assets. The CB is the operational transportation link between the UK and the Theatre of Operations operated by either the PJHQ or the lead FLC (UK MoD, 2009c, p 16), and is defined as *“commencing at the point of entry into the Ports of Embarkation (POE) and terminating at the point of exit from the Port of Disembarkation (POD)”*. Materiel flow in both directions along a joint pipeline utilising air (Air Lines of Communication, ALOCs) and surface (e.g. Sea Lines of Communication, SLOCs) assets as required. Information flow is a vital part of the CB which depends upon robust communications (UK MoD, 2009b, pp. 3-4).

According to the UK MoD (2009b, pp. 4-5), Contractor Support to Operations (CSO) is an increasingly important element in the overall provision of logistic support to operations and the JSC. CSO is an overarching concept which rests on three pillars: Sponsored Reserves (SRs), Contractors on Deployed Operations

⁵⁴ The logistics Section in a military Headquarters (HQ) is designated Section 4. In a Joint HQ, i.e. an HQ for all three services, the logistics Section is known as J4. In a Land Component Command (LCC), Maritime Component Command (MCC) and an Air Component Command (ACC), Section 4 is called L4, M4, and A4, respectively.

(CONDOs) and Private Military and Security Companies (PMSCs). The existence and utilisation of SRs is regulated in UK legislation. SRs are employed by a contractor and by the Territorial Army (TA), and can be deployed as any regular reserve. The CONDO concept *“provides a formal framework to facilitate the provision of elements of support to deployed operations and exercises through the use of contractors in circumstances that do not engender unacceptable military risk⁵⁵”* (UK MoD, 2008f, p 1-1). Contractors are involved in a progressively wider range of roles and functions resulting from a smaller military force, the outsourcing of some logistic functions and the introduction into service of technical weapon and equipment systems. CSO encompasses CONDO, Contractor Logistics Support (CLS, see Section 5.3.7), where in-service equipment is maintained under contract with the equipment provider, and the use of contractors through the PJHQ Contractor Logistic (CON LOG) contract, where a range of services can be provided from a long-term commercial contract (UK MoD DCDC, 2006, p C-22). It also covers contract arrangements that require civilian personnel to enlist under SRs conditions.

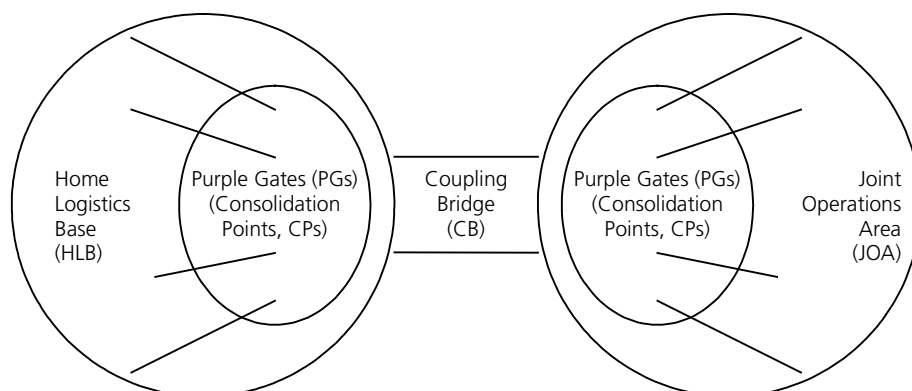


Figure 4.20: Purple gates (consolidation points) in coupling bridge logistics and deployed logistics.

HLB comprises military assets, industrial partners and national and international capacity. The military logistics system is made up of static depots, repair workshops, naval bases, garrisons and airfields within the UK and abroad. All operations regardless of size, nature and duration will be reliant to some degree on industrial and commercial support (UK MoD, 2009b, p 5).

⁵⁵ Risk in this instance refers to the operational risk faced by the local military commander in achieving the mission (UK MoD, 2008f, p 1-1).

The Purple Gate⁵⁶ (PG), see Figure 4.20, is a process to ensure the regulation of materiel into the JSC for the sustainment of operational theatres (UK MoD, 2009c, p 54), including equipment procured through Urgent Operational Requirements (UOR) and different forms of CLS agreements (UK MoD, 2009b, p 5). The PG was introduced in the JSC because of the Lessons Learned (LL, see Section 1.2) from the British participation in the PSOs on the Balkans, where CONDOs were allowed as part of the CSO concept. It was discovered that when contractors were allowed to send spares directly, there were considerable problems with theft of spares and fragmentation⁵⁷ of the supply chain, and also problems with operational planning (see Section 6.2). To remedy these problems, the PG was introduced (Warren, 2010). The PG was also introduced because there was a need to control the flow of materiel into the CB, and it can be defined as *“a process to ensure the regulation of materiel flow into the JSC for the sustainment of Operational Theatres”* (UK MoD, 2011f, p 5). Conceptually, there is *“one”* entrance, *“the PG”*, into the JSC, but in the real implementation of the concept, there are multiple primary and secondary⁵⁸ PG nodes, and beyond these, the UK MoD is responsible for the single military supply chain, the JSC. The primary PG is located at the Joint Support Chain Services (JSCS) at Bicester. Secondary PG nodes will *“replicate the function of the primary PG node when it is expedient to deliver sustainment materiel directly to the Port of Embarkation (POE) in order to meet operational requirements”* (UK MoD, 2011f, p 6). Such cases will be specifically authorised by Defence Support Chain Operations & Movements Logistics Operations (DSCOM Log Ops), and locations for secondary PG nodes include: Royal Air Force (RAF) Brize Norton, RAF Lyneham, Her Majesty’s Naval

⁵⁶ The Purple Gate (PG) is a British invention in military logistics, but in business logistics the PG would be known as a Consolidation Point (CP). Hence, all references to the UK specific PG in the UK specific Joint Supply Chain (JSC) in this thesis could be regarded as references to the more generic CP in any supply chain. There is, however, one important conceptual difference. While in a CP, the supplier, or any Third Party Logistics (TPL) provider, would be allowed to transport the goods from the CP, only transportation resources at the disposal of the UK Armed Forces are allowed to transport anything beyond the PG.

⁵⁷ Fragmentation refers to the notion that the introduction of more actors, i.e. contractors, in the supply chain, with different roles and responsibilities in different parts of the supply chain, lead to a fragmentation of the supply chain into a supply/support network. From a Supply Chain Management (SCM) and a Supply Chain Risk Management (SCRM) perspective, fragmentation raises questions regarding who should manage the fragmented supply chain and who should manage risk in the fragmented supply chain.

⁵⁸ Consequently, the author is well aware of the fact that there are multiple Purple Gates (PGs) that are potential nodes of entry into, and exit out of, the Joint Supply Chain (JSC). However, throughout the remainder of the thesis, the PG will be referred to in the conceptual sense, as a single entity, i.e. as if there was only one PG for entry in existence.

Base (HMNB) Portsmouth, Marchwood Military Port, Her Majesty's (HM) Ships when deployed and JSCS Aschchurch (UK MoD, 2011f, p 6). Despite the fact that it is a secondary PG node, JSCS Aschchurch is the nominated node for vehicles (UK MoD, 2011f, p 11). In addition to the Primary and Secondary PG nodes *into* the JSC, there are also corresponding PGs at the theatre end of the CB, which are called theatre PG nodes, the scale and resourcing of which is at the request of the Permanent Joint Headquarters (PJHQ) or the relevant Front Line Command (FLC), depending on who has command of the CB (UK MoD, 2011f, p 6). The main purpose of the Theatre PG Node is to record the receipt of materiel into Theatre via the CB and to act as the conduit for materiel returning to the UK through the Reverse Supply Chain (RSC). Figure 4.20 illustrates the role of PGs (CPs) and the CB in *"transit or coupling bridge logistics"* (the movement of equipment and stores into a theatre of operations) and *"deployed logistics"* (the support of operational units in theatre).

The Standard Priority System (SPS) is a process for defining, allocating and implementing JSC priorities in peace and on operations. The SPS is based on relative levels of urgency and split into operational and non-operational categories and three movement levels: Immediate, Priority, and Routine (UK MoD, 2011e, p 5). The SPS governs the priority for materiel flow in any direction within the JSC (UK MoD, 2011e, p 7), i.e. the FSC and the RSC. Within the SPS there are Supply Chain Pipeline Times (SCPTs), the primary aim of which it is *"to enable logistics support staff to plan the depth required for the deployed inventory"*, and the SPS is based on three movement levels (UK MoD, 2011e, p 5): Immediate (Delivery within the UK and Northwest Europe (NWE) within 24 hours); Priority (Delivery within the UK and NWE between 48 hours and 6 days); and Routine (Delivery within the UK and NWE within 7 days). To other destinations, the delivery times will increase depending on the distance. Furthermore, the RSC will have less demanding requirements than the FSC. For the UK and NWE, the RSC values are within 3 days for immediate, 22 days for priority and 55 days for routine (UK MoD, 2011e, p 28). As a comparison, the values of the total SCPT for transportation in the FSC to the Falkland Islands is 8 days, 10-20 days and 99 days, whereas the total SCPT for transportation in the RSC from the Falkland Islands is 12 days, 33 days and 146 days (UK MoD, 2011e, p 37). For operations, the SCPTs will be calculated for each SPS priority for each separate operation (UK MoD, 2011e, p 7).

4.9 Performance Measurement

"The evaluation of performance is a vital managerial function. However, refined measures to use in evaluation of logistics have not been rigorously developed. Further,

agreement on what constitutes optimal logistics performance has not been clarified beyond consistent comparison between inputs expended and outcomes measured.”

Mentzer and Konrad (1991)

“Thirty-five years ago, it was concluded that the purchasing department was one of the more difficult departments to evaluate. From the author’s own experience I would say that, certainly in comparison with other business areas, things have progressed only in a limited way.”

van Weele (2002, p 257)

The first of the above quotes implies that 20 years ago, Performance Measurement was not a rigorous enterprise in the area of business logistics. The second quote illustrates that the performance of purchasing, or procurement, or acquisition, has been, and perhaps is, a particularly difficult area to evaluate. According to van Weele (2002, p 258), four major problems seriously limit an objective and accurate assessment of the purchasing performance: Lack of definition (*“Although frequently used in practise and in theory, terms like purchasing performance, purchasing effectiveness, and purchasing efficiency have not been precisely defined; some authors even use these concepts interchangeably”*); Lack of formal objectives and performance standards (*“The objectives of the purchasing function often are not clearly defined; likewise, most purchasing departments operate without the guidance of well-defined performance standards”*); Problems of accurate measurement (*“Purchasing is not an isolated function; purchasing performance is a result of many activities which, due to their intangible character, are difficult to evaluate – In general, direct input-output relationships are difficult to identify; this seriously limits the possibility of measuring and evaluating purchasing activities in an accurate and comprehensive way”*); and Difference in scope of purchasing (*“Purchasing tasks and responsibilities differ greatly from one company to another. This precludes the development of broadly based, uniform evaluation systems”*). The importance of measuring performance, the difficulty of measuring performance, and the potential consequence of failing to measure performance, in the context of outsourcing is illustrated by Logan (2000): *“when managers could not easily measure the performance of an outsourced activity, it strongly damaged the user’s evaluation of the provider’s cost performance”*.

4.9.1 Performance, Profitability and Productivity

The terms performance, profitability and productivity are often confused and considered to be interchangeable (Tangen, 2005). According to Tangen (2005), productivity is a physical relationship between input and output, and is defined as the relation between output quantity and input quantity; profitability is a monetary relationship between input and output, which includes price-factors, such as price recovery; and performance is an umbrella term of excellence, which

includes profitability and productivity, and other non-cost factors such as quality, speed, delivery and flexibility. The relationships between performance, profitability and productivity are illustrated in Figure 4.21.

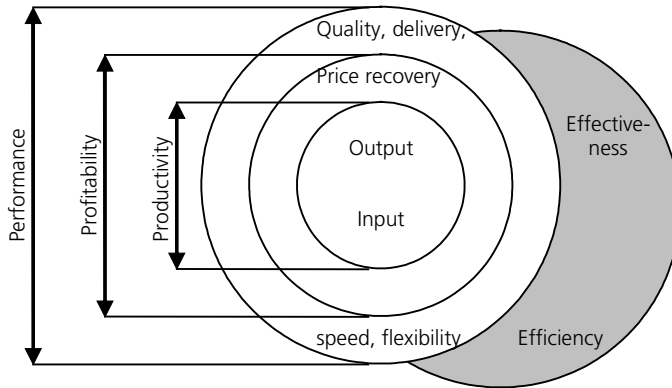


Figure 4.21: The triple P-model (Source: Tangen, 2005).

According to Tangen (2005), the terms effectiveness and efficiency, which represent the degree to which desired results are achieved, and how well the resources of the transformation process are utilised, are “*somewhat cross-functional when it comes to the other three terms*”, and are also frequently confused with performance, profitability and productivity.

4.9.2 Competitive Priorities and Performance Objectives

According to Afuah and Tucci (2003, p 3), there are three major determinants of business performance (defined as accounting profits): BMs, the environment in which businesses operate, and change. The relationships between performance and these determinants are illustrated in Figure 4.22.

Like many other theoretical areas, Performance Measurement is an area without consensus. Even within the area of Operations Management (OM), there is opposition between different contributions. According to Ward *et al* (1998), there is a common need among manufacturers for “*choosing among and achieving one or more key capabilities*”, which they refer to as “*competitive priorities*”. Furthermore, “*There is broad agreement that manufacturing competitive priorities can be expressed in terms of at least four basic components: low cost, quality, delivery time, and flexibility*” (Ward *et al*, 1998). Slack *et al* (2010, p 40) propose a different label, “*performance objectives*” and also an expansion to five components, as an answer to the question: “*What kind of things are you likely to want to do in order to satisfy customers and contribute to competitiveness?*”: Quality advantage (do things right); Speed advantage

(do things fast); Dependability advantage (do things on time); Flexibility advantage (be able to change what you do); and Cost advantage (do things cheaply).

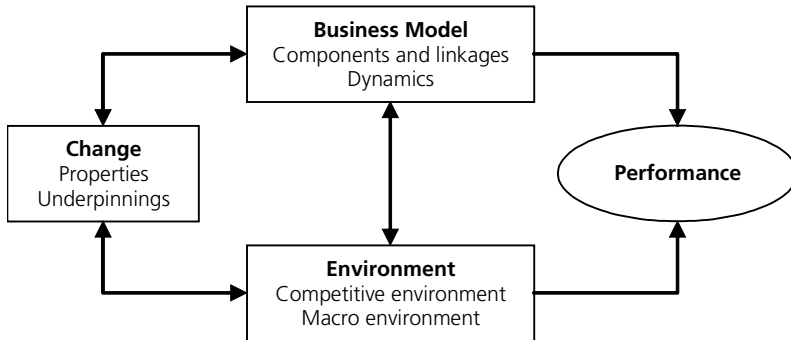


Figure 4.22: Determinants of business performance (Source: Afuah and Tucci, 2003, p 4).

The Anglo-Saxon political rhetoric and defence acquisition practise prestige words, i.e. “*faster, cheaper, better*” (see Section 5.2.2), explicitly addresses advances in *three* of these components, i.e. speed, cost and quality, while the remaining two are either handled indirectly in defence acquisition practise, which is the case with dependability, or not at all, which is the case with flexibility. That flexibility is not addressed is perplexing, since flexibility is one of the generic principles of military logistics (see Section 4.8.2). Simultaneous advances in three components, if at all possible, are likely to come at a price in the other dimensions. That flexibility is omitted, implying that there will be a price to pay in terms of reduced flexibility for any advances in the other dimensions, indicates that this perspective is a top-down, political perspective, predominantly aimed at efficiency, i.e. Value-for-Money (VfM, see Sections 4.7.2 and 4.9.9).

In Sweden, “*acquisition of equipment shall be cost-effective from a life-cycle perspective and satisfy the requirement for increased delivery assurance*”. One of the means to achieve this objective is formulated as “*acquisition of equipment shall be governed by elucidated and conscious choices between cost, (operational) effect and freedom of action*” (The Swedish Armed Forces, 2007a, p 2). Hence, the Swedish focus is on the performance objective components cost, dependability and flexibility. That dependability and flexibility are explicitly included indicates that this is a bottom-up, military perspective, principally designed to ensure military effectiveness.

4.9.3 Performance Measurement, Measures and Metrics

“What you measure is what you get.”

Kaplan and Norton (1992)

Business performance is a multi-faceted concept and the question of how it should be measured has *“been tackled by a variety of people from different disciplines”* (Neely, 1999). In a business context, performance can be defined as the efficiency and effectiveness of action (Neely *et al*, 1996). According to Neely *et al* (1995), *“the level of performance a business attains is a function of the efficiency and the effectiveness of the actions it undertakes, and thus”*: “Performance Measurement” can be defined as the process of quantifying the efficiency and effectiveness of action; a “performance measure” can be defined as a metric⁵⁹ used to quantify the efficiency and/or effectiveness of an action; and a “Performance Measurement System” (PMS) can be defined as the set of metrics used to quantify both the efficiency and effectiveness of actions. In Figure 4.23, the components of a PMS, and their interrelatedness, are presented.

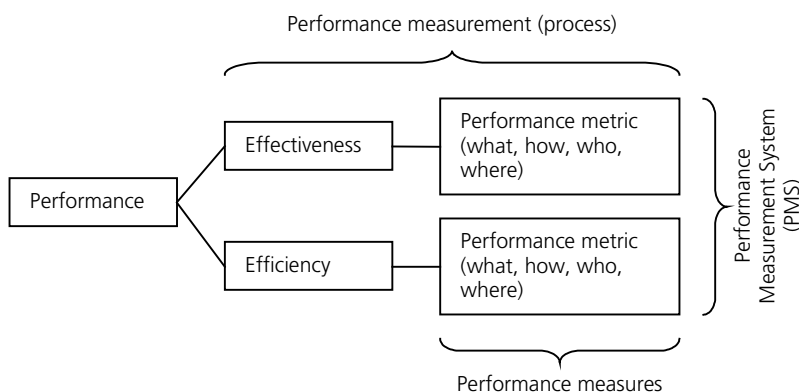


Figure 4.23: A generic representation of components of a Performance Measurement System (Source: Building on Neely *et al*, 1995; and Gunasekaran *et al*, 2007).

A PMS can be examined at three different levels (Neely *et al*, 1996): the individual performance measures; the PMS as an entity; and the relationship between the PMS and the environment in which it operates. According to Tangen (2003), there are several classifications of performance objectives, but most of them distinguish between: cost, flexibility, speed, dependability and quality. However, the metrics in a supply chain has been defined into four categories: time, quality,

⁵⁹ The term metric refers to more than simply the “formula” used to calculate the measure; for a given performance measure to be specified it is necessary to define, among other things, the title of the measure, how it will be calculated (the formula), who will be carrying out the calculation, and from where they will get the data (Neely *et al*, 1995).

cost efficiency and diagnostic measure (Bagchi, 1996). Furthermore, the key dimensions of manufacturing performance has been defined in terms of quality, delivery speed, delivery reliability, price (cost), and flexibility; but *“confusion still exist over what these generic terms actually mean”* (Neely *et al*, 1995). This confusion is illustrated in Table 4.21, which demonstrates that the generic terms quality, time, cost and flexibility encompass a variety of different dimensions.

Table 4.21: Multiple dimensions of performance metrics (Source: Neely *et al*, 1995).

Quality	Time	Cost	Flexibility
Performance	Manufacturing lead time	Manufacturing cost	Material quality
Features	Rate of production introduction	Value added	Output quality
Reliability	Delivery lead time	Selling price	New product
Conformance	Due-date performance	Running cost	Modify product
Technical durability	Frequency of delivery	Service cost	Deliverability
Serviceability			Volume
Aesthetics			Mix
Perceived quality			Resource mix
Humanity			
Value			

When analysing system performance, qualitative evaluations such as *“good”*, *“fair”*, *“adequate”*, and *“poor”* are *“vague and difficult to utilise in any meaningful way”*, which is why quantitative performance measures are often preferred over qualitative evaluations (Beamon, 1999). Nevertheless, a qualitative evaluation is utilised, since the author deemed this approach sufficient in order to establish the strengths and weaknesses that different Business Models (BM) have in the context of defence acquisition, i.e. in order to answer RQ 2.

4.9.4 Performance Measurement Systems

One of the key problems with PMSs is that *“they have traditionally adopted a narrow, or uni-dimensional, focus”* (Neely *et al*, 1997). The dissatisfaction with traditional backward looking accounting based PMSs led to the development of *“balanced”* or *“multi-dimensional”* Performance Measurement frameworks, which emphasised non-financial, external and future looking performance measures (Bourne *et al*, 2000). The Balanced ScoreCard (BSC) is probably the best known PMS, or Performance Measurement framework (Bourne, 2008). The BSC complemented the traditional financial measures with criteria that measured performance from three additional perspectives: customers, internal business processes, and learning and growth (Kaplan and Norton, 1996a). Consequently, the BSC allows managers to look at the business from four important perspectives, by producing answers to four different questions (Kaplan and Norton, 1992): *“How do customers see us?”* (Customer perspective); *“What must we excel at?”* (Internal perspective); *“Can we continue to improve and create value?”* (Innovation and learning perspective); and *“how do we look to our shareholders?”* (Financial

perspective). A good BSC should have a mix of core outcome measures, which are generic measures that reflect the common goals of many strategies across industries and companies, and performance drivers, which tend to be unique for a particular business unit (Kaplan and Norton, 1996b). Ultimately, causal paths from all the measures on a Scorecard should be linked to financial objectives (Kaplan and Norton, 1996b). The BSC has “*swept the world*” (Neely and Al Najjar, 2006) and become the dominant approach in the field of Performance Measurement; and Kaplan and Norton (1992) has become the most cited Performance Measurement paper (Neely, 2005). When asked to describe how the BSC has helped them improve performance, executives of adopting organisations consistently referred to two words: alignment and focus (Kaplan and Norton, 2001b). However, according to Neely and Bourne (2000), 70% of BSC implementations fail.

Though dominating⁶⁰, the BSC is far from the only Performance Measurement framework. According to Neely *et al* (2001), there is a need for a second generation of Performance Measurement framework, e.g. the “*Performance Prism*”. The Performance Prism consists of five interrelated facets: Stakeholder satisfaction, which asks “*Who are the stakeholders and what do they want and need?*”; Strategies, which asks “*What are the strategies we require to ensure the wants and needs of our stakeholders are satisfied?*”; Processes, which asks “*What are the processes we have to put in place in order to allow our strategies to be delivered?*”; Capabilities, which asks “*What are the capabilities that we require to operate our processes?*”; and Stakeholder contribution (Neely *et al*, 2001).

According to Gunasekaran and Kobu (2006), the BSC perspective is one of seven different categories of Performance Measurement in logistics and SCM, where the criteria are: BSC perspective (financial, internal process, innovation and improvement, and customers); components of performance measures (time, resource utilisation, output, and flexibility); location of measures in supply chain links (planning and product design, supplier, production, delivery, and customer); decision-making levels (strategic, tactical, operational); nature of measures (financial and non-financial); measurement base (quantitative and non-quantitative); and traditional versus modern measures (function-based and value-based). Shepherd and Günther (2006) offer a similar description of four different ways in which to categorise performance measures in SCM: whether they are qualitative or quantitative; what they measure (cost and non-cost); their strategic, operational or tactical focus; and the process in the supply chain they relate to.

⁶⁰ The *Harvard Business Review* even cited the BSC as one of the most important management tools of the last 75 years (Bourne *et al*, 2002).

4.9.5 Performance, Effectiveness and Efficiency

Performance is a function of both effectiveness (incorporating the goal structure for determining standard outputs) and efficiency (incorporating inputs). Hence, Performance Measurement is an analysis of both effectiveness and efficiency in accomplishing a given task (Mentzer and Konrad, 1991). However, the terms effectiveness and efficiency are frequently confused with each other (Tangen, 2004b, p 46). Effectiveness refers to the extent to which customer requirements are met (Neely *et al*, 1995), and can be defined as the extent to which goals are accomplished. Effectiveness measures, or Measures of Effectiveness (MoEs), can be viewed as the ratio between the real level of outputs and the normal level of outputs. 100% effectiveness implies full success at achieving a particular goal, but effectiveness levels may be set arbitrarily. Hence, it is important to consider what level of output that would be adequate (Mentzer and Konrad, 1991). Efficiency is a measure of how economically the firm's resources are utilised when providing a given level of customer satisfaction (Neely *et al*, 1995). Efficiency measures, or Measures of Efficiency, can be defined as the ratio between the normal levels of inputs over the real level of inputs (Mentzer and Konrad, 1991). In public procurement, efficiency, or economic efficiency, is often referred to as Value-for-Money, VfM (Arrowsmith, 2010a, p 5) (see Sections 4.7.2 and 4.9.9). Performance measures, or Measures of Performance (MoPs), or Key Performance Indicators (KPIs) are fragmented and only include a partial account. This creates an under-determination problem which gives an inherently flawed MoP. Such a flawed MoP may later be utilised for decision-making, consequently providing management with defective information. Hence, it is of the utmost importance to select criteria for MoPs and to establish MoPs carefully (Mentzer and Konrad, 1991).

However, *“a performance measure means relatively little until it is compared against some kind of target”, “it tells us relatively little unless we know whether this is better or worse than we were achieving previously, and whether it is better or worse than other similar operations are achieving”* (Slack *et al*, 2010, pp. 609-610). According to Slack *et al* (2010, p 610), there are several approaches to setting targets, including: Historically based targets that compare current against previous performance; Strategic targets set to reflect the level of performance that is regarded as appropriate to achieve strategic objectives; External performance-based targets set to reflect the level of performance that is achieved by similar, or competitor, external operations; and Absolute performance targets based on the theoretical upper limit of performance. *“One of the problems in setting targets is that different targets can give very different messages regarding the improvement being achieved”* (Slack *et al*, 2010, p 610), which means that depending on with what a specific measurement is compared, the same measurement can be *“Good”*, and *“Poor”*. The

performance can, in comparison with, e.g., historic performance, be “Good”, whereas, if the comparison would have been made against, e.g., a strategic target, it could have been “Poor”.

4.9.6 Input, Output and Outcome

For the area of public spending, Mandl *et al* (2008) investigate effectiveness and efficiency and these concepts’ relationships with input, output and outcome, where the monetary and non-monetary resources that are deployed, i.e. the input, produce an output. In the area of Operations Management (OM) the general view is that “*all operations produce products and services by changing inputs into outputs using an “Input-Transformation-Output” (ITO) process*”, even if “*they differ in the nature of their specific inputs and outputs*” (Slack *et al*, 2010, p 11). In Figure 4.24, the ITO-process is combined with outcome, to illustrate the connection between input, transformation, output, outcome, efficiency and effectiveness.

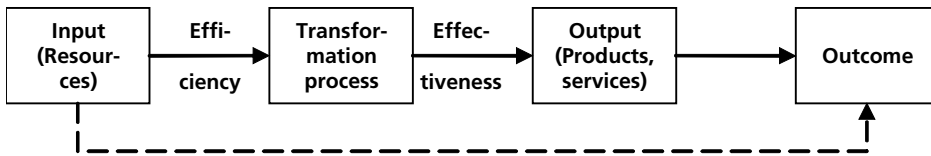


Figure 4.24: Conceptual framework of efficiency and effectiveness (Source: Building on Mandl *et al*, 2008, p 3; Neely *et al*, 2000; Slack *et al*, 2010, p 11; and Tangen, 2004b, p 47).

There is a difference between input, process, output and outcome measures⁶¹ (Neely *et al*, 2000). Efficiency relates the input to the output and the most basic measure of efficiency is the input-output ratio. Effectiveness relates the input, or the output, to the final objectives to be achieved, i.e. the outcome. The distinction between output and outcome is often blurred and output and outcome are frequently used interchangeably, and, consequently, efficiency and effectiveness are not always easy to isolate (Mandl *et al*, 2008, p 3).

⁶¹ According to Neely *et al* (2000), an analogy with baking a cake is useful in order to understand these different measures: input measures are concerned with volume of flour, quality of eggs, etc.; process measures are concerned with oven temperature and length of baking time; output measures are concerned with the quality of the cake; and outcome measures are concerned with the satisfaction of the cake eaters, i.e. was the cake enjoyable.

4.9.7 Public Sector Performance Measurement

Governments are demonstrating growing interest in the measurement of performance in the public sector, and officials are using performance targets in order to push through modernisation programs and demonstrate that Value-for-Money (VfM, see Sections 4.7.2 and 4.9.9) is being delivered, and observers of these changes coined the phrase “*New Public Management*” (NPM, see Section 4.7.1) to describe them (Micheli and Neely, 2010). Furthermore, as the public procurement process continues to gain critical importance in public sector organisations, “*the need to apply Performance Measurement methods to measure and improve the procurement processes is also gaining increased attention*” (Rendon, 2008).

The BSC has been applied by Non-Profit and Government Organisations (NPGOs), but one of the barriers to applying the BSC to these sectors is “*the considerable difficulties NPGOs have in clearly defining their strategy*” (Kaplan and Norton, 2001a). These difficulties can be overcome, and the BSC is now successfully being implemented in state and local government agencies (Rendon, 2008). However, in many advanced economies, such as the Anglo-Saxon and Scandinavian countries public services have come under increasing pressure to: improve their efficiency and effectiveness, reduce their demands on taxpayers, but maintain the volume and quality of services supplied to the public; but significant improvements in performance and results-based accountability have not been fully achieved, and research is needed to identify the key determinants of successful design, implementation, and use of PMSs (Micheli and Neely, 2010).

4.9.8 Defence Procurement Effectiveness: Faster, Cheaper, Better

According to van Weele (2002, p 258), purchasing effectiveness is defined as “*the extent to which, by choosing a certain course of action, a previously established goal or standard is being met*”. Purchasing effectiveness consequently essentially refers to the relationship between actual and planned performance of any human activity. A strategy or activity is either effective or not: a goal is reached or not (van Weele, 2002, p 258). Purchasing effectiveness is related to the goals and objectives of the purchasing function. The classical statement which summarises the overall objectives of the purchasing function in the “7 Rs” is that it should “*obtain the right material, in the right quantity, from the right source, for delivery at the right time and right place, with the right service and at the right price*” (van Weele, 2002, p 258). van Weele (2002, p 259) proposes three dimensions on which to base measurement and evaluation of purchasing effectiveness: a price /cost dimension; a product /quality dimension; and a logistics dimension.

There are four objectives of Smart Acquisition (Hambleton *et al*, 2005, p 81), which was initially known as Smart Procurement (see Section 5.2.2). The first of

these goals states that defence capabilities should be delivered within the approved performance, time and cost parameters. The background to this goal was that historically, defence acquisition projects tended to be late, over budget and even frequently deliver a capability that was no longer needed. The overall aim of the Smart Procurement Initiative (SPI), which was part of the UK Strategic Defence Review (SDR, see Section 5.2), in 1998 was to: “*acquire Defence capability faster, cheaper, better and more effectively integrated*”. Consequently, the desired outcome of defence acquisition projects is to be faster, cheaper and better. Today, many defence acquisition projects deals with procuring availability (see Section 5.3.7). Consequently, an explicit objective of such defence acquisition projects is that a contractor should deliver the contracted availability. Implicitly, though, in all defence acquisition projects, it is also expected that this should be done “*faster, cheaper, better*” than what the Defence Procurement Agency (DPA) could have done on its own accord. In summary, effectiveness: involves “*doing the right things, at the right time, with the right quality*”; can be defined as the extent to which goals are accomplished; and can be expressed as a ratio of actual output to expected output (Tangen, 2004a). For a defence acquisition project, there are four goals: the availability target, reduced delivery time, reduced delivery cost and increased delivery quality⁶². In order for a defence acquisition project to be 100% effective, there must be a 100% match between the actual output and the expected output.

4.9.9 Defence Procurement Efficiency: Value-for-Money

According to van Weele (2002, p 258), purchasing efficiency is defined as “*the relationship between planned and actual sacrifices made in order to be able to realise a goal previously agreed upon*”. Purchasing efficiency consequently essentially refers to the relationship between planned and actual costs. Purchasing efficiency relates to the resources which are required in order to meet the objectives which have been set for the purchasing function. Therefore purchasing efficiency relates to the purchasing organisation. van Weele (2002, p 259) consequently proposes one dimension on which to base measurement and evaluation of purchasing efficiency: an organisational dimension. As previously noted (see Section 4.6.2), in public procurement, efficiency is often referred to as VfM. VfM is, however, an elusive concept. In terms of UK defence procurement (see Section 5.3.8), VfM was traditionally seen as the procurement of “*the cheapest solution consistent with quality requirements*”. Later, focus was on Whole Life Costs (WLCs) and VfM was assessed

⁶² In this thesis, quality is defined in accordance with IBM’s definition: “*Quality is the degree in which customer requirements are met. We speak of a quality product or a quality service when both supplier and customer agree on requirements and these requirements are met*” (van Weele, 2002, p 191).

in trade-offs across procurement and support over a system's life cycle. Nowadays, focus has shifted towards Through Life Capability Management (TLCM) and VfM should now (see Section 5.3.7) be considered in terms of trade-offs across procurement, support and other Defence Lines of Development (DLoDs, see Section 5.3.6). In summary, efficiency: involves *“doing the things right”*; can be defined as the measure of how well the resources are utilised; and can be expressed as a ratio of resources expected to be consumed to resources consumed (Tangen, 2004a). For a defence acquisition project, there is one goal: Value-for-Money (VfM). In order for a defence acquisition project to be 100% efficient, i.e. deliver VfM, there must be a 100% match between the resources expected to be consumed and the resources consumed.

4.9.10 Defence Procurement Performance: Doing more with less

According to van Weele (2002, p 258), purchasing performance can be considered to be the *“extent to which the purchasing function is able to realise its predetermined goals at the sacrifice of a minimum of the company's resources, i.e. costs”*. Acquisition project performance is a function of effectiveness and efficiency, which is illustrated in Figure 4.25.

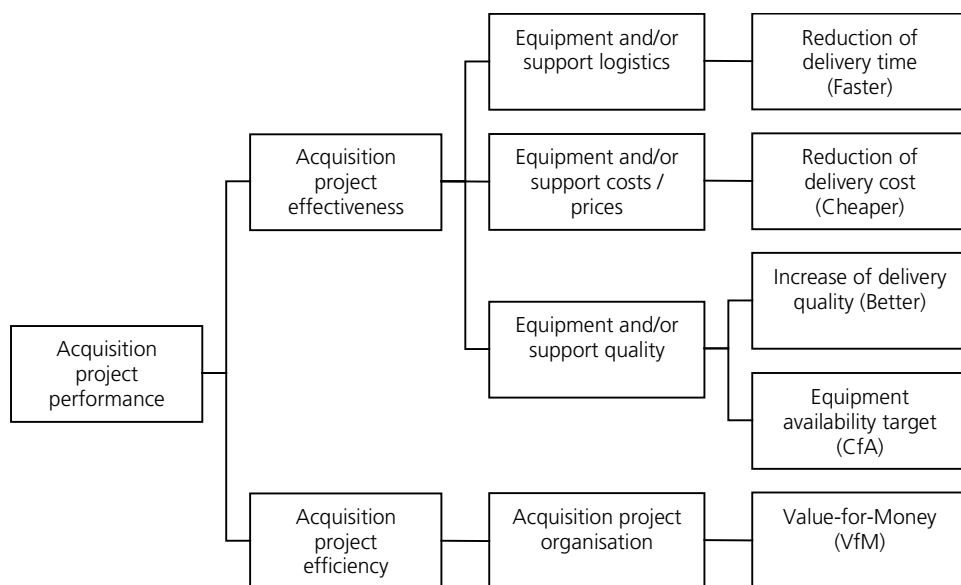


Figure 4.25: Key areas of acquisition project performance (Source: Adapted from van Weele, 2002, p 259).

As demonstrated in Figure 4.25, acquisition project performance is a combination of two components: effectiveness and efficiency. Acquisition project effectiveness

has three dimensions: logistics, price/cost, and product/quality; corresponding to the objectives: reduction of delivery time (Faster), reduction of delivery cost (Cheaper), increase of delivery quality (Better) and availability target (CfA, see Section 5.3.7). Acquisition project efficiency has one dimension: organisation, which corresponds to VfM. In Section 4.14, these components and dimensions of performance will be utilised in order to create a model for analysis of PPBM (see Section 4.12) performance in the context of defence acquisition.

4.10 Supply Chain Risk Management

“The uses of the term “risk” can be confusing because it is perceived as a multidimensional construct. On the one hand, it is used to refer to uncertain internal or external, environmental variables that reduce the outcome predictability. In this sense, “risk” actually refers to a source of risk and uncertainty, such as “political risks” and “market risks”, or, from a supply chain view, “the volatility of customer demand”. On the other hand, the term risk is also used when referring to the consequences of risk, i.e. to the potential outcome indicators. In this sense, the terms “operational risks”, “human risks” or “risks to customer service levels” are consequences of risks becoming events.”

Jüttner et al (2003)

There are numerous definitions of the terms hazard, risk and uncertainty. There is also an abundance of suggestions regarding how to categorise different forms of risks, risk sources and risk consequences. There are also several different descriptions of the process of Risk Management. Since the context of this thesis is military logistics, more specifically defence acquisition and its consequences in the military supply chain, the definitions, categorisations and process descriptions selected have predominantly been selected from the area of Supply Chain Risk Management (SCRM).

4.10.1 Hazard, Risk and Uncertainty

While the words “*Hazard*” and “*Risk*” are widely used in everyday conversation, in SCRM they have specific meanings, which may not coincide with common usage of the terms (Tweeddale, 1994). Similarly, the terms “*Risk*” and “*Uncertainty*” are often used interchangeably in practise, even though they are two quite different concepts in the technical sense (Peck, 2006). Tweeddale (1994) stresses that risk must be expressed in terms of two factors, the defined level of harm and the likelihood of that harm occurring, and proceeds to define hazard and risk as the potential to cause harm and the likelihood of occurrence of a defined level of harm. In the context of investment appraisal and evaluation, the UK MoD (2010f, pp. 171-172) defines risk as an event which may or may not occur, where the

probability of occurrence and financial impact are susceptible to measurement; and uncertainty as an event that will occur, which has more than one possible outcome. The starting point for many discussions of risk is classical decision theory (Peck, 2006). According to Hansson (2005, p 27) classical decision theory refers to decision making under: Certainty (each action leads to a specific outcome); Risk (each action leads to one of a set of possible specific outcomes with a known probability); or Uncertainty (each action leads to one of a set of possible specific outcomes with an unknown probability).

Among practitioners, *“risk taking is generally perceived as an integrated and inevitable part of management. In their view, risk taking equals decision-making under uncertainty and hence any strategic choice has certain risk implications”* (Jüttner et al, 2003). According to Hansson (2005, p 27), the three classical alternatives are not exhaustive. Hence, in *“modern decision theory”*, Hansson (2005, p 28) proposes the following scale of knowledge situations in decision problems; decision making under: Certainty (deterministic knowledge); Risk (complete probabilistic knowledge); Uncertainty (partial probabilistic knowledge); or Ignorance (no probabilistic knowledge).

Probability	Very high		
	High		
	Medium		
	Minor		
	None		
		None	Medium
		Minor	Catastrophic
		Business Impact	

Figure 4.26: Risk Matrix (Source: Norrman and Lindroth, 2004, p 18).

While there are differences in the way that different disciplines address risk, the following two components are included in all different conceptualisations of risk (Manuj and Mentzer, 2008a and 2008b): Potential losses (if the risk is realised, what losses will result and what is the significance of the consequences of the losses); and Likelihood of those losses (the probability of the occurrence of an event that leads to realisation of the risk). Hence, risk embraces both the range of outcomes that might occur and the likelihood of their occurring (Khan and Burnes, 2007), which is illustrated in Figure 4.26. The term *“risk”* often acquires downside connotations (Peck, 2006). However, a risk can lead to positive and to negative outcomes. A positive (beneficial) risk is often referred to as an

“*opportunity*”, whereas a negative (detrimental) risk is frequently labelled as a “*threat*” (UK MoD, 2011c).

According to Brindley and Ritchey (2004, p 7), an important aspect of the field of SCRM is the integration and interaction of the terms risk and uncertainty, which means that the commonly used term risk is understood to comprise risk and uncertainty. From a SCRM perspective, Jüttner *et al* (2003) define risk as “*the variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective values*”. From this supply chain perspective, the uncertain variations or disruptions affect the flows of information, materials, products or money across organisation borders (Jüttner, 2005). Jüttner *et al* (2003) suggest that in SCRM, it is relevant to distinguish between four different basic constructs: supply chain risk sources, supply chain risk consequences (impacts), supply chain risk drivers and supply chain risk mitigating strategies. Figure 4.27 illustrates the four basic constructs of SCRM.

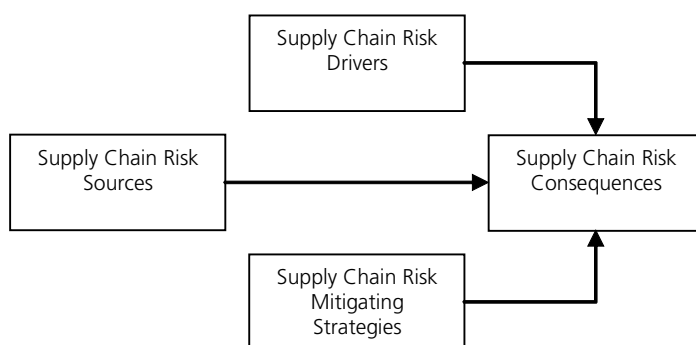


Figure 4.27: Supply Chain Risk – The Basic Constructs (Source: Jüttner et al, 2003).

4.10.2 Supply Chain Risk Types, Sources and Consequences

In the area of Public Private Partnerships (PPPs), Grimsey and Lewis (2002) define nine categories of risks: technical risk, construction risk, operating risk, revenue risk, financial risk, *force majeure* risk, regulatory/political risk, environmental risk, and project default (project failure because of a combination of the other risks). Abednego and Ogunlana (2006) identify the following types of risks for PPPs: political risks, construction risks, operation and maintenance risks, legal and contractual risks, income risks, financial risks, and *force majeure*. Ibrahim *et al* (2006) classify risk factors into exogenous and endogenous risks. Exogenous risk factors include political and government policy, macroeconomic factors, legal and legislative factors, social factors, and natural factors. Endogenous risk factors include project selection, project finance, residual risk, design factors, construction risks, operation risks, relationship risks, and third party risks.

In the area of PPPs Shen *et al* (2006) contribute with the following categorisation of risks: project-related risks, government-related risks, client-related risks, design-related risks, contractor-related risks, consultant-related risks, and market-related risks. Zou *et al* (2008) suggest that the common risks associated with PPP projects may include the following: legal risks, political risks, financial/market risks (project cost, interest rate, exchange rates, currency inflation, etc.), economical risks, social and public acceptance risks, construction and geological risks, technical risks, technology risks, health risks, safety risks, and management risks. In his seminal papers on SCRM, Svensson (2000 and 2002) introduced two dimensions for sources of risks, quantitative and qualitative. Quantitative risks include stock-outs, overstocking, obsolescence, customer discounts, and/or inadequate availability of components and materials in the supply chain, whereas qualitative risks include lack of accuracy, reliability, and precision of the components and materials in the supply chain (Manuj and Mentzer, 2008a).

As illustrated in this section, there are numerous ways of defining different types of risks. In general, business risks can be classified into five core groups (Norrman and Lindroth, 2004, p 18): Strategic risk (the risk of plans failing or succeeding); Financial risk (the risk of financial control failing or succeeding); Operational risk (the risk of human error of achievement); Commercial risk (the risk of relationships failing or succeeding); and Technical risk (the risk of physical assets failing/being damaged or enhanced).

Supply chain risks are risks that are related to the logistics activities in flows of materials, which mean that it is only part of all business risk, and which implies a perspective on a chain of three entities: customer, suppliers, and sub-suppliers (Norrman and Lindroth, 2004, p 20). In their SCRM framework, Norrman and Lindroth (2004, p 20) distinguish between three different types of risk and uncertainty: Operational accidents (generally relatively high probability and relatively low impact); Operational catastrophes (very rare but potentially disastrous consequences); and Strategic uncertainties (unknown and thus more difficult to address).

Svensson (2000 and 2002) introduced two dimensions for sources of risks, atomistic or holistic. Atomistic sources of risk are usually applicable for low-value, non-complex, and generally available components and materials, whereas holistic sources of risk are preferable to use for high-value, complex, and rare or unique components or materials (Manuj and Mentzer, 2008a). Jüttner *et al* (2003) takes a different view, and consider risk sources to be *“the environmental, organisational or supply-chain related variables that cannot be predicted with certainty and that impact on the supply chain outcome variables”*. According to Jüttner *et al* (2003), risk can be classified as: Environmental risks sources (comprise any uncertainties arising from the supply chain – environment interaction); Organisational risk sources (lie within

the boundaries of the supply chain parties); and Network-related risk sources (arise from interactions between organisations within the supply chain). Jüttner (2005) modifies the above classification, and introduces the following variant on the theme when classifying risk sources as external to the supply chain (environmental risk sources) and internal to the supply chain (demand and supply risk sources): Environmental risk sources (comprise any external uncertainties arising from the supply chain); Supply risk (the uncertainty associated with supplier activities and in general supplier relationships); and Demand risk (any risk associated with the outbound logistics flows and product demand). *“Risk consequences are the focused supply chain outcome variables like costs or quality, i.e. the different forms in which the variance becomes manifest”* (Jüttner *et al*, 2003).

Operational accidents, operational catastrophes and strategic uncertainties will be used to differentiate between different types of risks and uncertainties. For supply chain risk sources, a combination of Jüttner *et al* (2003) and Jüttner (2005) has been selected. Hence, supply chain risk sources will be categorised as external to the supply chain (environmental) or internal to the supply chain (organisational or network-related, where the latter is either supply or demand risk). In Section 4.15, these aspects of SCRM will be used in order to create a model for analysis of PPBM (see Section 4.12) risk in the context of defence acquisition.

4.10.3 The Supply Chain Risk Management Process

SCRM can be defined as *“the process whereby decisions are made to accept a known or assessed risk and/or the implementation of actions to reduce the consequences or probability of the occurrence”* and the stages of the SCRM process can be described as (Norrman and Lindroth, 2004, p 20): Risk identification/analysis/estimation; Risk assessment/evaluation; and selection and implementation of supply chain mitigation strategies. For SCRM, several complex strategies have been proposed (Manuj and Mentzer, 2008a): Avoidance, Postponement, Speculation, Hedging, Control, Sharing or transferring, and Security. For mitigating the risk of opportunism due to bounded rationality, mechanisms include long-term contracts, penalty clauses, equity sharing, and joint investments (Halldórsson *et al*, 2007).

In more general terms, SCRM include (Norrman and Lindroth, 2004, p 22): Risk avoidance (eliminating the types of events that could trigger the risk); Risk reduction (reducing the probability and/or reducing the consequence or the risk); Risk transfer (transfer the risk to insurance companies, supply chain partners, and/or customers; or through outsourcing activities; or through contracts); Risk sharing (sharing the risk by contractual mechanisms and/or by improved collaboration); and Risk taking (retaining the risk).

Risk allocation is the process of allocating (retaining, sharing or transferring) the risk to a party in the supply chain. Several conditions must be satisfied in order to determine whether the risks have been properly allocated or not (Abednego and Ogunlana, 2006): risk should be allocated to the party with the biggest capability to control the events that might trigger its occurrence; risks must be properly identified, understood, and evaluated by all parties; a party must have the technical/managerial capability to manage risks; a party must have the financial ability to sustain the consequences of the risk or prevent the risk from occurring; and a party must be willing to accept the risk. The process of risk allocation in a PPP contract is illustrated in Figure 4.28. *“The optimal allocation of risks is the key objective of all PPPs and the value of transferable risk needs to be included in the PSC (Public Sector Comparator)”* (Grimsey and Lewis, 2005).

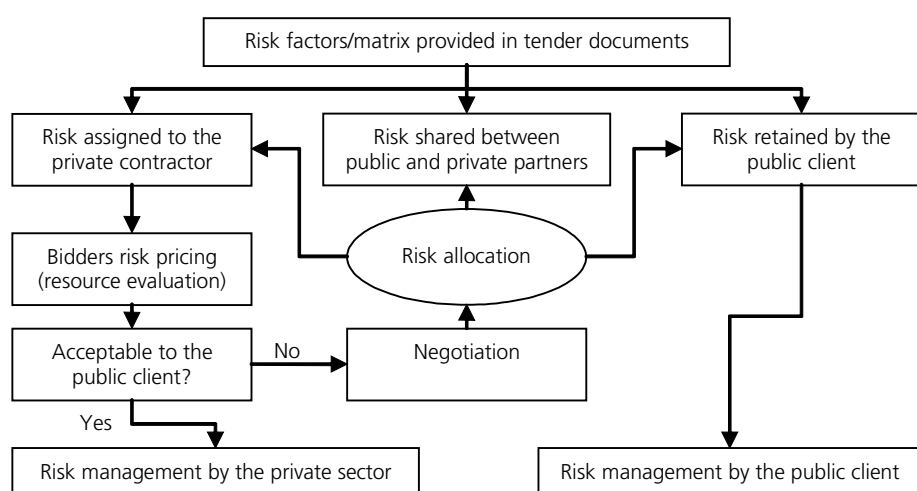


Figure 4.28: Risk allocation process in PPP contract procurement (Source: Ibrahim et al, 2006).

The transferred risk is often a key determinant of Value-for-Money (VfM) in PPPs (see Section 4.7.2), and risks that are not transferred (or shared) are retained risks (Grimsey and Lewis, 2005). In addition to base costs, costs for risks that are to be transferred to the private sector and costs for risks that are to be retained by the public sector, the PSC requires a supplementary cost component, namely the cost for competitive neutrality, which *“remove any competitive advantages that accrue to a government business by virtue of its public ownership”* (Grimsey and Lewis, 2005). Figure 4.29 demonstrates how, in a PPP arrangement, some risks are retained by the public sector, while others are transferred to the private sector, and the necessity to calculate costs for these risks in order to compare public sector costs, private sector costs and potential cost savings to the public sector.

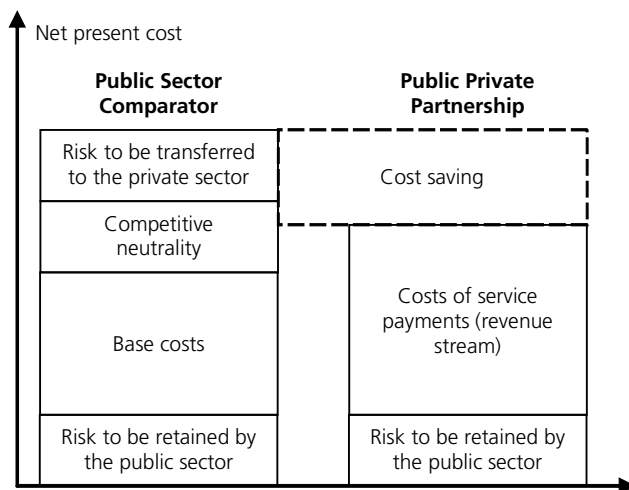


Figure 4.29: Public Sector Comparator (Source: Grimsey and Lewis, 2005).

In this thesis, SCRM is regarded as a process that consists of risk identification, risk assessment, and selection and implementation of appropriate SCRM strategies (avoiding, reducing, transferring, sharing, or retaining the risks).

4.11 Key Theoretical Constructs

The key theoretical constructs that are used from BM theory in the creation of the generic PPBM for defence acquisition are the “*Business Model Canvas*” (Osterwalder and Pigneur, 2010) and the nine BM building blocks (i.e. “*Customer Segments*”, “*Customer Relationships*”, “*Channels*”, “*Value Propositions*”, “*Key Activities*”, “*Key Resources*”, “*Key Partnerships*”, “*Revenue Streams*” and “*Cost Structure*”), see Section 4.5.5. The “*Business Model Canvas*” and the nine BM building blocks constitute the framework for the PPBM. The contents of the PPBM building blocks have, however, come from various other areas of theory and from practise. From defence acquisition theory, the following key theoretical constructs are used: the spectrum from public provision to outright privatisation (i.e. public provision, traditional public procurement, outsourcing, contracting out, Public Private Partnerships (PPPs) and Private Finance Initiatives (PFIs), franchising, concessions, Joint Ventures (JVs) and outright privatisation, see Section 4.7.4) (Grimsey and Lewis, 2004, p 54); Off-The-Shelf (OTS) products and services (including Commercial-Off-The-Shelf, COTS, and Military-Off-The-Shelf, MOTS, see Section 4.6.3) (Lawrence, 2009, p 167); and different types of public private contracts (i.e. Firm Fixed-Price, FFP, Fixed-Price Incentive, FPI,

Cost-Plus Incentive Fee, CPIF, Cost-Plus Fixed Fee, CPFF, or Performance Based Contracts, PBC, see Section 4.6.7) (Sols *et al*, 2007).

The area of Public Private Participation (including Public Private Cooperation or Public Private Partnerships) has contributed with the following key theoretical constructs: Value-for-Money, VfM (including competition, risk transfer and PSC, see Section 4.7.2) (Grimsey and Lewis, 2004, p 135); bundling (which is taken to mean the sharing of responsibilities for the following activities: Design (D), Finance (F), Buy (B)/Rent (R)/Lease (L), Construct (C) (Build (B)), Develop (D), Own (O), Operate (O), Manage (M), Maintain (M) and Transfer (T), see Section 4.7.3) (Grimsey and Lewis, 2004, p 129); and modes of delivery (which is taken to be the same spectrum as the spectrum from public provision to outright privatisation, less public provision and traditional public procurement, see Section 4.7.4) (Grimsey and Lewis, 2004, p 54).

Table 4.22: Key constructs from the theoretical frame of reference.

Business Models	Defence Acquisition	Public-Private Participation	Military Logistics
The Business Model Canvas (Source: Osterwalder and Pigneur, 2010)	The spectrum from public provision to outright privatisation (Source: e.g. Grimsey and Lewis, 2004, p 54)	Value-for-Money (VfM) (Source: e.g. Grimsey and Lewis, 2004, p 135)	Functions (Source: e.g. Foxton, 1994, p 11)
The Business Model building blocks (Source: Osterwalder and Pigneur, 2010, pp 16-17)	Off-The-Shelf (OTS) (Source: e.g. Lawrence, 2009, p 167)	Bundling (sharing of responsibilities) (Source: Grimsey and Lewis, 2004, p 129)	Principles (Source: e.g. Foxton, 1994, pp 3-7)
	Types of public private contracts (Source: e.g. Sols <i>et al</i> , 2007)	Modes of delivery (Source: e.g. Grimsey and Lewis, 2004, p 54)	Alternatives (Source: e.g. Kress, 2002, p 10)
	(Defence acquisition transition staircase) (Source: The UK MoD, 2005c, p 135)		Distribution channels (Source: The author)
	(Defence Lines of Development) (Source: The UK MoD, 2011d)		

From the area of military logistics the following key theoretical constructs are used: functions (i.e. supply, support, and transportation and movements, see Section 4.8.2) (Foxton, 1994, p 11); principles (i.e. foresight, economy, flexibility, simplicity, and cooperation, see Section 4.8.2) (Foxton, 1994, pp. 3-7); alternatives (acquire it in the JOA, bring it to the JOA, and/or transport it to the JOA afterwards, see Section 4.8.2) (Kress, 2002, p 10); and distribution channels (i.e. supply chain for overseas operations, supply chain for domestic training and exercises, support chain for overseas operations and support chain for domestic training and exercises, see Section 4.8.5). Table 4.22 illustrates the key theoretical constructs that have been used in the creation of the PPBM.

In addition to the key theoretical constructs from the area of defence acquisition, two constructs from UK defence acquisition practise has also been used for the PPBM: the defence acquisition transition staircase (i.e. “*Traditional*”, which involves procurement and support, “*Spares Inclusive*”, which includes procurement and “*Contractor Logistics Support*” (CLS), “*Contracting for Availability*” (CfA), i.e. the equipment is available when you want it, “*Contracting for Capability*” (CfC), which means that the contractor will have to provide people to the front line, delivering the service, see Section 5.3.7) (The UK MoD, 2005c, p 135) and Defence Lines of Development, DLoDs (i.e. Training (T), Equipment (E), Personnel (P), Information (I), Concepts and Doctrine (D), Organisation (O), Infrastructure (I) and Logistics (L), see Section 5.3.6) (The UK MoD, 2011d). In Table 4.22 these constructs are presented in brackets.

4.12 A Generic Public Private Business Model

“Models are for thinking with”.

Sir M. G. Kendall (Hughes, 1997, p 12)

A model can succinctly be defined as “*a simplified representation of the entity it imitates or simulates*” (Hughes, 1997, p 1). A more elaborate definition states that a model is “*the explicit interpretation of one’s understanding of a situation, or merely one’s ideas about that situation. It can be expressed in mathematics, symbols or words, but it is essentially a description of entities, processes or attributes and the relationships between them. It may be prescriptive or illustrative, but, above all, it must be useful*” (Wilson, 1990, p 11). In essence, a model can be regarded as a useful simplification of a phenomenon for thinking about that phenomenon.

At the end of Section 4.5.9, it was established that in the UK, in defence acquisition practise, the concept of BMs is hitherto used more or less synonymously with different forms of Public Private Partnerships (PPPs), or, more appropriately, different forms of Public Private Cooperation (PPC), which is a concept that is wider in scope than what PPPs are, since it includes all different forms of cooperation between the public and the private sector (see Section 4.3). This categorisation provides labels for different types of cooperation, e.g. contracting out or PPP, but it does not offer much in the way of the contents of this particular cooperation. As seen in Section 4.7, the PPP BM can by itself be regarded as an entire range of different models based on the sharing of responsibilities between the public and the private sector. To this author’s mind, to place BMs on an equal footing with PPPs is a far too simplistic view on BMs in this context, i.e. an oversimplification that severely reduces the usefulness of the

model, which is why a more sophisticated generic Public Private Business Model (PPBM) for defence acquisition is proposed in this section.

To create a generic PPBM for defence acquisition, i.e. a model for describing and analysing the different defence acquisition projects in the multiple case study, the “*Business Model Canvas*” (see Table 4.12) and the operationalisation (see Section 4.2) of its building blocks (see Table 4.13 and Table 4.14) were used as a foundation. Building on the “*Business Model Canvas*” as described by Osterwalder and Pigneur (2010, p 44) and using their nine BM buildings blocks as scaffolding, theory from BMs, defence acquisition, Public Private Participation and military logistics was used to produce a comprehensive PPBM.

4.12.1 Customer Segments

The “*Customer Segments*” building block “*defines the various groups of people or organisations that an enterprise aims to reach and serve*” (Osterwalder and Pigneur, 2010, p 20) and addresses the questions (see Table 4.13): “*For whom are we creating value?*” and “*Who are our most important customers?*” According to Osterwalder and Pigneur (2010, p 20), customer groups represent separate segments if: their needs require and justify a distinct offer; they are reached through different “*Channels*”; they require different types of relationships; they have substantially different profitabilities; or they are willing to pay for different aspects of the offer. Different customer segment types include: mass market; niche market; segmented; diversified; multi-sided platforms (multi-sided markets).

Defence acquisition is about a Defence Procurement Agency (DPA) acquiring a product or providing a service for its customer, a nation’s Armed Forces. Several categories of potential customers within the Armed Forces can be envisaged, but the author has deemed three categories to be sufficient. Hence, building on the analyses of interviews conducted at FMV and at DE&S, three categories of “*Customer Segments*” are proposed: a section or department within the Armed Forces Permanent Joint Headquarters (PJHQ) or within the Front Line Command (FLC); a service within the Armed Forces; or a branch, Corps, Regiment or military unit within the services. The DPA can serve all three different categories simultaneously, within the auspices of one acquisition project.

4.12.2 Customer Relationships

The “*Customer Relationships*” building block “*describes the types of relationships that a company establishes with specific Customer Segments*” (Osterwalder and Pigneur, 2010, p 28) and addresses the questions (see Table 4.13): “*What type of relationship does each of our Customer Segments expect us to establish and maintain with them?*”; “*Which ones have we established?*”; “*How costly are they?*”; and “*How are they*

integrated with the rest of our BM?” According to Osterwalder and Pigneur (2010, p 28), a company should clarify the type of relationship, ranging from personal to automated, it wants to establish with each “*Customer Segment*”. “*Customer Relationships*” may be driven by: customer acquisition; customer retention; and boosting sales. “*Customer Relationship*” categories include: personal assistance; dedicated personal assistance; self-service; automated services; communities; and co-creation.

Building on the analyses of interviews conducted at FMV and at DE&S, it is proposed that for the relationships between a DPA and its military customer it would be appropriate to use the three archetypes: colleague (comrades in arms); procurer (professional); and challenger (Devil’s advocate). In the first archetypal relationship, the DPA representative acts as a colleague that genuinely sympathises with the requirements of the military customer, and also shares the interest in new technology to the degree that there is a tacit agreement that “*nice-to-have*” overrules “*need-to-have*”. Hence, the DPA representative will happily engage in discussions regarding how to best satisfy the customer’s requirements by developing new systems, or even researching new technologies. In the second relationship, the DPA representative acts professionally as a procurer towards the military customer, and proceeds to acquire the system as specified, preferably OTS. In the third relationship, the challenger, the DPA representative questions the requirements as presented by the customer. Hence, if there is an alternative solution, even if it is less suitable to the requirement put forward by the customer, the DPA representative will push questions such as if it is necessary to meet the exact specifications of the customer, or if an, e.g., “*80% solution at 50% of the price*” would suffice. Well aware that the relationship between availability and cost is probably more exponential than linear when availability approaches 100%, the DPA representative will also relentlessly challenge ostensibly arbitrary statements such as a requirement for 80% availability. The DPA can assume one of these relationships for each customer in every defence acquisition project.

4.12.3 Channels

The “*Channels*” building block “*describe how a company communicates and reaches its Customer Segments to deliver a Value Proposition*” (Osterwalder and Pigneur, 2010, p 26) and addresses the questions (see Table 4.13): “*Through which Channels do our Customer Segments want to be reached?*”; “*How are we reaching them now?*”; “*How are our Channels integrated?*”; “*Which ones work best?*”; “*Which ones are most cost-efficient?*”; and “*How are we integrating them with customer routines?*” According to Osterwalder and Pigneur (2010, p 26), “*Channel*” types include: sales force; Web sales; own stores; partner stores; and wholesaler. “*Channel*” phases include: awareness; evaluation; purchase; delivery; and after sales.

Building on the analyses of interviews conducted at FMV and at DE&S, it is proposed that the “*Channels*” building block can be made up of three dimensions (see Section 4.8.5): type of function (i.e. what is distributed?); type of activity (i.e. why is it distributed?); and type of distance (i.e. where is it distributed, and therefore; how is it distributed?). There are two types of functions (supply and support); two types of activities (operations and training/exercises); and two types of distances (far enough to require strategic lift and near enough not to require strategic lift). The type of value can be either supply (products, i.e. equipment or spare parts) or support (i.e. services in the form of Maintenance, Repairs and Overhauls, MRO). In practise, the two dimensions type of activity and type of distance can currently be simplified and combined to produce one dimension (see Table 4.19), type of destination, which can take two values: overseas operations; and domestic training and exercises. The two new dimensions create a two-by-two matrix (see Table 4.20) with four elements, i.e. “*Channels*”: overseas supply chain (operations); overseas support chain (operations); domestic supply chain (training and exercises); and domestic support chain (training and exercises). The DPA can use all four “*Channels*” for each customer in every defence acquisition project.

4.12.4 Value Propositions

The “*Value Propositions*” building block “*describes the collection of products and services that create value for a specific Customer Segment*” (Osterwalder and Pigneur, 2010, p 22) and addresses the questions (see Table 4.13): “*What value do we deliver to the customer?*”; “*Which one of our customer’s problems are we helping to solve?*”; “*Which customer needs are we satisfying?*”; and “*What bundles of products and services are we offering to each Customer Segment?*” According to Osterwalder and Pigneur (2010, p 22), a “*Value Proposition*” creates value for a “*Customer Segment*” through a distinct mix of elements catering to that segment’s needs. Values may be quantitative or qualitative and include: newness; performance; customisation; “*getting the job done*”; design; brand/status; price; cost reduction; risk reduction; accessibility; and convenience/usability.

Building on the analyses of interviews conducted at FMV and at DE&S, the “*Value Propositions*” building block consists of two dimensions: equipment and support. Equipment can take the values: no new equipment; standard Off-The-Shelf (OTS); adapted OTS; foreign development; and domestic development. Support can take the values: traditional (procurement and support), spares inclusive (procurement and Contractor Logistics Support, CLS), availability (Contracting for Availability, CfA), or capability (Contracting for Capability, CfC), see Figure 5.4. The combination of these two dimensions results in 20, mutually exclusive, permutations of equipment and support “*Value Propositions*” (see Table 5.1) that the DPA can use for a defence acquisition project. The value

that is being created by a DPA for the Armed Forces is a contribution to a military capability. Hence, building on the analyses of interviews conducted at DE&S, this building block contains a third, additional dimension, which contains eight Defence Lines of Development (DLoDs, see Section 5.3.6) that can be used to describe how military capability is generated (The UK MoD, 2011d). These DLoDs are explicitly included, implicitly affected or not affected at all: Training (T), Equipment (E), Personnel (P), Information (I), Concepts and Doctrine (D), Organisation (O), Infrastructure (I) and Logistics (L). Presumably, CfCs will include all DLoDs, whereas CfAs will include most of them and CLS may only include Equipment and Logistics. The DPAs “*Value Proposition*” can be any combination of the DLoDs.

4.12.5 Key Activities

The “*Key Activities*” building block “*describes the most important things a company must do to make its BM work*” (Osterwalder and Pigneur, 2010, p 36) and addresses the questions (see Table 4.14): “*What Key Activities do our Value Propositions require?*”; “*Our Distribution Channels?*”; “*Customer Relationships?*” and “*Revenue Streams?*” According to Osterwalder and Pigneur (2010, p 36), “*Key Activities*” categories include: production; problem solving; and platform/network.

To fill this building block, constructs from Public Private Partnerships (PPPs) theory (Grimsey and Lewis, 2004, p 129) have been used to categorise the public-private buyer-supplier partnership regarding which actor, in the public or the private (contractor, sub-contractor, TPL providers, or banks) sector, that, in the endeavour to create value for the end-customer (i.e. the Armed Forces), assumes responsibility for different activities (see Table 4.18). Hence, for the PPBM, “*Key Activities*” is proposed to consist of public buyer (decider) or private supplier (provider) responsibility, and Transfers (T) of responsibility, for “*Key Activities*” such as: Design (D), Finance (F), Buy (B)/Rent (R)/Lease (L), Construct (C)/Build (B), Develop (D), Own (O), Operate (O), Manage (M), and Maintain (M) for products (equipment) and services (support to the equipment). In principle, the DPA is free to give the private sector the responsibility for any bundle of activities.

4.12.6 Key Resources

The “*Key Resources*” building block “*describes the most important assets required to make a BM work*” (Osterwalder and Pigneur, 2010, p 34) and addresses the questions (see Table 4.14): “*What Key Resources do our Value Propositions require?*”; “*Our Distribution Channels?*”; “*Customer Relationships?*” and “*Revenue Streams?*” According to Osterwalder and Pigneur (2010, p 34), “*Key Resource*” categories include: physical; intellectual; human; and financial resources.

Building on the analyses of interviews conducted at FMV and at DE&S, the “*Key Resources*” building block consists of three dimensions: personnel with different sets of knowledge, skills and experience; organisation; and corporate culture. Competencies in project management, different areas of technology, system integration, acquisition, logistics, etc., will be required and play an important role in order for the DPA to satisfy the requirements of its military customer. This building block has not been included in the reported research (see Section 1.5).

4.12.7 Key Partnerships

The “*Key Partnerships*” building block “*describes the network of suppliers and partners that make a BM work*” (Osterwalder and Pigneur, 2010, p 38) and addresses the questions (see Table 4.14): “*Who are our Key Partners?*”; “*Who are our key suppliers?*”; “*Which Key Resources are we acquiring from partners?*”; and “*Which Key Activities do partners perform?*” According to Osterwalder and Pigneur (2010, p 38), there are three motivations for creating partnerships: optimisation and economy of scale; reduction of risk and uncertainty; and acquisition of particular resources and activities. Partnership types include: strategic alliances between non-competitors; coopetition: strategic partnerships between competitors; Joint Ventures (JVs) to develop new businesses; and buyer-supplier relationships to assure reliable supplies.

Building on the analyses of interviews conducted at FMV and at DE&S, the “*Key Partnerships*” building block consists of four components: spectrum of Public Private Cooperation (PPC) (The Swedish Armed Forces, 2006b, p 4): “*Contracting out of services*” (Facility Management, Contractor Support to Operations, Outsourcing), “*Alternative financing solutions*” (Leasing, PFI solutions), “*Partnership solutions*” (Project Alliances, Strategic Partnerships (PPPs)); process for selection of partner (competition, alternative form of selection); identity of partner (prime contractor), and network of suppliers (individual sub-contractors that supply products and services). In principle, the DPA can use any form of PPC for any defence acquisition project.

4.12.8 Revenue Streams

The “*Revenue Streams*” building block “*represents the cash a company generates from each customer segment*” (Osterwalder and Pigneur, 2010, p 30) and addresses the questions (see Table 4.14): “*For what value are our customers really willing to pay?*”; “*For what do they currently pay?*”; “*How are they currently paying?*”; “*How would they prefer to pay?*”; and “*How much does each Revenue Stream contribute to overall revenues?*” According to Osterwalder and Pigneur (2010, p 30), each “*Revenue Stream*” might have different pricing mechanisms: fixed (list price; product feature dependent; customer segment dependent; volume dependent) and dynamic

(negotiation/bargaining; yield management; real-time-market; auctions) pricing. Ways to generate “*Revenue Streams*” include: asset sale; usage fee; subscription fees; lending/renting/leasing; licensing; brokerage fees; and advertising.

This building block could be relevant also in the focal context, at least if the relationship between a DPA and its military customer was strictly business, but the author decided against including “*Revenue Streams*” in this research project (see Section 1.5). The “*Revenue Streams*” building block in the PPBM consists of the payments from the customers.

4.12.9 Cost Structure

The “*Cost Structure*” building block “*describes all costs incurred to operate a BM*” (Osterwalder and Pigneur, 2010, p 40) and addresses the questions (see Table 4.14): “*What are the most important costs inherent in our business?*”; “*Which Key Resources are most expensive?*” and “*Which Key Activities are most expensive?*” According to Osterwalder and Pigneur (2010, p 40), there are two classes of BM “*Cost Structures*”: cost-driven and value-driven. “*Cost Structure*” characteristics include: fixed costs; variable costs; economies of scale; and economies of scope.

The “*Cost Structure*” building block consists of all operation costs, i.e.: external costs, i.e. what the DPA pays partners and suppliers for delivering the products and services; and internal costs, e.g. the costs that the DPA has for its personnel, facilities, etc. External costs consist of one of the five most frequently used “*Cost Structures*” in defence acquisition (Sols *et al*, 2007): Firm Fixed-Price (FFP); Fixed-Price Incentive (FPI); Cost-Plus Incentive Fee (CPIF); Cost-Plus Fixed Fee (CPFF); and Performance Based Contract (PBC). For the PPBM used in this thesis only the external costs have been explicitly included (see Section 1.5). In principle, the DPA can use any “*Cost Structure*” for any defence acquisition project.

4.12.10 The proposed model

In Table 4.23 the proposed generic Public Private Business Model (PPBM) for defence acquisition is illustrated. The PPBM consists of nine BM building blocks. However, because of the demarcations made (see Section 1.5), only six building blocks and one partial building block are used in the reported research. Two building blocks, “*Key Resources*” and “*Revenue streams*”, have not been included at all in this licentiate research. In the “*Cost Structure*” building block, *external costs* have been included, whereas *internal costs* have been excluded from the research.

Table 4.23: A generic Public Private Business Model for defence acquisition (Source: Adapted from Osterwalder and Pigneur, 2010, p 44).

Key Partnerships Spectrum of degree of Public buyer (decider) – Private supplier (provider) Cooperation (PPC): Contracting out of services (Facility Management, Contractor support to operations (CSO), Outsourcing), Alternative financing solutions (Leasing, PFI solutions), Partnership solutions (Project Alliances, Strategic Partnerships (PPPs)) Process for selection of partner Identity of partner Network of suppliers	Key Activities Public buyer (decider) or private supplier (provider) responsibility, as well as Transfers (T) of responsibility, for activities such as: Design (D), Finance (F), Buy (B) / Rent (R) / Lease (L), Construct (C) / Build (B), Develop (D), Own (O), Operate (O), Manage (M), and Maintain (M) for products (equipment) and services (support). Key Resources The most important assets required to make a business model work'. NOT included in this thesis	Value Propositions Two dimensions: Equipment: Existing – Standard (OTS) – Adaptation – Foreign Development – Domestic Development Support: Traditional – Contractor Logistics Support (CLS) – Contract-for-Availability (CfA) – Contract-for-Capability (CfC) CfAs and CfCs will also influence most of the other Defence-Lines-of-Development (DLoDs): Training (T), Equipment (E), Personnel (P), Information (I), Concepts and Doctrine (D), Organisation (O), Infrastructure (I), Logistics (L)	Customer Relationships Spectrum of degree of compliance with – opposition to the user requirements: Colleague, Procurer, Challenger Channels Two dimensions: Type (Supply – Support); Destination (Overseas – Domestic): Overseas supply chain (operations) Overseas support chain (operations) Domestic supply chain (training and exercises) Domestic support chain (training and exercises)	Customer Segments Section or department within the Armed Forces Permanent Joint Headquarters (PJHQ) or the Front Line Command (FLC) Or Service within the Armed Forces Or Branch, Corps, Regiment, or Military unit within the services
Cost Structure Only different forms of the external costs (i.e. FFP, FPI, CPIF, CPFF, PBC) have been explicitly included. Internal costs are NOT included in this thesis		Revenue Streams “The cash a company generates from each customer segment”. NOT included in this thesis		

The production of the PPBM has not been linear, sequential or straightforward. There have been several versions of the PPBM during the research project. The first version was created after having read the relevant theory. The first revision was made after the interviews that were conducted at DE&S. The second revision was made after listening to a presentation by Osterwalder (2011), which was when the *"Business Model Canvas"* entered the scene. The third revision was made in conjunction with the analyses of the cases. The fourth revision was made after a *"knowledge transfer seminar"* that was given to Subject Matter Experts (SMEs) from the Swedish Armed Forces, FMV and FOI. The fifth revision, consequently resulting in the current sixth version of the generic PPBM for defence acquisition, was made during the cross-case synthesis and the ensuing writing up of the thesis.

4.13 Theoretical Research Relevance

In Section 2.6, the efforts to ensure the practical research relevance were described. In this section, the corresponding theoretical relevance, i.e. gaps in extant theory of importance to the reported research, is identified and defined. The gaps are then utilised in order to formulate propositions regarding how theoretical constructs are related to each other (see Section 4.2).

4.13.1 Extant Business Model Theory

As described in Section 4.5, the area of Business Model (BM) theory has relatively recently begun its development. Consequently there are several parts of BM theory in which contributions to extant theory can be made. In Figure 4.6 and Figure 4.7, two frameworks for categorisation of BM theory development are presented. While researchers have moved towards the more complex areas in these frameworks, i.e. higher levels such as “*Ontologies*” and “*Applications and tools*” (Gordijn *et al*, 2005) or “*Change methodologies*” and “*Evaluation models*” (Pateli and Giaglis, 2003), contributions are being made also at lower levels. Hence, theoretical contributions can be made to most aspects of extant BM theory.

To date, researchers in BM theory development have predominantly, one could even argue almost exclusively, concerned themselves with the businesses in the for-profit private sector, whereas organisations in the non-profit public sector of society have largely been left untouched. Consequently, in comparison, the public sector is a more or less white field when it comes to BM research and theory development. Any contributions that may exist are rare and far between and, as far as is known to this author, contributions in the area of public sector defence acquisition are non-existent. Consequently, it is relatively straightforward to identify gaps in most aspects of extant BM theory. For the reported research it is, however, sufficient to state that theory for the highest levels of theoretical contributions, e.g. “*Evaluation models*”, has never been developed and applied for public sector defence acquisition. The particular theoretical gap in which the reported research aims to make its theoretical contribution is the application of the “*Business Model Canvas*”, including its structure of nine BM building blocks, as proposed by Osterwalder and Pigneur (2010), in public sector defence acquisition, in order to investigate its appropriateness to describe and evaluate public sector defence acquisition projects. Furthermore, the research aims at contributing to BM theory by applying the idea of public/private Business Models, including its spectrum ranging from public provision to outright privatisation, as proposed by Grimsey and Lewis (2004), in order to investigate its appropriateness to differentiate between different types of defence acquisition projects. These aims can be formulated in theory building terminology (see Section 4.2) as:

- Proposition 1: BM theory from the private sector is applicable in the public sector.
- Proposition 2: The nine BM building blocks can be adapted and filled with content to fit the defence acquisition context.
- Proposition 3: The nine PPBM building blocks are appropriate to exhaustively describe defence acquisition projects.
- Proposition 4: The nine PPBM building blocks are appropriate to evaluate the performance of defence acquisition projects.
- Proposition 5: There is a correlation between the configuration of the nine PPBM building blocks and defence acquisition projects' performance.
- Proposition 6: The nine BM building blocks are appropriate to evaluate the risks associated with defence acquisition projects.
- Proposition 7: There is a correlation between the configuration of the nine PPBM building blocks and defence acquisition projects' risks.

These seven propositions will be addressed in Section 8.4.

4.13.2 Extant Public Private Participation Theory

In comparison to the area of BM theory, the area of Public Private Participation (Cooperation/Partnership) theory (see Section 4.3) is somewhat more developed. However, as explicitly demonstrated in Section 4.7, there are several fundamental aspects of the area that require further research in order to provide necessary theoretical contributions and development. To mention but a few areas where further research is required; there is no consensus regarding what constitutes the spectrum between public provision and privatisation (OECD, 2008, p 16); there is no consensus regarding terminology and definitions (Parker and Hartley, 1997); there is no common agreement regarding what Public Private Partnerships (PPPs) encompass (Vonortas and Spivack, 2006); the relationship between PPPs and PFIs is not unambiguous (Parker and Hartley, 2003); and regional and cultural differences prevail concerning the interpretation and description of different forms of Public Private Participation (Minow, 2003). Consequently, it is comparatively undemanding to identify gaps also in Public Private Participation (Cooperation/Partnership) theory.

Even though the areas of PPPs and PFIs have been thoroughly researched in the UK, also in the defence sector, there is one particular gap of interest to the reported research. While terminology such as a Build-Own-Transfer (BOT) type PPP is used for research in other sectors of society, predominantly for projects that include the private financing of infrastructure projects, it has never, to this author's

knowledge, been used in the defence sector. Hence, this is the theoretical gap that the reported research aims to contribute to when it comes to Public Private Participation (Cooperation/Partnership) theory. Using theory building terminology (see Section 4.2), the theoretical research purpose can be described as:

- Proposition 8: The spectrum of public/private Business Models can be utilised in order to categorise different defence acquisition projects.
- Proposition 9: The notion of bundling can be utilised in order to differentiate between different defence acquisition projects, by describing how the public and private sectors assumes responsibility for certain activities.

Furthermore, in PPP theory, there is consensus (Grimsey and Lewis, 2004, p 135) regarding the necessity to have competition and risk transfer in order to achieve Value-for-Money (VfM). However, in defence acquisition practise, there seems to be ambivalence in this respect. This leads to an additional proposition:

- Proposition 10: Competition and risk transfer are necessary prerequisites for VfM also in the defence acquisition context.

These three propositions will be addressed in Section 8.5.

4.13.3 Extant Public Private Business Model Theory

As seen in Sections 4.5, 4.6 and 4.7 there are overlaps between BM theory and defence acquisition theory; BM theory and Public Private Participation theory; and defence acquisition theory and Public Private Participation theory. It is not clear where one area ends and the other starts. However, in each of these areas, BM theory, defence acquisition theory, and Public Private Participation theory, there is in current theoretical development a potential place of abode for PPBM theory. This is hardly surprising, considering that the PPBM has elements from all of these areas of theory, and should, consequently, fit reasonably well into each of them. There are, however, other possibilities than the areas of theory from whence theoretical constructs have been borrowed in order to create the PPBM for defence acquisition. Even if the theoretical contribution of the reported research does not require a new theoretical area, the emerging areas of Performance Based Contracts (PBC), Performance Based Logistics (PBL) and Procuring Complex Performance (PCP, see Section 4.16) are of the utmost interest to the notion of PPBM. This observation leads to two additional propositions, which are based on the research purpose, which will not be handled in this thesis, but which may well be relevant to explore in future research:

- Proposition 11: Research regarding how BMs can handle the new supply concept that a new logistical interface brings about, with a particular

emphasis on the risk taking that is part of the business concept, can be conducted within the emerging area of Performance Based Contracting.

- Proposition 12: Research regarding how BMs can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept, can be conducted within the emerging area of Procuring Complex Performance.

These two propositions will be addressed in Section 8.6.

4.14 A Model for Analysis of Acquisition Project Performance

Performance is defined as a combination of effectiveness and efficiency (see Section 4.9). Effectiveness is concerned with the goals of the contract, i.e. *“if the contract did the right things”* or *“if the goals were reached”*. Efficiency deals with how the resources were used to reach the goals, i.e. *“if the contract did the things right”*, or *“if there was an optimum use of resources to reach the goals”*. The goals of an acquisition project are explicitly to deliver the agreed upon system availability. Implicitly though, there is also the expectation that availability will be delivered *“faster, cheaper, better”* than if MoD had delivered the service. It is, however, not clear if it is the initial acquisition of products (i.e. equipment) or services (i.e. support to equipment), the ensuing delivery of products or services, or both acquisition and delivery, that is supposed to be *“faster, cheaper, better”*. In this thesis, it is assumed that both acquisition and delivery (see Figure 6.1) is supposed to be *“faster, cheaper, better”* than the performance of DE&S when outsourced to a private contractor. Hence, the goals of the acquisition projects are considered to be the delivery of agreed availability, reduced delivery time, reduced delivery cost and increased delivery quality (see Section 4.9.10). An acquisition project is 100% effective if it delivers the contracted availability and is *“faster, cheaper, better”*. The use of resources to reach the goals constitutes the efficiency component of performance. The analysis of resources is limited to monetary resources, or Value-for-Money (VfM). An acquisition project is considered to be 100% efficient if the monetary resources have been used optimally in order to reach the goals. Using the descriptions of acquisition project performance, effectiveness and efficiency from Section 4.9, a model for analysis of acquisition project performance has been created. The analysis model is presented in Table 4.24. In the table, *“Ops”* signify *“Overseas operations”* and *“T&E”* indicate *“Domestic Training and Exercises”*.

Table 4.24: A model for analysis of acquisition project performance.

	Goals		Strengths	Weaknesses
Effective-ness	Availability target	Ops		
		T&E		
	Reduced delivery time	Ops		
		T&E		
	Reduced delivery cost	Ops		
		T&E		
	Increased delivery quality	Ops		
		T&E		
Efficiency	Monetary resources	Ops		
		T&E		

Using the model for analysis, the strengths and weaknesses for the four effectiveness goals and the single efficiency goal are analysed for overseas operations (Ops) and domestic training and exercises (T&E), which is illustrated in Table 4.24. Using the methodology described in Section 3.5.4, the effectiveness, efficiency and performance of the defence acquisition projects are then assessed.

4.15 A Model for Analysis of Acquisition Project Risk

Risks are regarded as belonging to one of the three risk types operational accidents, operational catastrophes or strategic uncertainties (see Section 4.10.2). The risk sources are either external to the supply chain (environmental) or internal to the supply chain (organisational or network-related, where the latter is either supply or demand risk) (see Section 4.10.2). Using these descriptions of risk types and risk sources, a model for analysis of acquisition project risk has been created. The analysis model is presented in Table 4.25.

Table 4.25: A model for analysis of acquisition project risk.

Ops: Overseas operations T&E: Domestic Training and Exercises			Sources of supply chain risks and uncertainties			
			External	Internal		
			Environ-mental risks	Organi-sational risks	Network risks	
					Supply risks	Demand risks
Type and consequence of supply chain risks and uncertainties	Operational accidents	Ops				
		T&E				
	Operational catastrophes	Ops				
		T&E				
	Strategic uncertainties	Ops				
		T&E				

Using the model for analysis, the different risk types are analysed for overseas operations and domestic training and exercises, which is illustrated in Table 4.25.

4.16 A Comparison between PCP and PPBM

“The bespoke, project-based, one-of-a-kind and even “all or nothing” nature of a CPS (Complex Product-Service) contract dictates a different relationship between customer/procurer and major contractor than happens under simple component-based models such as Kraljic. Suppliers in these oligopolistic markets are very unlike the interchangeable ones that form the core of more portfolio-based approaches. This dependency on key suppliers is reflected in the role of the contract, where the purchase of discrete components is little preparation for the depth of contractual terms and relational capital necessitated in a CPS. A new system of dynamic and iterative Performance Measurement is required, shifting away from traditional metrics such as quality defects per x, 000 units manufactured and service-level agreements on how many times a day a corridor is swept. Instead, CPS appears to mandate a more complex approach based on the need to align outputs and requirements, rather than merely to provide compliance. A primary imperative here in complex performance is how to spread risk and reward sharing across the entire supply chain or network”.

Howard and Caldwell (2011, p 7)

The quotation above suggests that Procuring Complex Performance (PCP) is near what the PPBM aims to be. This is of some interest already for the reported research, but, and more importantly, potentially of great interest to future research in the same context. That the area of PCP theory is a dynamic and developing area is demonstrated by two rather different definitions of PCP:

“Inter-organisational arrangements that are characterised by significant levels of performance complexity (i.e., must include numerous knowledge intensive activities) and infrastructural complexity (i.e., must include substantial bespoke or highly customised hardware and software elements).”

Lewis and Roerich (2009)

“The need for a co-ordinated, relationship-focused approach to buying made necessary by the task being so composed of sub-elements that it cannot be achieved by the sequential or additive achievement of individual tasks or transactions.”

Howard and Caldwell (2011, p 16)

That there is a connection between the PPBM and PCP at the notional level is demonstrated by a contribution by Spring and Mason (2011, p 99): *“In Operations and Supply Management and in Marketing, services have been treated as difficult to manage because of their supposed Intangibility, Heterogeneity, Inseparability and Perishability, the so-called IHIP characteristics”.* But now, Spring and Mason (2011, p 100) argue, the distinction between manufacturing businesses and service businesses has ceased to be tenable, as *“products are taking on the characteristics of services or being combined with them in “bundles”; services are being standardised and*

“productised”, or physical artefacts used as platforms for the delivery of additional services rather than embodying benefits in and of themselves”. It is in the light of this development that Spring and Mason (2011, p 105) suggest that *“at some levels the Business Model (BM) is a kind of heuristic that ...may offer a way to grasp the complexity of Procuring Complex Performance”* (PCP). As demonstrated in Table 4.26, the comparison is made *“one-way”*, from the point of view of PCP, in order to establish which of the theoretical constructs included in the PCP framework that is also included in the PPBM framework.

Table 4.26: A comparison between the PCP and PPBM frameworks.

Procuring Complex Performance (PCP)		Public Private Business Model (PPBM)	
		Included	Not Included
Managing Markets	Public-private Governance	X	
	Risk	X	
	Supply Management	X	
	Performance Management	X	
Procurement	Alliances	X	
	Outsourcing	X	
	Relationships	X	
	Contracts	X	
Innovation Management	Knowledge & Learning		X
	Sustainability		X
	Product-service Innovation		X
	Discontinuity		X
Complexity	Life-cycle Management	X	
	Through Life Capability	X	
	Temporal Dynamics		X
	Complex Products & Services	X	

As illustrated in Table 4.26, the PCP *“problem space”*, or framework, rests on four distinct areas: *“Managing Markets”*, *“Procurement”*, *“Innovation Management”* and *“Complexity”*, each of which consist of four different sub-areas. All the sub-areas of *“Managing Markets”* (i.e. *“Public-private Governance”*, *“Risk”*, *“Supply Management”* and *“Performance Management”*) and *“Procurement”* (*“Alliances”*, *“Outsourcing”*, *“Relationships”* and *“Contracts”*) are explicitly to some extent included also in the PPBM framework. In the area of *“Complexity”*, three (i.e. *“Life-cycle Management”*, *“Through-Life Capability”* and *“Complex Products and Services”*) of four of the sub-areas are explicitly included also in the PPBM framework, while the fourth sub-area (*“Temporal Dynamics”*) is not part of the PPBM framework. Even though Innovation Management is not included in the PPBM framework there is a striking resemblance between the PCP and PPBM frameworks. Future research in the same area as the reported research should take this similarity into consideration. As demonstrated by the relatively superficial comparison performed in this section and by the statement that BMs *“may offer a way to grasp the complexity of Procuring Complex Performance”*, PPBMs are closely related to the emerging area of PCP.

5 Defence Acquisition in the UK

“The aim of smart acquisition is to acquire Defence capability faster, cheaper, better and more effectively integrated.”

The UK MoD DPA (2004, p 1)

“Despite the emphasis on realistic cost and timescale forecasting in the Smart Acquisition Initiative of July 1998 and in the Enabling Acquisition Change report of June 2006 (and indeed in many earlier studies), MoD still appears to be unable to generate either unbiased forecasts of project cost and timescales, or confidence limits on those forecasts which adequately reflect the risks involved.”

Kirkpatrick (2008)

“Defence acquisition is a critical subject, not just because it takes a high proportion of the defence budget, but also because it must provide equipment that, in the necessary quantity and quality, gives the servicemen the best protection possible. We have to remember that lives are at stake. But let us be quite clear: there is unlikely to be more money for defence, so we will have to be absolutely definite about our priorities and spend our acquisition funds wisely, effectively and efficiently. What should our priorities be? How do we make our funds go further? How do we safeguard our spending of public funds while getting first-rate equipment into the field much faster than we have traditionally done? These are difficult questions to answer, but we have to do so.”

Lord Robertson (2008, pp.x-xi)

5.1 Introduction

Defence acquisition in the UK has had its fair share of emerging, enduring and disappearing buzz-words the last couple of decades. This chapter introduces and explains terms such as the Initial Gate (IG) and the Main Gate (MG); Through Life Management (TLM) and Through Life Capability Management (TLCM); CADMID and CADMIT sequential acquisition processes; Defence Lines of Development (DLoDs); and the defence acquisition transformation staircase. This is by no means an exhaustive introduction, but serves the purpose as a brief introduction to that subset of UK defence acquisition terminology that is utilised in this thesis. Hence, with an emphasis on the reforms that have had the most profound impact on defence acquisition, the major contributions of some of the more recent defence reviews are introduced in Section 5.2. In Section 5.3, the aspects of current defence acquisition that are pertinent to the reported research are summarised. The UK MoD DE&S is portrayed in Section 5.4.

5.2 Recent Defence Reviews

The defence review is the process by which the UK government decides its defence policy and also decides which means and resources that should be allocated in order to achieve the defence objectives. The UK defence reviews have hitherto been conducted when political and economic factors, such as a change of government, economic recession, or the ending of the Cold War, have required a revision. This is also the procedure in, e.g., Sweden. The UK *Strategic Defence Review* (SDR) usually results in a policy document, a *Defence White Paper*, and is presented by the government to the Parliament, “by her Majesty’s command”, as a *Command Paper*. In the US, the *Quadrennial Defense Review* (QDR), as the name implies, is a similar study that is conducted on a set four year cycle. It has, however, recently (Gray, 2009, p 22) been recommended that the UK should adopt the US QDR approach, and conduct the SDR on a regular four or five year basis.

In 1990, following the ending of the Cold War, the “*Options for Change*” was a major restructuring of the British Armed Forces, aimed at cutting defence spending. The logic behind this reduction of the military was the so-called “*peace dividend*” (see Section 1.2.1), which was used by most major Western countries in order to reduce their military expenditure, and the total military manpower was reduced by nigh on one fifth. In 1994, the “*Front Line First: The Defence Cost Study*” was another programme of defence cuts, resulting, *inter alia*, in reductions of the number of civil servants and Armed Forces personnel, and the closure of depots, bases, etc. Critics among the Labour opposition in the Parliament argued that the cuts were driven by the Treasury, while the Conservative majority’s counter argument was that the front line of the Armed Forces was not affected and that it was support staff and assets which were being cut. According to the then Secretary of State for Defence (Rifkind, 1994), “*the Ministry of Defence and other headquarters at all levels are too large, too top heavy and too bureaucratic*”.

In 1998, the SDR (The UK MoD, 1998) resulted in dramatic changes to military logistics and defence acquisition. These changes are to a large extent the focus of the reported research, and will be introduced and described throughout the different sections of this chapter. In 2002, following the September 11th attacks on New York and Washington, a New Chapter was added to the SDR. “*The SDR: A New Chapter*” (The UK MoD, 2002a) and “*The SDR: A New Chapter – Supporting Information & Analysis*” (The UK MoD, 2002b) reviewed which changes to the UK defence that were necessary because of 9/11. The 2003 Defence White Paper, “*Delivering Security in a Changing World – White paper*” (The UK MoD, 2003a) and “*Delivering Security in a Changing World – Supporting Essays*” (The UK MoD, 2003b) introduced a series of cutbacks to core equipment and manpower and the scaling back of a series of future capital procurement projects. The justification for

these reductions was the implementation of a new concept called Network Enabled Capability (NEC, see Section 1.2.4). The level of ambition for the UK Armed Forces ability was scaled back to simultaneously lead and/or support three small to medium scale operations, of which one enduring Peace Keeping (PK, see Section 1.2.2) mission, and, at longer notice, to deploy forces in one large scale operation, while running a concurrent small scale operation.

The 2005 Defence White Paper (The UK MoD, 2005c), the “*Defence Industrial Strategy*” (DIS), was intended to ensure that the UK Armed Forces are provided with “*the equipment which they require, on time, and at best Value-for-Money (VfM) for the tax payer*” (The UK MoD, 2005c, p 16), which was supposed to be achieved by the maintenance of sovereign capabilities, i.e. the capabilities of UK companies in key defence areas. Hence, the DIS changed UK defence acquisition back to the days before NPM (see Section 4.7.1), when Cost-Plus Contracts (see Section 4.6.7) and “*national champions*” were abandoned in favour of competitive tendering, i.e. back to the concept of “*national champions*” to maintain vital capabilities, as identified by MoD “*to maintain appropriate sovereignty and thereby protect our national security*” (The UK MoD, 2005c, p 2). In 2010, the Strategic Defence and Security Review (SDSR), “*Securing Britain in an Age of Uncertainty: The Strategic and Security Review*” (HM Government, 2010) was delivered.

5.2.1 Recent Defence Acquisition Reforms

Prior to 1998, procurement, logistics, supply and support were functions that were all handled within the different services, i.e. the traditional stovepipes, independently of each other. The 1998 SDR, however, initiated a significant transformation of the way in which MoD buys and maintains equipment, and supplies and supports the Armed Forces. Gray (2009, p 57) eloquently describes the UK MoD acquisition system as “*something of a moving target*”. The UK defence acquisition has been the focus of reoccurring reviews and subsequent transformation over the past fifty years, but since the introduction of the Smart Procurement (now Smart Acquisition) Initiative in 1998, the acquisition system has been in a state of more or less continuous change. According to Gray (2009, pp. 57-58 and pp. 239-245), the key reforms include: The Smart Procurement Initiative (SPI), which was an integral part of the 1998 SDR, implemented the Initial Gate (IG) and the Main Gate (MG) in the decision making process (see Section 5.3.4), and the introduction of Integrated Project Teams (IPTs) to deliver individual projects. Following Smart Procurement principles and SDR recommendations, in 1999 the Equipment Capability Customer (ECC) was created, the Procurement Executive (PE, which had been established in 1971) was converted into the Defence Procurement Agency (DPA), and the three single service logistics organisations were integrated to form the Defence Logistics

Organisation (DLO). In 2002 the Defence Change Portfolio (DCP) was launched in order to join up the major investment programmes across the Defence to produce a single coherent portfolio of change programmes. The portfolio was subdivided into four headings: infrastructure, acquisition, people, and management and organisational. The Purpose of the DCP was *“to modernise MoDs business processes improving efficiency and effectiveness, thus maximising our investment in front-line operational capability”* (The UK MoD, 2008c, p 27).

In 2004 the Defence Logistics Transformation Programme (DLTP) was launched to *“deliver better logistic support to the front-line through improving effectiveness, efficiency and flexibility”* (The UK MoD, 2008c, p 27). The DLTP incorporates all previous logistics change and efficiency programmes, including the Defence Logistics Organisation Change Programme underpinning the Strategic Goal and the End-to-End Logistics Review. The scope *“covers all logistic activity from one end of the acquisition cycle to the other, from the early stages of equipment acquisition, through support in the Front Line Commands and in industry, to the final planning for and process of equipment disposal at the end of its operating life”*. In 2006 the Enabling Acquisition Change (EAC) was an examination of MoDs ability to undertake TLMC. Among the recommended improvements, one of the EAC report’s more noteworthy suggestions was the recommendation to merge the DPA and the DLO in order to *“create an integrated procurement and support organisation, whose core function would be delivery of equipment and support for operations to the Front Line. It should be a centre for excellence in portfolio and project management, drawing on the private sector where relevant skills cannot be cost effectively maintained in-house”* (The UK MoD, 2006b, p 5).

In 2006 the Defence Acquisition Change Programme (DACP) built on the principles of Smart Acquisition (1998) and the establishment of the ECC (1999), and was established in order to deliver the changes needed to facilitate TLMC as identified in the DIS (2005) and recommendations from the EAC (2006) report. The objectives of the DACP was to *“create a high performing and agile acquisition system, focused on through-life considerations, including: streamlined acquisition process; better decision making through-life and across all DLoDs; more effective relationships with industry; and improved skills for acquisition more effectively deployed”* (The UK MoD, 2006a, p 26). In 2007 the DACP led to the merger of the DPA and the DLO, as suggested by the EAC report (2006), into the Defence Equipment and Support (DE&S). In 2008 the Performance, Agility, Confidence and Efficiency (PACE) programme was launched to implement DACP changes effectively in DE&S and was intended to transform DE&S post-merger into *“a more effective organisation, capable of achieving its mission and making its contribution to the Defence acquisition agenda”*.

5.2.2 Smart Acquisition

The SPI was an integral part of the 1998 SDR. One of the first conclusions to emerge from the SDR was *“the need for a radical appraisal of the way we carry out defence procurement”*. At that point in time the UK MoD was spending approximately £9 billion *per annum* on equipment, spares and stores, and the average delay on major equipment programmes was 37 months (UK MoD, 1998, §151). The aim of Smart Procurement, later relabelled as Smart Acquisition, was to: *“acquire Defence capability faster, cheaper, better and more effectively integrated”*. The original objectives of Smart Acquisition were (UK MoD DPA, 2004, p 1): To deliver and sustain defence capabilities within the performance, time and cost parameters approved at the time the major investment decisions are taken; To integrate defence capabilities into their environment within Defence, with the flexibility to be adapted as the environment changes; To acquire defence capabilities progressively, at lower risk; Optimisation of trade-offs between military effectiveness, time and Whole Life Cost (WLC) are maximised; To cut the time for (key) new technologies to be introduced into the frontline, where needed to secure military advantage and industrial competitiveness. The seven principles in Smart Acquisition were (UK MoD DPA, 2004, p 1): A whole-life approach, typified by applying Through Life Cost (TLC) techniques; Integrated Project Teams (IPTs) with clearly identified customers; A better, more open relationship with industry; More investment during early project phases; Effective trade-offs between system performance, TLC and time; New procurement approaches, including incremental acquisition; and A streamlined process for project approvals. According to Moore and Antill (2001), IPTs have been described as the *“centrepiece of Smart Procurement”*, which itself has been described as a *“revolution and complete cultural change in MoD procurement”*. In the SPI, IPTs were introduced in UK defence acquisition. When the interviews for the reported research were conducted (October 2010), it was apparent that IPTs had not survived the merger between the DPA and the DLO. Within DE&S, there were few IPTs, but in their stead there were many Project Teams (PTs), several Delivery Teams (DTs) and even a few Joint Teams (JTs). Throughout the remainder of this thesis, these teams will all be referred to as PTs in order to minimise confusion.

5.3 Current Defence Acquisition

“The deficiencies in MoDs Project and Programme Management (PPM) were highlighted in the 1998 SDR and specifically addressed in the Smart Procurement Report which followed. Its recommendations were delivered under the banner of the Smart Acquisition change programme and Through Life Management (TLM) provided the solution to a number of the requirements of Smart Acquisition. The Defence

Industrial Strategy (DIS), and resultant Defence Acquisition Change Programme (DACP), build on the principles of Smart Acquisition by introducing the concept of Through Life Capability Management (TLCM). The key to the success of TLCM is the culture and behaviours provided by the application of good TLM.”

The UK MoD (2008a)

According to Gray (2009, p 54), within MoD, the term acquisition has a particular meaning and should not be confused as a synonym for procurement or purchasing. Instead, *“acquisition refers to the entire “cradle to grave” set of activities and processes to bring defence capabilities into existence; support them over their useful lives and dispose of them when no longer needed”*. According to MoD itself, it *“uses the word acquisition to denote the totality of: setting the requirement for a new equipment; procuring that equipment, facility or service; and supporting it through-life – all the way to its disposal or decommissioning”* (The UK MoD, 2001, p 2). The MoD considers defence acquisition to be the process by which MoD works together with industry in order to provide the necessary military capability to meet the requirements of the UK Armed Forces, today and in the future. Hence, UK defence acquisition covers the setting of requirements; the selection, development and manufacture of a solution to meet those requirements; the introduction into service and support of equipment or other elements of capability through life, and, finally, the appropriate disposal of the equipment and other elements of capability. The purpose of the UK Defence is summarised in the Defence Aim, which is:

“The defence aim is to deliver security for the people of the UK and the Overseas Territories by defending them, including against terrorism, and to act as a force for good by strengthening international peace and stability.”

According to MoD, defence acquisition is vital to military success and in order to meet the defence aim, since it translates industrial capacity into effective military capability and provides the Armed Forces with the battle-winning equipment, support and infrastructure that it needs to defeat current and potential enemies. Hence, the key purpose of UK defence acquisition is to: provide battle-winning capability for Defence; ensure Value-for-Money (VfM, see Sections 4.7.2 and 4.9.9) for the taxpayer; and sustain a responsive Defence Industrial Base (DIB). According to MoD, the key factors in determining the long-term success of a military capability are the selection of the appropriate lifecycle and the development of the most appropriate acquisition strategy.

5.3.1 Combined Operational Effectiveness and Investment Appraisal

The Combined Operational Effectiveness and Investment Appraisal (COEIA) is: *“A formal comparison, on a cost-effectiveness basis, of particular equipment options (or*

combination of options) for satisfying an operational requirement. Its purpose is to inform the decision to select one of the procurement options, and to reject the others, before proceeding further with the project, and to confirm the validity of this choice at all subsequent approval stages” (Kincaid, 1999, p 79). The COEIA considers the following options: Do nothing: Allow existing equipment to go out of service without replacement; Do minimum: Run on existing equipment or refurbish it with no change in performance; Replace with the same: Procure new or second-hand equipment with broadly the same capability; Refurbish: Refurbish existing equipment to improve its capability; Buy follow-on: Procure an improved version of the same equipment; Buy Off-The-Shelf (OTS): Buy new equipment with improved equipment OTS; and Develop and procure new: Develop and procure new equipment from scratch.

5.3.2 Integrated Logistics Support

Integrated Logistics Support (ILS) is *“a comprehensive discipline that is applicable to all acquisition activity through life. However, the cost-effective application of ILS requires that there is a balance between benefit and cost. Research shows that over the whole life cycle of a product, the cost of acquisition is small compared to the cost of support, both financially and in unavailability of assets during operations. Reliability and Maintainability have large implications on the overall Cost of Ownership, thus investment during development or production in these areas will be saved many times over the whole life of the product”* (UK MoD, 2010d, p 3). ILS is *“a disciplined approach that influences the product design and develops the Support Solution to optimise supportability and Through Life Finance (TLF)”* (UK MoD, 2010d, p 5). The key principles of ILS are: Influence on Product Design (Ensure where appropriate, that product design (including associated packaging), and the use of facilities, services, tools, spares and manpower are optimised to maximise product availability at optimal TLF); Design the Support Solution (Create an integrated Support Solution to optimise TLF. Ensure that the through life use of facilities, services, tools, spares and manpower is optimised to minimise Whole Life Costs (WLCs). Use of standard and/or common facilities, tools, spares and manpower shall be encouraged where appropriate); Deliver the Initial Support Package (Decide and procure the facilities, services, tools, spares and manpower required to support the product for a given period. Ensure that the physical deliverables of the Support Solution are in position to meet the Logistic Support Date (LSD) requirements. Ensure through life support is in place where appropriate); Acquisition of Products (ILS applies to the acquisition of all products for MoD including Technology Demonstrator Programmes, major upgrades, software projects, collaborative projects and OTS procurement); Supportability of Products (ILS will be applied to ensure that products are designed to be supportable, that the necessary support infrastructure is put in place and that TLF is optimised); and

Requirement for ILS. ILS is required even when the product selected is already developed, is Commercial-Off-The-Shelf (COTS) or Military-Off-The-Shelf (MOTS), and design decisions cannot be affected, on the grounds of supportability and TLF.

5.3.3 The Through Life Management Approach

“A Through Life Management (TLM) approach was deemed necessary in order to improve the management of projects and programmes within MoD by forcing individuals and teams to consider the long-term implications and requirements of the capabilities they were procuring to support the Front Line. There have been many well publicised examples of projects where the longer term implications were not recognised or were ignored when decisions were made. There have also been occasions when equipment was delivered to the front-line without the necessary support, trained manpower, associated facilities and equipment, to be able to deploy it. TLM was introduced to prevent or at least reduce such instances of poor management”.

The UK MoD (2008a)

Capability is 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 (FEs), i.e. ships, aircraft, army formations, other military units and force enablers, combined into packages by Joint Force Commanders and tailored for particular operations or missions. Each FE is delivered by either a single service, or by a joint organisation such as the Joint Helicopter Force, and requires the integration of the eight Defence Lines of Development (DLoDs, see Section 5.3.6); Training, Equipment, Personnel, Information, Doctrine, Organisation, Infrastructure, and Logistics (TEPIDOIL).

Through Life Capability Management (TLCM) is the management of enduring defence capability, with no constraints on the way it is delivered. When options have been selected as part of TLCM projects, the Through Life Management (TLM) process can begin. TLM is the philosophy that brings together the behaviours, systems, processes and tools to deliver and manage projects through the acquisition lifecycle. The approach to TLM has a number of easily identifiable characteristics: Whole life system outlook; Whole Life Costs (WLC); Involvement of Stakeholders; Through Life Management Plan (TLMP); Better informed decision making; and IPT and stakeholder processes.

Having a “*whole life outlook*” means starting from the point that Equipment Capability Customer (ECC) identifies the capability gap, and continuing up to the point of final disposal, while having a “*whole life system outlook*” means taking a Systems Engineering (SE) approach, including the integration of all DLoDs and

the management of all component systems and equipment which together deliver a capability. The characteristic of “*Whole Life Costs*” (WLC) means managing the WLCs of the capability ensuring that investment decisions take full account of all the longer term implications of acquisition, in terms of operating, supporting, maintaining and finally disposing of equipment. “*Involvement of Stakeholders*” refers to proactive involvement of stakeholders throughout the process, being realistic about what can be affordably achieved and agreeing this with the customers and other stakeholders. The “*Through Life Management Plan*” (TLMP) is about having a realistic, costed, whole life plan and maintaining this throughout the lifecycle. “*Better informed decision making*” means better informed decision making, through the use of the TLMP. Finally, “*Integrated Project Team (IPT) and stakeholder processes*” implies building all of these characteristics into IPT and stakeholder processes and working practices.

The necessity to make through life decisions emanate from the fact that decisions regarding costs are made at the early stages of the acquisition cycle, while most of the WLCs occur when the equipment is in-service, as illustrated in Figure 5.1.

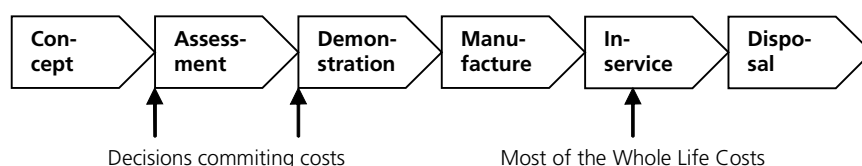


Figure 5.1: Distribution of Whole Life Costs over a system’s life cycle (Source: UK MoD, 2008a).

The concepts of CADMID and CADMIT are further explained in Section 5.3.4.

5.3.4 Sequential Defence Acquisition Life Cycles

Sequential acquisition is the most common type of lifecycle adopted in MoD (UK MoD, 2011d). Sequential acquisition has two variants, CADMID (Concept, Assessment, Demonstration, Manufacture, In-Service, and Disposal) for the acquisition of equipment capability and CADMIT (Concept, Assessment, Demonstration, Migration, In-Service, and Termination) for the provision of services.

The CADMID defence acquisition life cycle is characterised by approval points, generally at either end of the assessment phase, see Figure 5.2. The early stages of a project lifecycle contain two major decision points: the Initial Gate (IG) and the Main Gate (MG). Sponsors and Project Teams (PTs) are required to develop a Business Case (BC) at both of these stages, which justifies the project proceeding to the next stage.

Each of the six acquisition phases in the CADMID lifecycle involves executing the plan agreed in the previous phase, reviewing the outcome, and planning for the remaining phases. The basic activities in the different phases include (UK MoD, 2011d): *Concept*: Produce a statement of the outputs that users require from the system, framed as a User Requirements Document (URD); Form the Delivery Team (DT); Involve industry; Identify technology and procurement options for meeting the requirement that merit further investigation; Obtain funding and agree plan for the Assessment (in detail) and subsequent stages (in outline), identifying performance, cost and time boundaries within which it is to be conducted; Initiate the Through Life Management Plan (TLMP); Continuously monitor concept maturity and, when appropriate, construct and submit an Initial Gate Business Case (IGBC) seeking approval for the Assessment Stage within time, cost and performance boundaries.

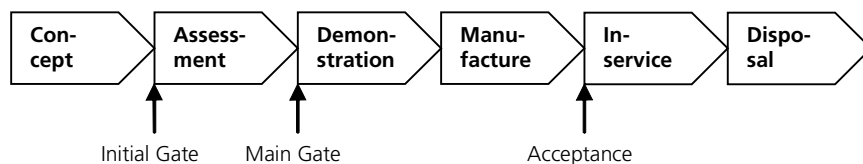


Figure 5.2: The CADMID lifecycle (Source: The UK MoD, 2011d).

Assessment: Produce the System Requirements Document (SRD), defining what the system must do to meet user needs as stated in the URD; Establish and maintain the linkage between user and system requirements; Identify the most cost-effective technological and procurement solution; Develop the SRD, trading time, cost and performance to identify the technological solution; Reduce risk to a level consistent with delivering an acceptable level of system performance to tightly controlled time and cost parameters; Refine the TLMP, including detailed plans for the Demonstration phase; Continuously monitor project maturity and, when appropriate, construct and submit a Main Gate Business Case (MGBC) seeking approval for the project within tightly defined performance, time and cost boundaries. *Demonstration*: Eliminate progressively the development risk and fix performance targets for manufacture, ensuring there is consistency between the final selected solution and the SRD and the URD; Place contract(s) to meet the SRD; Demonstrate the ability to produce integrated capability. *Manufacture*: Deliver the solution to the military requirement within the time and cost limits; Conduct System Acceptance to confirm that the system satisfies the SRD and the URD, as agreed at the Main Gate (MG); Transfer the lead customer function to the User, for equipment. *In-Service*: Confirm the Defence capability provided by the system is available for operational use, to the extent defined at MG, and declare the In-Service Date (ISD); Provide effective support to the front line; Maintain

levels of performance within agreed parameters, whilst driving down the annual Cost of Ownership (COO); Carry out any agreed upgrades or improvements, refits or acquisition increments. *Disposal*: Carry out plans for efficient, effective and safe disposal of the equipment.

In the CADMIT lifecycle, the approval points occur later, in order to manage the risks better. In comparison with CADMID, the M in CADMIT stands for Migration, rather than Manufacture, and T, for Termination, replaces Disposal. In cases where risk has been comprehensively reduced, for example when a new requirement is added to an existing contract, the IG and the MG may coincide. Figure 5.3 illustrates the CADMIT lifecycle.

Each of the six acquisition phases in CADMIT involves executing the plan agreed in the previous phase, reviewing the outcome, and planning for the remaining phases. The basic activities of each phase are as follows (UK MoD, 2011d): *Concept*: Produce a statement of the user's required outputs framed as a URD; Identify the team who should undertake the acquisition, and if necessary form a DT; Involve industry through informal market sounding; Identify procurement options that merit further investigation; Start to identify the acquisition boundaries of performance, cost and time; Agree the Assessment plan (in detail); Agree subsequent stages (in outline); Initiate the TLMP.

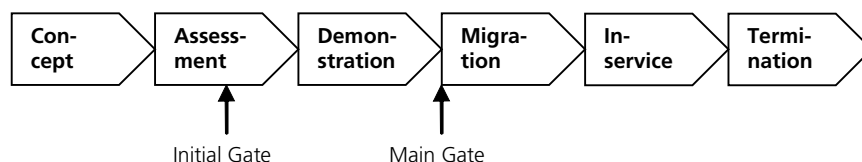


Figure 5.3: The CADMIT lifecycle (Source: The UK MoD, 2011d).

Assessment: Produce the SRD, defining what the system, service or asset must do to meet user needs as stated in the URD; Establish and maintain the linkage between user and system, service or asset requirements; Refine the TLMP, including detailed plans for the Demonstration phase; Identify availability of funding for the whole programme; Secure funds for the demonstration phase; Identify the most appropriate procurement strategy; Continuously monitor project maturity and, when appropriate, construct and submit an IGBC seeking approval for the Demonstration phase within time, cost and performance boundaries. *Demonstration*: Identify the most effective solution by formally engaging industry through the issue of an Invitation to Tender or Negotiate (ITT/ITN). Evaluate bids and recommend a bidder; Develop the SRD, trading time, cost and performance parameters necessary to identify the solution; Reduce risk to a level consistent with delivering an acceptable level of system, service or asset

performance to tightly controlled time and cost parameters; Fix performance targets for migration ensuring there is consistency between the final selected solution the SRD and the URD; Negotiate and place contract(s) to meet the SRD; Demonstrate ability to produce the required capability; Continuously monitor project maturity and, when appropriate, construct and submit a MGBC seeking approval to proceed to Migration within tightly defined performance, time and cost boundaries; Negotiate and place contract(s) to meet the SRD. *Migration*: Migrate to the new service; Manufacture/build assets if appropriate; Deliver the solution to the requirement within the time and cost limits; Handover the services/assets to the user/customer; Confirm the acquired capability is available for operational use, to the extent defined at the MG, and declare the ISD. *In-Service*: Provide effective support to ensure delivery of the service/capability; Maintain levels of performance within agreed parameters; Drive down the annual cost, where Cost of Ownership (COO) features; Conduct agreed upgrades or improvements, refits or acquisition increments; Prepare for the timely replacement of the service. *Termination*: Carry out the termination/closure of the estate, service, or business Information System (IS) contract in accordance with the TLMP; Dispose of any assets, migrate data to follow-on systems.

5.3.5 The Approvals and Scrutiny Process

As illustrated in Figure 5.2 and Figure 5.3, the approvals and scrutiny process is mandated for all investment decisions. The process can be summarised as the following stages: planning for approval; engagement with the scrutiny community; collection of evidence and development of the BC; and the formal approvals process. The earliest stages of any acquisition project life cycle involve two major decision points; the IG and the MG. In order for the project to be allowed to proceed beyond these gates, sponsors and Project Teams (PTs) are required to develop a BC at each of these stages. The IG is the first approval point which occurs before any assessment work is undertaken and is considered to be a relatively low hurdle in the process. Industry must not be engaged formally prior to IG approval. The MG occurs after the assessment work has been undertaken and is the major decision point at which the solution and “*not to exceed figures*” are approved. No manufacture or service contracts can be signed prior to approval. Based primarily on monetary value, although other factors (e.g. novel and contentious issues for example), can lead to a project being moved into a higher category, projects are divided into four categories: A, B, C and D.

5.3.6 Defence Lines of Development

In the UK, capability is considered to be made up of the Defence Lines of Development (DLoDs), with the mnemonic TEPIDOIL (The UK MoD, 2011d):

Training: The provision of the means to practise, develop and validate, within constraints, the practical application of a common military doctrine to deliver a military capability. *Equipment:* The provision of military platforms, systems and weapons, (expendable and non-expendable, including updates to legacy systems) needed to outfit/equip an individual, group or organisation. *Personnel:* The timely provision of sufficient, capable and motivated personnel to deliver Defence outputs, now and in the future. *Information:* The provision of a coherent development of data, information and knowledge requirements for capabilities and all processes designed to gather and handle data, information and knowledge. Data is defined as raw facts, without inherent meaning, used by humans and systems. Information is defined as data placed in context. Knowledge is Information applied to a particular situation. *Concepts and Doctrine:* A Concept is an expression of the capabilities that are likely to be used to accomplish an activity in the future. Doctrine is an expression of the principles by which military forces guide their actions and is a codification of how activity is conducted today. It is authoritative, but requires judgement in application. *Organisation:* Relates to the operational and non-operational organisational relationships of people. It typically includes military force structures, MoD civilian organisational structures and Defence contractors providing support. *Infrastructure:* The acquisition, development, management and disposal of all fixed, permanent buildings and structures, land, utilities and facility management services in support of Defence capabilities. It includes estate development and structures that support military and civilian personnel. *Logistics:* Logistics is the science of planning and carrying out the operational movement and maintenance of forces. In its most comprehensive sense, it relates to the aspects of military operations which deal with; the design and development, acquisition, storage, transport, distribution, maintenance, evacuation and disposition of materiel; the transport of personnel; the acquisition, construction, maintenance, operation, and disposition of facilities; the acquisition or furnishing of services, medical and health service support.

In addition to the DLoDs, Interoperability is included as an overarching theme that must be considered when any DLoD is being addressed. Interoperability is the ability of UK Forces and, when appropriate, forces of partner and other nations to train, exercise and operate effectively together in the execution of assigned missions and tasks. In the context of DLoDs, Interoperability also covers interaction between Services, UK Defence capabilities, other government Departments and the civil aspects of interoperability, including compatibility with Civil Regulations. Interoperability is used in the literal sense and is not a compromise lying somewhere between integration and de-confliction.

The DLoDs, i.e. the mnemonic TEPIDOIL, are the UK capability component equivalent of the US acronym DOTMLPF, i.e. Doctrine, Organisation, Training,

Materiel, Leadership, Personnel, and Facilities, and the NATO acronym DOTMLPFI, where NATO has also included Interoperability. The US and NATO corresponding acronyms constitute the analogous building blocks of capability in the US and in NATO. From the point of view of the focus of the reported research, it is interesting to observe that the UK DLoDs include *logistics* as one of its capability components, whereas neither the US nor NATO include logistics in their corresponding decomposition of what military capability is.

5.3.7 Defence Acquisition Transformation Staircase

The MoD uses a defence acquisition transformation staircase (also referred to as the defence acquisition transition staircase, the transformational staircase, or the transitional staircase), which is illustrated in Figure 5.1, in order to differentiate between different types of contracts.

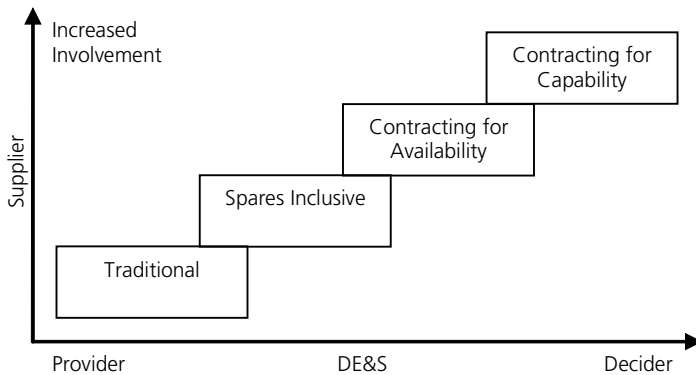


Figure 5.4: The Defence Acquisition Transformation Staircase (Source: The UK MoD, 2005c, p 135).

The first two steps entails traditional “*spares and maintenance*” type arrangements (Gray, 2009, p 145). The first of these steps, which is called “*Traditional*” (UK MoD, 2005c, p 135), involves procurement and support. The next step, i.e. “*Spares Inclusive*” (UK MoD, 2005c, p 135), includes procurement and Contractor Logistics Support (CLS). CLS is “*a range of support options that involves the transfer of responsibilities for delivering an agreed level of equipment availability, to a Contractor*” (UK MoD, 2009c, p 15). CLS is defined as “*the methodology by which responsibility for provision of an agreed level of support is transferred to an industry provider. CLS can cover a wide spectrum of industry involvement ranging from minimal transferral under traditional product based support solutions to maximum transfer of responsibility to a Contractor*” (UK MoD, 2011g, p 4).

Through the transformation staircase, support arrangements are now migrating to contracting for availability⁶³ and capability (Gray, 2009, p 145). The third step is about Contracting for Availability (CfA), i.e. the equipment is available when you want it, which is often referred to as “*power-by-the-hour*” (see Section 4.6.7). The final step in the staircase concerns Contracting for Capability (CfC), which means that the contractor will have to provide people to the front line, in order to deliver the service. An individual project’s place on the Transformation Staircase is dictated by the potential financial benefits of moving up the staircase (Roberts, 2004, p 5-2). In a CfA, “*the supplier is responsible for delivering platforms and equipment to an agreed performance and outputs standard*”, whereas in a CfC, “*the supplier is responsible for providing a capability (e.g. Air Refuelling) and outputs to an agreed performance standards*” (Gray, 2009, p 145).

While CLS, CfA and CfC are UK specific military concepts, they have similarities with civilian concepts and generic military concepts. CLS can be seen as a military version of Third Party Logistics (TPL, see Section 4.7.6), whereas CfA can be seen as a military version of Fourth Party Logistics (FPL, see Section 4.7.6) or as a UK version of the US concept of Performance Based Contracts (PBC, see Section 4.6.7). CLS, CfA and CfC are increasingly taking over from more traditional “*spares and repair*” acquisition programmes. This increased complexity presents a challenge when setting requirements and specifications in these contracts (UK MoD, 2008h, p 14). A CfA is intended to incentivise industry to develop the products to become more reliable. Previously, the more a system broke down, the more spares and repairs were needed, and the more work and money was received by the contractors. Under a CfA, in order to maintain the availability, the idea is that it will be in industry’s interest for the equipment to be reliable.

5.3.8 Evolution of Capability Management

Around half of the money that DE&S spends on equipment is related to support. Hence, in order to investigate and understand defence acquisition performance, it is not sufficient to only study how effectively and efficiently DE&S procures equipment, it is also necessary to study how effectively and efficiently DE&S provides support. Gray (2009, p 144) equates CLS, CfA and CfC with Business Models (BMs) for equipment support and states that these BMs have seen significant evolution and development over the past decade.

⁶³ Availability can be defined as a ratio of expected value of the uptime of a system to the aggregate of the expected values of up and down time. Availability can be calculated as Mean Time Between Failure (MTBF) over MTBF plus Mean Time To Repair (MTTR).

Historically, the externally contracted aspects of support were procurement of spares, and the occasional “*return to Original Equipment Manufacturer (OEM)*” upgrades or updates. The traditional way of doing business evolved into “*whole life procurement and support*”, which explicitly considered Whole Life Costs (WLCs) in the initial equipment procurement decision making. The next level of sophistication in this development takes into account other factors which impact the costs of using the equipment to deliver military capability, e.g. training or manpower (personnel). This approach, i.e. TLCM, is an evolution of the principle of WLC. The evolution from traditional procurement and support, via WLC, to TLCM, is illustrated in Figure 5.5.

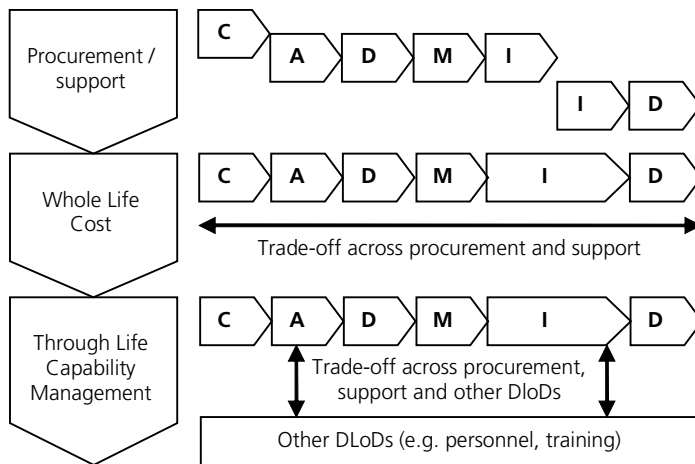


Figure 5.5: Evolution of Capability Management (Source: Gray, 2009, p 144).

Through TLCM, every aspect of new and existing military capability is planned and managed coherently across all DLoDs, from “*cradle to grave*”. The MoD is moving along a transformation pathway towards TLCM at various rates across the capability structure (Gray, 2009, p 144).

5.3.9 Acquisition of Equipment and Support

There has been a dramatic development in defence acquisition, particularly regarding how support is acquired. It is, however, not only the acquisition of support that has developed, but also the acquisition of equipment. Whereas previously, equipment and support would often be developed by the supplier in accordance with the specifications of the receiving military force, that is becoming increasingly atypical nowadays. There is an escalating political pressure, at least in the countries within NATO and EU, on the military forces in general, and on the Defence Procurement Agencies (DPAs) in particular, to commence buying Off-

The-Shelf (OTS) equipment and support, which can be either COTS or MOTS, to a greater extent, in order to save money. OTS can be acquired “*as it is*”, i.e. in its existing condition, or adapted to the receiving military forces’ requirements and subsequent specifications. If equipment and/or support are developed and delivered to specification, there is presumably a significant difference⁶⁴ whether this is done in a foreign country, by any international defence conglomerate that happened to provide the most commercially advantageous tender in an open competition, or if it is done domestically, by a preferred bidder from the domestic defence industry, belonging to the Defence Industrial Base (DIB). Consequently, at present, there are four essentially diverse ways through which to acquire new equipment. If these four ways of acquiring new equipment are sorted in order of acquisition cost, it is probably safe to say that the order in which the alternatives is presented above is equivalent to the order from the least expensive to the most expensive. This is, however, not necessarily the same order as an exercise in sorting them from the point of view of Value-for-Money (VfM) would have resulted in.

Table 5.1: Equipment and Support Value Proposition matrix.

Support	Contracting for Capability (CfC)	CfC	CfC	CfC	CfC	CfC
	Contracting for Availability (CfA)	CfA	CfA	CfA	CfA	CfA
	Contractor Logistics Support (CLS)	CLS	CLS	CLS	CLS	CLS
	Procurement and support (P&S)	(P&) S	P&S	P&S	P&S	P&S
		No new acquisition	Off-The-Shelf (OTS)	Adapted OTS	Foreign development	Domestic development
		Equipment				

There are four different ways in which to provide support to new equipment. However, regarding support, there is also the necessity to occasionally provide support to already existing equipment, i.e. in cases where there is no acquisition of new equipment. In combination, the four ways of acquiring new equipment and the four ways of providing support to new equipment and already existing equipment, constitutes a five-by-four matrix, consisting of twenty mutually exclusive elements (see Table 5.1). Each element in the matrix represents a unique offering, or “*Value Propositions*”, that a DPA can offer its military customer in each defence acquisition project. Consequently, these mutually exclusive elements

⁶⁴ From the point of view of the defence sector, this difference is probably predominantly of a monetary nature. However, from the point of view of a nation’s interests, the difference can lie in several different areas of policy, including, defence policy, security policy, labour market policy, financial policy, regional policy, environmental policy and industrial policy.

provide a DPA with the opportunity to categorise any acquisition project as one out of twenty possible varieties.

As demonstrated in Table 5.1, Contracting for Capability (CfC), Contracting for Availability (CfA) and Contractor Logistics Support (CLS) can be envisioned for the entire spectrum of equipment “*Value Propositions*”. However, Procurement and Support (P&S) presupposes the acquisition of new equipment. If P&S is applicable also for support to already existing equipment, which seems reasonable, it is only the support component of the concept that is appropriate, which is why the rest of the acronym has been bracketed for the “*No new acquisition*” alternative for equipment, since any such acquisition project would exclusively be providing support to already existing equipment.

5.3.10 A new Paradigm for Defence Acquisition

The ascension in the defence acquisition staircase (see Figure 5.4) symbolises a shift in paradigm for defence acquisition in the UK that has transpired the past decade. To this author’s mind, there are two fundamental features in this shift in paradigm, which can be described by answering the two questions: “*What is procured?*” and “*How is it procured?*” The first aspect of this shift in paradigm, “*What is procured?*” has already been described, i.e. the transition towards TLMC (see Figure 5.5). The second aspect of the new paradigm, “*How is it procured?*” has to do with how acquisition is being conducted in practice. The traditional approach in the UK previously tended towards (The UK MoD, 2005c, p 31): a tight definition of the scope of work; the use of competition to select suppliers; negotiation targeted at reducing risk and cost; and a transactional approach to management of the contract, holding the suppliers to account against agreed milestones.


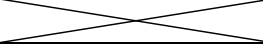
In the beginning of the new millennium, it was recognised that a “*one-size-fits-all*” approach to engagement with the key suppliers is sub-optimal. The UK already had “*a history of leading the way in deploying innovative acquisition and financing models in defence, for example PFI and PPP*” (The UK MoD 2005c, p 31) and was now also moving into using alliances (see Section 4.7.8) and lead system integrators. The MoD and the defence industry recognised the need for work to optimise the approach to risk and reward. It was realised that long timescales entails that “*a whole range of factors change during the lifetime of a programme or even a decision-making cycle, introducing risk including cancellation, requirements change, funding changes and delays*” (The UK MoD 2005c, p 31). The MoD came to the conclusion that partnering relationships (see Section 4.7.8), designed for mutual benefit, that recognise that risk is shared and that reward performance, are more attractive to the defence industry.

A central component of the traditional approach to acquisition was the use of competition to select suppliers. While competition is part of the new paradigm, there is also a more flexible approach, an alternative approach to competition. The 2002 Defence Industrial Policy (DIP) recognised that “*even in competitive environments there are a number of wider factors besides cost and operational effectiveness, affordability and long-term Value-for-Money that will influence supplier and procurement selection. These include security of supply and the retention of key technologies and industrial capabilities, the implications for export potential, our wider policy framework and industrial participation*” (The UK MoD 2005c, p 48). As a result, four alternative acquisition models were identified for the following procurement situations: one supplier has the capacity and capability to deliver the requirement and is chosen because it is the sole source of supply, or it is chosen on the basis of consistently high performance compared to other suppliers, or it is the only suitable supplier to sustain sovereign capabilities in industrial base or other procurement grounds; no single supplier has the capacity and capability to deliver the requirement and where an inclusive and willing group or groups of suppliers might be formed and sustained; the through life support of a capability that requires the engagement of the equipment Design Authority and/or other Systems Engineering (SE) capability; and competition exists but the procurement can readily be compared or benchmarked against similar technologies, supplies and services, or for Urgent Operational Requirements (UORs) where equipment is readily available.

In summary, it is probably fair to say that the many changes in defence acquisition have resulted in a new paradigm. In the new paradigm, DE&S has altered both *what* it acquires and *how* it acquires it. DE&S no longer acquires only equipment, and DE&S no longer uses only competition to select suppliers. The author will introduce and promote two terms, *First Generation Defence Acquisition Contracts* and *Second Generation Defence Acquisition Contracts*, in order to differentiate between the contracts that came immediately after SDR 1998, and the contracts that have already replaced, or that are now about to replace, these early contracts, after the DIS 2005. Consequently, the underlying Business Models (BMs) will be categorised as *First Generation Defence Acquisition Business Models* and *Second Generation Defence Acquisition Business Models*. Had “*defence procurement*” not been changed to “*defence acquisition*” in conjunction with the SDR 1998, it would have been more appropriate to label the “*First Generation Defence Acquisition Contracts*” as “*Second Generation Defence Procurement Contracts*” and to label the “*Second Generation Defence Acquisition Contracts*” as “*Third Generation Defence Procurement Contracts*”. However, since defence acquisition encompasses more than its predecessor, defence procurement, the author decided to use the described terminology.

First Generation Defence Acquisition Contracts will predominantly be CLS arrangements, where the contractor has been selected by competition. Second Generation Defence Acquisition Contracts are first and foremost CfAs, where the prime contractor has been selected by a more flexible approach than competition. There will, however, be exceptions to these general rules. First Generation Defence Acquisition Contracts are, however, always contracts that were signed between the SDR 1998 and the DIS 2005, whereas Second Generation Defence Acquisition Contracts are contracts that have replaced First Generation Defence Acquisition Contracts after the DIS 2005. What constitutes First and Second Generation Defence Acquisition Contracts is illustrated in Table 5.2.

Table 5.2: First and Second Generation Defence Acquisition Contracts.

		Selection of contractor	
		Always competition	Preferred bidder
Type of support	Contract for Availability (CfA)		Second Generation Defence Acquisition Contract
	Contractor Logistics Support (CLS)	First Generation Defence Acquisition Contract	

Since Contracting for Capability (CfC) probably is to be anticipated in the relatively near future, and judging by the relatively dramatic changes that the SDSR 2010 is likely to bring about, it will probably soon be relevant to introduce a new term, Third Generation Defence Acquisition Contracts, which will be referring to defence contracts that have been signed after the SDSR 2010. Third Generation Contracts are, however, a topic for another tale.

5.4 The UK MoD Defence Equipment and Support

“The Smart Procurement Initiative (SPI) gave priority to creating a clear Customer/Supplier relationship within MoD, with the Central Customer (EC) dictating its capability requirements to its supplier (the DPA) during procurement, and the Service Customer (the Commanders-in-Chief) being supported during the in-service life of the equipment by its supplier (the DLO). Responsibility was to be handed over from the DPA to the DLO at the ISD, with the IPT transferring from the DPA to the DLO at that point. This was always a naïve view of life, for things are far more complex than that. For one thing, more than 90% of projects lie within “cluster” or multi-project IPTs which cannot be transferred from DPA to DLO when one of its projects reaches ISD because the remainder will be at various other stages in the procurement cycle. For another, even single-project IPTs seem unable to transfer with its individual members, because those members do not wish to move their place of work from Bristol to Andover or Whitton.

The result is that all projects are effectively “thrown over the wall” to the DLO at a critical juncture. This inevitably causes major disruption. If the IPT leader is responsible for the project only until ISD, how much effort will be put into support arrangements for the future? And if funding is split between the DPA IPT (for procurement) and the DLO IPT (for support), when each IPT has many other projects, how transparent is that funding allocation and use and how can changes to the balance of funding be effected? Furthermore, if the contract is placed with a company for production and initial support (say, for ten years), how good will the support part of the contract be if written by the DPA IPT contract officer who may have little or no experience of either working in the DLO or of DLO support contracts? Throwing projects over the wall destroys continuity, corporate knowledge and accountability. A complete change of personnel is not what is required at ISD”.

“Many people see that the only realistic solution is a merger between DPA and DLO, or at least that part of DLO which handles equipment support”.

Kincaid (2002, p 14-15)

The UK MoD Defence Equipment and Support (DE&S) was formed in 2007 through a merger of the UK MoD Defence Procurement Agency (DPA) and the UK MoD Defence Logistics Organisation (DLO). Under the leadership of the Chief of Defence Materiel, the DE&S mission is *“To equip and support our Armed Forces for operations now and in the future”* (UK MoD DE&S, 2007, p 4). DE&S has activities throughout the UK, but its Headquarters (HQ) is located in Filton, Bristol. DE&S has around 21,000 employees, and is responsible for equipping and supporting the UK's Armed Forces for current and future operations. DE&S has an annual spend of £16 billion, representing 43 per cent of the UK annual defence budget (UK MoD DE&S, 2007) and acquires and supports equipment and services, including ships, aircraft, vehicles and weapons and Information Systems (IS). DE&S also continues to supply general requirements, food, clothing, medical and temporary accommodation. DE&S is also responsible for HM (Her Majesty's) Naval Bases, the Joint Supply Chain (JSC, see Section 4.8.7) and British Forces Post Office. DE&S is responsible for the through-life approach to equipment procurement and support, and the creation of an improved service to the front line customers. This means that DE&S manage defence equipment from before it is brought into service at the ISD until it goes out of service at the OSD. DE&S works closely with industry through partnering agreements (see Section 4.7.8) and Private Finance Initiatives (PFIs, see Section 4.7.7) in accordance with the Defence Industrial Strategy (DIS) to deliver effective solutions for defence.

The UK MoD DPA, which was led by the Chief of Defence Procurement, was an executive agency of the UK MoD and was responsible for the acquisition of materiel, equipment and services for the British Armed Forces. The DPA was established on 1 April 1999, after the announcement in the Strategic Defence

Review (SDR) of a specialised agency to succeed the MoD Procurement Executive (PE). Before the establishment of the DPA, the MoD PE was the acquisition organisation of MoD. The PE was established in 1971 as a single procurement agency for all three services under the first Chief of Defence Procurement. The UK MoD DLO, which was led by the Chief of Defence Logistics, was a key element of the UK MoD, responsible for supporting the Armed Forces throughout an operation or exercise; from training, deployment, in-theatre training and conduct of operations, through to recovery and recuperation ready for redeployment. The DLO maintained and upgraded military equipment and coordinated its storage and distribution. It had an annual spend of almost £9 billion, representing over 20 per cent of the Defence budget. The DLO employed around 20,000 staff at 80 locations throughout the UK and overseas, and had its headquarters in Bath. The DLO was created in 2000 when MoD brought together all the logistics departments and MoD central agencies together under a joint command.

DE&S consists of Integrated Project Teams (IPTs), specialist Business Units (BUs) and Agencies which exist to procure and support a specific capability. Within these are financiers, engineers, contracts staff, logistic staff, purchasers and equipment or commodity managers. They plan and manage inventory, and also develop arrangements with industrial partners to support equipment and platforms; they are key to priming the Joint Supply Chain (JSC) (UK MoD, 2009b, p 6). DE&S has five tasks: to procure new equipment, to support equipment through life, to provide support services to the Armed Forces, to manage relationships with people in MoD, the front line and industry, and to continually improve its business. In order to address the continual improvement task, DE&S has a Change Programme that is called PACE (Performance, Agility, Confidence and Efficiency). PACE is supposed to improve effectiveness through: *“Performance – improved output through better processes, used by higher skilled people, focused on delivery; Agility – improved responsiveness to Sponsor and User priorities, formulation of innovative solutions to delivering capability, and a real focus on “time to market”; Confidence – by the Sponsor, User, industry, public and staff as we plan better, work together better, and build a record of assured delivery on time, cost and performance; and Efficiency – improved investment in defence in order to maximise Value-for-Money for the taxpayer”* (UK MoD DE&S, 2008c).

All references regarding defence acquisition in the UK between 1999 and 2007 ought to be references to the MoD DPA and the MoD DLO, whereas references regarding defence acquisition in the UK between 1971 and 1999 should be references to the MoD PE. However, the author has decided against making sure that these chronological observations are rigorously adhered to. DE&S is intentionally and consistently used throughout the thesis in order to avoid unnecessary confusion.

6 Case Descriptions

“The reason why most of our projects are over budget and late is that we never actually want what we contracted for. We change our mind half way through, because of developments in technology and because the requirements change” (Warren, 2010)

“I think that we should invest with our own traditional levels of support, because we can do it on a far larger scale, and we can do it cheaper. I am a fan of contracting out complex things that we, perhaps, would have difficulty keeping the skills to do, but for running a mere shopping and putting stuff in a cupboard somewhere for a rainy day, that should be easy business, really, for us” (Respondent C, 2010).

6.1 Introduction

In this chapter, the four cases of the multiple case study are presented:

- Case A: The C Vehicle⁶⁵ acquisition project⁶⁶.
- Case B: The STSA⁶⁷ (C-17⁶⁸) acquisition project.
- Case C: The HASP⁶⁹ acquisition project.
- Case D: The ADAPT⁷⁰ acquisition project.

⁶⁵ In the UK, C Vehicles is the military abbreviation for the construction vehicles that are used by the military for engineering projects, equipment handling and material handling.

⁶⁶ The term “*acquisition project*” is used by the author in order to provide a framework in which to include BMs and written contracts (see Figure 6.1), to relate them to each other, and to relate them to the acquisition and delivery phases of the acquisition project. Hence, in the UK, there is not a project that is called, e.g., the “*C Vehicle acquisition project*”. However, some acquisition projects are referred to as “*Project Teams (PTs)*”. In the ensuing chapters, defence acquisition Project Teams will be referred to as PTs, e.g. the “*C Vehicle PT*”.

⁶⁷ The STSA (Short Term Strategic Airlift) was an acquisition project initiated in 1998 by DE&S in order to temporarily fill the predicted seven year gap between the ageing fleet of Lockheed C-130K Hercules and their intended replacements, the European Future Large Aircraft (FLA), i.e. the Airbus A400M.

⁶⁸ The Boeing C-17 Globemaster III is a strategic military airlifter with a tactical capability. The C-17 is a four engine military transport aircraft with a carrying capacity exceeding 70 tonnes.

⁶⁹ The HASP (Heavy Armour Spares Provisioning) contract is the direct succession to the earlier CRISP (ChallengeR 2 Innovative Spares Provision) contract. The CRISP and the HASP contracts both involved delivering spares to the Challenger 2 (CR2), which is the UK Main Battle Tank (MBT).

The four cases are four defence acquisition projects, which represent four recent and current defence acquisition contracts, based on four different Public Private Business Models (PPBMs, see Section 4.12), and which involve the UK Ministry of Defence (MoD) Equipment and Support (DE&S, see Section 5.4) and the international defence industry. It proved to be complicated to differentiate between the conceptual PPBM, the implementation (i.e. the written contract) of it, and the overarching business deal or agreement (i.e. the acquisition project). Eventually, the author settled for the following differentiation: a defence acquisition project refers to a project which, from *“the cradle to the grave”* (or *“from concept to disposal of equipment or termination of support”*, see Section 5.3.4), assumes responsibility for the acquisition of equipment and/or provision of support; a PPBM refers to a theoretical construct (i.e. the conceptual BM), based on which a contract can be written; and a written contract refers to the practical implementation (i.e. the physical undersigned piece of paper) of such a theoretical construct. In Figure 6.1, the interrelationships between these central terms are illustrated.

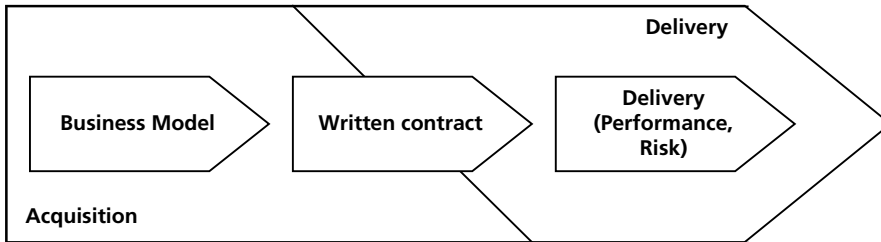


Figure 6.1: A schematic illustration of the life cycle of a defence acquisition project.

Figure 6.1 schematically depicts two distinct phases of the acquisition project: an acquisition phase (including procurement planning and contractor selection, see Section 4.6.1); and a delivery phase (including contract administration, see Section 4.6.1). No exact precision regarding the border between the two phases is intended. For each acquisition project, a team within DE&S is designated to be responsible for the project. Over the past ten years, the names of these teams have changed several times. Hence terms such as Integrated Project Team (IPT), Project Team (PT), Delivery Team (DT), and Joint Team (JT) all refer to the DE&S

⁷⁰ The ADAPT (Air Defence Availability Project for Rapier) contract is the direct succession to the earlier TRADERS (The Rapier Direct Exchange of Repairable Spares) contract. The TRADERS and the ADAPT contracts both involved delivering spares to Rapier, which is the UK Air Defence System (ADS), i.e. a Surface-to-Air Missile (SAM) system.

teams that are responsible for a specific defence acquisition project. Early on in the acquisition project, the activities are, either explicitly or implicitly, about defining which theoretical BM to use. Once the BM is in place, and the prime contractor has been selected, through competition or otherwise, a contract is developed and signed. During the last phase of the project, i.e. throughout the duration of the contract period, if everything is proceeding according to plan, the equipment and/or support is being delivered by the contractor, and the delivery is being monitored and paid for by DE&S. It is during this last phase that the performance, and any risks, of the acquisition project will ultimately manifest themselves, regardless if they are the inherent consequences of the BM, the written contract and/or environmental aspects outside of DE&S.

Table 6.1: An overview of some of the characteristics of the cases.

Case	Equipment	Support	Affected DLoDs	<i>Nota bene</i>	Contract period
C Vehicle	Acquisition of new equipment: Adapted COTS construction vehicles	Provision of consumable and repairable spares, maintenance and repair: CFA (C Vehicle)	Training, Equipment, Personnel, Information and Logistics	PFI; Reached Initial Gate in 1999	2006-2021
STSA	Acquisition of new equipment: MOTS aircraft for strategic airlift	Provision of consumable and repairable spares, maintenance and repair: CFA (C-17)	Training, Equipment, Personnel, Information and Logistics	Leasing; Interim, short term solution	2001-2008
HASP	No acquisition of equipment	Provision of consumable spares: CFA (CR2 MBT)	Equipment, Information and Logistics	Interim, short term solution	2009-2011
ADAPT	No acquisition of equipment	Provision of consumable and repairable spares, maintenance and repair: CFA (Rapier SAM)	Training, Equipment, Personnel, Information, Organisation, Infrastructure and Logistics	Permanent, definite solution until OSD	2007-2020

The case descriptions in this chapter are based on primary data from interviews with representatives, henceforth labelled respondents, of DE&S acquisition projects, and secondary data from articles, reports, brochures, archives, the Internet, etc. Quotes regarding primary data obtained from the acquisition project representatives are referenced as coming from Warren (i.e. Respondent A), Respondent B, C and D. For all secondary data, explicit references are made to the source from whence it came. Hence, all data and information that is not referenced emanate from the interviews with the respondents for each case. The case descriptions are structured as homogenously as possible. Hence, each case is introduced with a background to the acquisition project. Then three central BM building blocks, i.e. “*Value Propositions*”, “*Channels*”, and “*Key Activities*”, of the Public Private Business Model (PPBM, see Section 4.12) are explicitly described.

Finally, each case description is concluded with a summary of other pertinent aspects of the acquisition project, e.g. information regarding the remaining PPBM building blocks (see Section 4.12), risk sharing, reward sharing, etc. As an introduction to the case descriptions, a few distinct characteristics of the cases are summarised in Table 6.1.

Two cases (HASP and ADAPT) do not involve acquisition of new equipment (i.e. complex materiel that requires support), only the provision of support (i.e. consumable and repairable spares, Maintenance, Repair and Overhaul (MRO) that is required in order to maintain the equipment at a certain level of availability) to already existing equipment. While all four cases formally, as described by DE&S, include Contracting for Availability (CfA, see Section 5.3.7), one case (HASP), in practise, only comprises the provision of consumable spares. Even though three of the cases (C Vehicle, STSA and ADAPT) affect several Defence Lines of Development (DLoDs, see Section 5.3.6), only one case (ADAPT) involves a written contract where other DLoDs than Equipment and Logistics, e.g. Training, are formally, included. Two cases (C Vehicle and STSA) involve alternative financing (PFI and leasing) solutions (see Section 4.7.7), while two cases (STSA and HASP) are examples of comparatively short-term, interim solutions, initially intended to be replaced by longer term, permanent solutions, and one case (ADAPT) is an example of a permanent, definitive solution, intended to be in place until the Out-of-Service-Date (OSD) of the system that it supports.

6.2 Case A: The C Vehicle Acquisition Project

“The idea was that this would be designed for war, but adapted for peace... It was really designed for peace, and adapted for war, and it’s the war risk that is really biting now. We are seeing the costs associated with not doing things perfectly at this end” (Warren, 2010).

6.2.1 Background to the Acquisition Project

C Vehicles is the military term for the construction vehicles that are used by the military for engineering projects, equipment handling and material handling. A C Vehicle is a wheeled or tracked item of earth moving equipment, either self-propelled or towed; all self-mobile, self-steering, purpose-made cranes, cable laying ploughs; all industrial and agricultural tractors and rough terrain fork lift tractors excluding warehouse tractors (UK MoD DCDC, 2006, p C-1). The C Vehicle PFI (Private Finance Initiative, see Section 4.7.7) was initiated because it was difficult to find money to finance the construction equipment and the Mechanical Handling Equipment (MHE) that the British Armed Forces require in support of operations. The reason for this was that these investments were given a low

priority. The idea was that a PFI would raise the money that was necessary in order to buy the equipment. The C Vehicle PT got to the Initial Gate (IG) in 1999, and then it took four years to get to the Main Gate (MG), where approval to proceed could have been given (see Sections 5.3.4 and 5.3.5). When the Business Case (BC) got to the MG in 2003, there was a military defence review (see Section 5.2) focusing on military expenditure, so the contract had to be renegotiated in order to save more money. The 15 year contract was finally signed in 2005, and then there was a one year setup phase, during which time the contract was initialised, in the UK and overseas. The company that was awarded the contract was a Special Purpose Vehicle (SPV, see Section 4.7), known as the Amey Lex Consortium (ALC) Ltd. The SPV, i.e. the ALC, that delivers the service, was originally generated by two companies, Amey and Lex. Lex has subsequently been bought out by VT, which in turn was later bought out by Babcock, so the companies behind the ALC are Amey and Babcock. Once the contract had been awarded, ALC purchased MoD's existing fleet of 4,000 vehicles, including cranes, dump trucks, excavators, bulldozers, rough terrain forklifts and container handlers, and became responsible for providing the right equipment to meet DE&S C Vehicle availability requirement. Multipart Defence⁷¹, ALC's sub-contractor, is responsible for providing the spares necessary to keep the fleet operational, and must ensure that the right items are in stock at the right time to meet the maintenance and repair requirements of the C Vehicles fleet (Multipart Defence, 2011a). While the entity delivering the services is a SPV, created by two parent companies, purely for the purpose of delivering the service, the original funding, i.e. £100 million, was provided by a consortium of six banks. Therefore, this PPBM is a PFI, which is also the biggest problem with this PPBM:

"The biggest problem with that pure PFI... Generally, a PPP will expect industry to bring the money, so that they have total control. With the Private Finance Initiative, they get it from the bank, so if you... If you had a £100,000 mortgage for a four bedroom house, and in ten years' time, you decided that house was too big and you wanted to down-size, you'd have to pay off the mortgage. And what we are seeing at the moment is the banks have a blue chip investment of £100 million for the return in the next 15 years. If the defence and security review wants to make it 20% smaller, the bank will say: "well, you owe me the return on that money for the next 15 years". So, the banks make it very difficult to change... The company would change, but you've always got the banks to consider in changes. So this is a pure PFI, with all the issues around the bank financing structure behind it" (Warren, 2010).

⁷¹ The Defence Division of Multipart Solutions is referred to as Multipart Defence in this thesis.

The 15 year, £600 million C Vehicle availability contract was awarded to the ALC in 2005 and ALC is supposed to provide a worldwide fleet of construction plant and field Mechanical Handling Equipment (MHE), i.e. C Vehicles, to DE&S. The contract also provides a broad range of integrated services, including a spares support and inventory management system which has been subcontracted to Multipart Defence (Multipart Defence, 2011a).

6.2.2 Value Propositions

The C Vehicles acquisition project delivers construction equipment and Mechanical Handling Equipment (MHE), which includes rough terrain fork lifts and cranes. Initially, the C Vehicle PT delivered construction equipment to the Royal Engineers⁷² (RE) and MHE to all the Corps (branches) and Regiments of the British Army, e.g. the Royal Electrical and Mechanical Engineers⁷³ (REME), the Royal Logistics Corps⁷⁴ (RLC) and the Royal Artillery⁷⁵ (RA). In 2011 the contract has been amended to include the provision of MHE to the Royal Air Force (RAF) for deployed air field handling and Navy Command for on board ship use, which gives DE&S a common tri-service fleet. Consequently, even if the “*Customer Segments*” for the C Vehicle acquisition project is frequently exemplified by the RE, it includes delivering a single supply solution throughout the three services. The contract covers 150 different equipment capabilities, from large bulldozers, via small dozers, down to concrete pokers, and has more than 2,500 assets available. In short, the contract covers anything that the British Armed

⁷² The Corps of Royal Engineers, referred to as the Royal Engineers (RE) throughout this thesis, but commonly known as the “*Sappers*”, is one of the Corps within the British Army. The RE provides military engineering and other technical support to the British Armed Forces (The British Army, 2012a).

⁷³ The Corps of Royal Electrical and Mechanical Engineers, referred to as the Royal Electrical and Mechanical Engineers (REME) in this thesis, is a Corps of the British Army that is responsible for the repair, maintenance, servicing and inspection of most electrical and mechanical pieces of equipment within the British Army (The British Army, 2012b).

⁷⁴ The Royal Logistics Corps (RLC) is the largest Corps in the British Army, with over 16,000 soldiers and officers working and operating in Regiments of every type. The motto describes what military logistics is all about: “*From tanks and ammunition to letters and food, we get the right amount of the right kit to the right people in the right place at the right time – enabling the Army to do its job, and boosting morale along the way*” (The British Army, 2012c). Because of its size, “*more soldiers wear the RLC cap badge than any other*”, the RLC is known as “*the Rather Large Corps*” to the rest of the Army (Page, 2007, p 166).

⁷⁵ The Royal Regiment of Artillery, referred to as the Royal Artillery (RA) in this thesis, is also known as the “*Gunners*” and “*The Five Mile Snipers*”. The RA provides the Army’s fire power, and is consequently responsible for “*shock and awe*” on the battle field (The British Army, 2012d).

Forces use in construction for airfield repair, construction of defences, ditches, etc. The overall Through Life Cost (TLC) of the contract is £1.5 billion, and on the UK transitional stair case (see Section 5.3.7), the BM is categorised as including a Contract for Availability (CfA). To take the BM to the next level, i.e. a Contract for Capability (CfC, see Section 5.3.7), it would, among other issues that would also have had to be dealt with, have been necessary for the contractor to employ Sponsored Reserves (SRs, see Section 4.8.7), which means that there would have been a hefty premium to pay for this increased level of service (see Section 6.2.5).

“So this is a CfA. I’ve got enough equipment ready to immediately call off a medium scale operation, and I can have that delivered to a Port of Embarkation in ten days, or twenty days, if I want it. So the equipment is all available and the company has to go around and make sure that all their equipment is ready to go. So, in our terms, we are as far as we can go, in the transitional staircase, without actually paying the company to fight the vehicles, to actually go into service with them. Because of the size of the Royal Engineers, and the scale of the task that they do, SRs weren’t considered cost-effective. So we didn’t go that far. So we stopped with a CfA” (Warren, 2010).

DE&S sets the initial User Requirement Document (URD), System Requirement Document (SRD), or Urgent Operational Requirement (UOR) for a vehicle. The contractor investigates the market and returns to DE&S and proposes a couple of vehicles that meet the requirements. The British Army then puts the vehicles through trials, and tests if the vehicles are compatible with other equipment. The contractor then takes the results of the trials into their selection criteria, but the contractor has the final decision, since they have to sustain capability. The contractor also conducts confirmation trials and militarisation work. The equipment then enters into service. In summary, the contractor is responsible for acquiring the equipment, making sure that the equipment meets the requirements of DE&S, codifying the spares, packaging the spares, producing publications, and agreeing a training package with DE&S.

“So the company is doing all the work, buying all of the equipment very quickly, and my team simply check that they are doing the right things, for compliance, and obviously, we pay the bill, so we have to check the service that is delivered” (Warren, 2010).

At DE&S, the C Vehicle PT is a team of 16 staff, who audit that the contractor is following the correct military processes for selecting the equipment, trialling the equipment, codification of spares, level (cf. line, see Section 4.8.2) of repair analysis⁷⁶, and make sure that they are providing the right spares to the right level

⁷⁶ A level of repair analysis is an analysis regarding where, i.e. at which level or line (see Section 4.8.2), that repairs should be carried out. Consequently, it is also an analysis regarding who, i.e. the contractor or the British Army, that should carry out the repairs.

at which the REME would do the repairs, and they also audit the publications to check that the publications are correct.

“Every month, we pay about £4 million for the service, so I’ve got four strands within the team: one is the requirements team – “what truck should we buy and does this truck meet that requirement?”; the sustainability team that say – “are they developing all of our lines of development for supply, training, support?”; I’ve then got the demand management cell for units ringing up saying – “I want this truck, that truck”, and they are actually managing our commitment to expenditure, because if we demand too many trucks I can’t afford it, so they are the daily hire company cell; and then I have a team that simply measure the quality of service and pay the bill, for these strands” (Warren, 2010).

The C Vehicle acquisition project encompasses the acquisition of equipment, and the provision of support to the equipment. Even though the BM is formally a CfA, the contractor was selected through competition. Hence, the C Vehicle BM is a First Generation Defence Acquisition BM (see Section 5.3.10).

6.2.3 Channels

The units within the British Army can demand the available equipment and spares by logging on to a computer system, and then specify which equipment or spares that they want, how many they want, when they want it, and where they want it. If the equipment or spares have been required for an operation overseas, the contractor packages the equipment to a military standard, with military labelling on it, and delivers the equipment to the Purple Gate (PG, see Section 4.8.7), as illustrated in Figure 6.2. Whichever way that the contractor chooses to transport the equipment or spares to the PG, through its own resources or by Third Party Logistics (TPL, see Section 4.7.6), the contractor has to pay for it.

“However the company has to get the equipment to the PG, they pay for it. So if they need to use a third party, that’s... They may do that. But after the PG, everything is through authority. In Afghanistan, at the airport in Kabul, we don’t really want 100 different contractors, all trying to manage their own supply chains. We’ve put in place a primary depot at Kabul now, which will be run by contractors, but they will just be acting as our agents for the other end of the PG. So the balance is, whilst people think that it is ideal to make a contractor to do everything, you can’t have 100 different contractors in theatre. You can’t control them. And they’ll all want their own shed and their own storage space. So you need to look at where is the best place for industry, and then you want a single supply chain, because the military at the other end, ideally only want to go to one place to get all the things they need” (Warren, 2010).

If equipment is required for training or exercise in the UK, in Germany, or on Cyprus, the contractor delivers the required equipment at the time and place that the units want them, as illustrated in Figure 6.3. The service is different in diverse areas and locations. The contract has two categories of services, henceforth referred to as Type I and Type II services, which is illustrated in Figure 6.3.

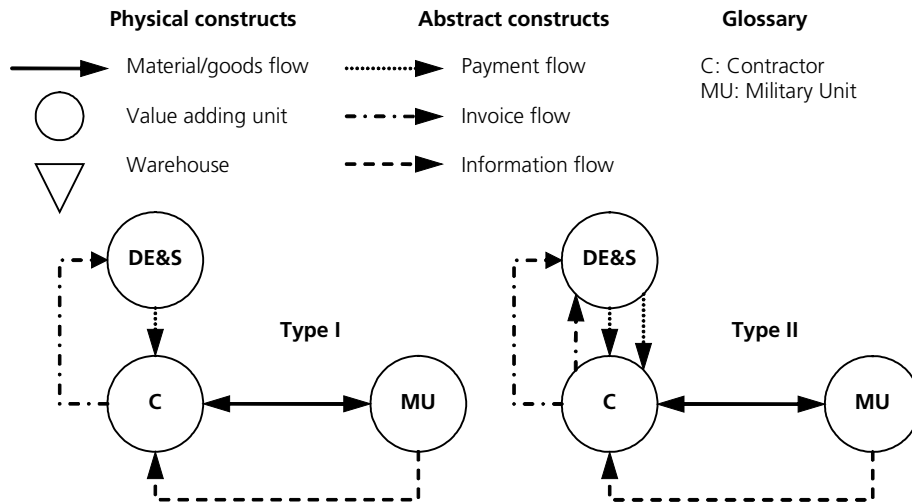


Figure 6.3: C-Vehicle Type I and Type II distribution channel for equipment for domestic training and exercises.

For a Type I location, a unit can demand the equipment, and it will be delivered to where they want to do training or an exercise, free of any additional charge. There are 300 predetermined Type I locations in the UK, and there are also predetermined Type I locations in Germany and on Cyprus. All other locations are Type II locations, and DE&S has to pay extra for having the equipment delivered to those other locations. For both Type I and Type II locations, spares (see Figure 6.4) and support (see Figure 6.5) go through the ordinary military supply and support chains. Whether on training, on an exercise or an operation, the Royal Engineers (RE), take the equipment away and operate it where they need to be. On training and exercises, the units train and exercise with spares in the system, and with the correct publications, so that the units can maintain and repair the equipment while on operations. When a Corps, e.g. the RE, within the British Army has finished with an exercise, or comes back from an operation, the equipment is returned to the contractor. The contractor then refurbishes the equipment, and puts it back on the park, ready to use again.

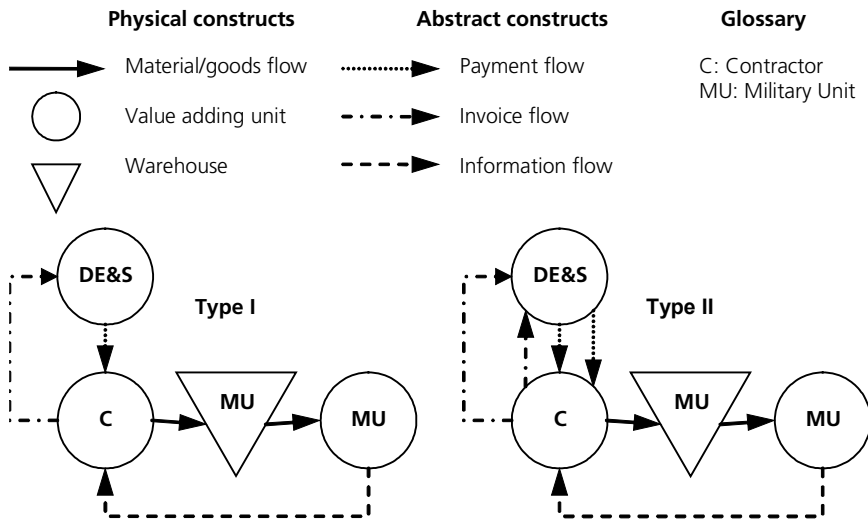


Figure 6.4: C-Vehicle Type I and Type II distribution channel for spares for domestic training and exercises.

Similarly to the online order book for the vehicles themselves, the spares to the vehicles can be ordered through the online spares book⁷⁷. When something breaks down, the units have a telephone help line that they can call. If the units are on an exercise when something breaks down, the contractor will come out and fix it. If the units are on an operation when something breaks down, the contractor will push the spares into the military supply chain directly, through the PG, without going through any other military system. The units will then have to fix the problem themselves, but they can be assisted by the contractor over the telephone. There are three major reasons for the introduction of the PG into the UK military supply chain: theft; fragmentation (see Section 4.8.7); and operational planning considerations. The experience from the Balkans was that 50% of the spares were stolen when contractors were allowed to move spares all the way into theatre.

“The contractor is not allowed to deliver spares directly on operations, because it corrupts the supply chain. For some of our early Contractor Logistics Support (CLS) arrangements, we allowed the company to send the spares directly, using DHL or Red Star. When we were in Bosnia, 50% of our spares got to the local Post Office in Bosnia, and then somebody stole it. The other issue that we had then was, because we had lots of

⁷⁷ During 2011, the support solution was further improved with the introduction of the “*Electronic Business Commerce*”, which enables industry spares IT systems to communicate directly with the MoD system. This improvement is part of the continuous improvement which is brought about through the Support Solutions Envelope (SSE) work within Joint Service Publication (JSP) 800.

spares coming in from different areas... If you are a soldier in a depot, you've got 50 different people that you need to communicate with, instead of one person in the supply chain" (Warren, 2010).

Further, the experience from the Balkans was that allowing contractors into the field complicated matters for soldiers working in different kinds of depots, since they had to deal with a multitude of different actors in the supply chain, rather than just the previous single node.

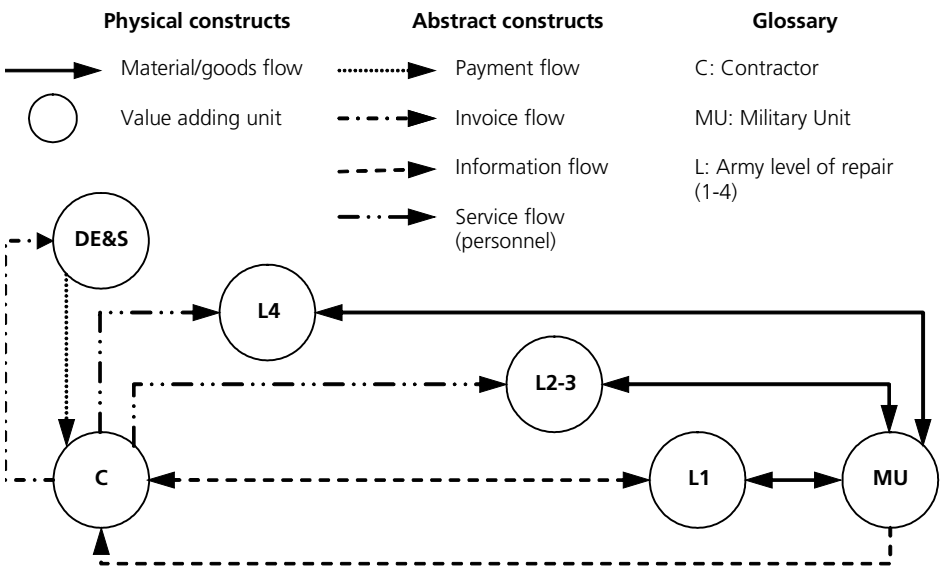


Figure 6.5: C-Vehicle distribution channel for Maintenance, Repairs and Overhauls (MRO) for overseas operations, and for domestic training and exercises.

"If in peace time, everybody delivers everything directly, you have no idea what volumes would move on operations. So we deliberately do not let them deliver directly. They have to deliver through the supply chain all of the time, so that we can always see the volume that is required, and when an operation goes, we know how many ships or how many aircraft we need. Otherwise you lose control of that" (Warren, 2010).

Finally, based on the experience from the Balkans, MoD realised that it was losing its ability to answer questions such as *"How big does our supply chain has to be?"*, *"How many ships?"*, and *"How many aircraft?"* when contractors were allowed to deliver freely throughout the military supply chain. Further, MoD has been struggling for years with management of the deployed inventory, i.e. to introduce computer systems to enable true supply chain tracking.

"If you order something from DHL, you can go on-line and you can see exactly where that is around the world, and we are now trying to roll out systems to enable units to do

that. Because what happened was, all the spares were getting a priority system, so a Priority 2 meant you would be there in two days. They would look in two days, and if it's not there, they'd assume it's not coming, and demand another one. Whereas if they've got visibility, they can look on the system and say: "It's actually in the next shed" or "It's coming". They wouldn't demand another one. So the key thing is the enabling IT and visibility of your spares, to stop you losing them. That's the... A supply chain that runs efficiently will save you so much effort everywhere else. That's the key" (Warren, 2010).

Personnel are trained on the new equipment before it's allowed into service. So by the time the equipment gets into theatre, the military unit should have people with it that are already trained to operate the new equipment, and trained to MRO it. They will also have the necessary publications and the spares catalogue with them, to be able to support the equipment, and any special tools and extra equipment that they might need in order to do that.

"When you are fighting, your Forward Supply Chain is very fast, but the Reverse Supply Chain is very slow. So if I have 100 pieces of equipment, and if 50 are broken in theatre and I keep sending them in, I can't get them back fast enough to repair them. So we've got to the situation where the shop is empty, because everything is broken in theatre. So the supply chain element is the very key. If you are going to run on a very lean fleet, with the minimum number of vehicles you need, that assumes that you will get them back to repair them, to have that repair loop. If they are not coming back at the same speed, it doesn't take very long for it to break. What we're trying to do is do as much of the repair as far forward as possible, to stop having to reverse supply vehicles" (Warren, 2010).

The British Army has four levels of repair (see Section 4.8.6) and is trained to do repairs at the first three levels of repair. It is mandated that the Army does repairs themselves in order to maintain competence. A level four repair is beyond what the Army can handle, and the equipment would have to be brought back to the UK.

"One of the problems with the contractor support arrangements was that in normal peace time, the army was using the equipment, but they didn't maintain it, because every time it broke they could call somebody in to fix it. And when we're out in Afghanistan, every time the equipment broke, they didn't know how to repair it. So we are now putting contractors in, but they are specific engineers to repair the equipment. We are actually sending them to theatre, to work within the military support chain, so they report to a military officer. So they become part of the army, in that sense. So there are not lots of random contractors in their sheds. "I am sending you this specialist to work for you to fix that equipment". You should be very careful how you manage your contractors on operations" (Warren, 2010).

The MoD uses contractors in the military support chain. While these contractors are civilians, they are, in effect, under military command, and if they do not do as they are requested, they will not come back. This is possible since these civilians are Sponsored Reserves (SR, see Section 4.8.7).

6.2.4 Key Activities

DE&S is responsible for designing (D) this service, i.e. the acquisition of C Vehicles and the provision of support to C Vehicles. The project is a PFI, hence, the responsibility for financing (F) lies with the private sector, in this BM with a consortium of banks. The private sector is also responsible for buying (B), owning (O), operating (O), managing (M), and maintaining (M) the equipment throughout the duration of the contract. Hence, there is no transfer (T) of ownership involved in this acquisition project. The sharing of responsibilities is depicted in Table 6.2.

Table 6.2: Sharing of responsibilities in the C Vehicle Business Model.

X: Not applicable for this type of actor ---: Not applicable for this particular contract []: Not relevant for spares TPL: Third Party Logistics		Design (D)	Finance (F)	Buy (B)	Own (O)	Operate (O)	Manage (M)	Maintain (M)	Transfer (T)
Private sector responsibility	Prime contractor	---	---	B	O	O	M	M	---
	Sub-contractor	---	---	---	---	---	---	---	---
	TPL provider	---	---	---	---	---	---	---	---
	Banks	---	F	---	---	---	---	---	---
Public sector responsibility		D	---	---	---	---	---	---	---

Using PPP terminology (see Section 4.7.3), the distribution of “*Key Activities*” used in the C Vehicle BM is Finance-Buy-Own-Operate-Manage-Maintain, or FBOOMM

6.2.5 Other Aspects of the Acquisition Project

The implementation of the C Vehicle BM is essentially a contract that involves the outsourcing of acquisition to a contractor, but the formal definition of the contract is a Private Finance Initiative (PFI). The Business Case (BC, see Section 5.3.5) was initiated almost immediately after the Strategic Defence Review in 1998 (SDR, see Sections 5.2 and 5.3.10). At that point in time, i.e. before the Defence Industrial Strategy (DIS, see Section 5.2) in 2005, all BMs were based on competition (see Section 5.3.10), and so was the C Vehicle BM. The contract was awarded to a Special Purpose Vehicle (SPV), the Amey Lex Consortium (ALC). Since the BM is a PFI, the partners also include a consortium of banks, in this case no less than six banks. Within DE&S, there are five yearly Value-for-Money (VfM, see Sections 4.7.2 and 4.9.9) reviews, and in 2011 the C Vehicle PT will complete a VfM review. In addition to this, the C Vehicle PT will also perform some options analyses, because of problems with over-capacity within the contract.

“Five years ago, a team of people tried to foresee 15 years of defence business, and the contract was set up at a certain scale and within it, we had a thing called a “minimum

take or pay". Because this was a company established purely to deliver this project, they wanted a guaranteed level of service⁷⁸. Otherwise it wasn't financially possible, they couldn't fund it. So we, against a forecast level of activity, we agreed a level at which we would not go below, and I have to pay them that level, regardless of whether or not they take the vehicles. So that was 90 % of an anticipated trend, normal training activity rate" (Warren, 2010).

When the contract was signed, the planning assumption was that the UK would continuously have to participate in two medium scale operations, one small scale operation, and conduct normal training activities, all concurrently. The day when the contractor started delivering according to the contract, the UK was participating in Op (Operation) Telic (Iraq), Op Herrick (Afghanistan), and was active in the Balkans, thus fulfilling the medium-medium-small assumption, and conducting a normal level of training and exercises.

"But what we see now is, with the draw down from Iraq, and the draw down from the Balkans; and Afghanistan is a completely different nature of fighting; we are actually occasionally running below that "minimum take or pay" level. I have to pay for capability that I am not using. So what we want to do is re-baseline that number. But that is where the banks come in, and they say: "we are guaranteed a return on this money", and we are now looking at how can we change it, to be what we want it to be, because we set that number too high. Five years ago, it looked like a good number, but today it not such a good number" (Warren, 2010).

When the C Vehicle contract was signed, PFIs were what the UK government wanted to do, because the government didn't want to make the necessary capital investment up front. Hence, DE&S is locked into several very long deals.

"What we are now realising is, we are locked into a lot of very long deals, and we don't ... want that level of service⁷⁹, and we don't have the right, or we don't have the money, to easily buy out, or change it. If it's purely the company, you could say: "downsize the company", "take some profit margin out", there are things that you can do. But the issue

⁷⁸ From the contractor's point of view, "the level of service" corresponds to a certain amount of work that they are contracted to do. Through the contract, there is a minimum amount of work, or the equivalent amount of money, that the contractor will expect to receive each month.

⁷⁹ From the point of view of DE&S, "the level of service" corresponds to the availability of the vehicles. Depending on the utilisation of the vehicles, this would, in turn, result in very different amounts of work for the contractor. Ultimately, though, because of the contract, DE&S has to pay the contractor at least as if the vehicles were used 90% of the anticipated utilisation. The anticipated utilisation is transformed into amount of work for the contractor through calculation of the frequency of breakdowns and estimation of losses. The frequency of breakdowns can be calculated based on historical data and information from the manufacturer. Losses due to hostile activities can be estimated based on historical data.

that we have is that the banks simply say: “this is my long-term investment plan, I am financing other fields against this money, I am not willing to give it up”, or we have to pay a premium to buy out of the deal, and we are actually doing some modelling to see what that would be now. So there is a prospect that we might want to, or might have to, close this contract early” (Warren, 2010).

On a more down-to-earth, practical level, a more specific problem with this PFI is the codification of spares.

“If you’ve got lots of different people supplying spares, and codifying them, mistakes get made. What we’ve been seeing is that the contractors will try and codify against their part number. The whole point of codification is that there is one supplier for one part, and any part under that number will be the same. People keep changing numbers, so I’ve got one instance where I’ve got 10,000 light bulbs in Afghanistan, and because somebody changed the part number, the computer system cannot see that they are the same part. So the unit keeps demanding a new light bulb and a different part number keeps coming, but it is the same light bulb. So, making sure that people follow the correct processes is a risk, because you just throw spares into theatre, and you lose them” (Warren, 2010).

Another problem is the management of spares. The contractor is responsible for the correct data and identification of the equipment, i.e. to make it traceable.

“If they don’t go packaged correctly with the right identification on them, you lose them. And one of the statistics that we got is that for every spare that we consume in the UK, we consume six spares on operations. And I only have 10 % of my equipment on operations. So there is your problem. But that’s not necessarily a result of the PFI. It’s a result of... If you look at all of my military units demanding spares in the UK, I get through nearly £1 million, and on operations I’m getting through £1.6 million, but I’ve only got 10 % of the fleet on operations. So that’s a fairly frightening statistic, all of that going down the supply chain. So legally... they are not identified in theatre, simply lost in theatre... The units move on, the spares are left somewhere else, so they just demand another one. So there is a huge saving to be made here” (Warren, 2010).

After the Purple Gate (PG), the military supply chain is responsible. Even if the contractor has packaged and codified correctly, mistakes can be made.

“In a normal situation, if I sent the wrong spare, if the people in theatre had the time, they could identify what it actually was, and trace it. But because of the operational tempo in Afghanistan, they don’t have the time to do that. So if I send... If you were expecting a bottle, and I send you something else, you’d simply say: “not a bottle” and you’d demand a new one. You wouldn’t even try to look for it. So there’s a reality, which means... We can sit here and think how a soldier should behave, but when they’re actually fighting, they are not going to do anything that requires writing on pieces of paper. If the computer doesn’t do it for them, it’s not going to happen. So there are big risks around assumptions that we make in peace time, that don’t actually work on” (Warren, 2010).

6.3 Case B: The STSA Acquisition Project

“It is important to know that the requirement was very, very constrained. There was nothing like airdrop, nothing like Air-to-Air Refuelling (AAR), it was just a simple flying truck. No short field landings. I think the only... There was a slight requirement in the sense that we didn’t want to have a huge amount of handling equipment at either end for deploying the aircraft. So it was a very limited requirement...” (Respondent B, 2010).

6.3.1 Background to the Acquisition Project

According to Roberts (2004, p 5-28), about 20 years ago, the UK Royal Air Force (RAF) had an ageing fleet of 50 Lockheed C-130K Hercules, which had come into service in the 1960s, and which, after three decades of service, were approaching the Out-of-Service-Date (OSD). Hence, in the mid-1990s, it was decided to replace half of the fleet with Lockheed Martin C-130J Super Hercules, which were subsequently delivered in 2000. The other half of the fleet were planned to be replaced with 25 European Future Large Aircraft (FLA), i.e. the Airbus A400M, which was originally anticipated to come into service in 2008. Hence, an interim solution was required.

In 1998, the SDR (see Section 5.2) initiated the transformation of the UK Armed Forces from a more or less static defence force, built for the Cold War, to an operational and deployable force, designed for strategic world-wide operations. This transformation coincided with the replacement of the C-130K fleet. Investigations revealed that there were going to be a seven year long gap between the point in time when the remaining C-130K had to be decommissioned and the point in time when the A400M could replace it. During this gap, i.e. between 2001 and 2008, the UK would not have any strategic airlift capability (see Section 4.8.6), i.e. the ability to “*get larger loads over greater distances*”. This was not acceptable for a country with new aspirations to participate in world-wide operations. The 1998 SDR recommended an interim solution for Short Term Strategic Airlift (STSA). It didn’t make sense to buy anything to meet a seven year capability gap, so it was decided to have a competition in order to lease an aircraft solution to meet the capability gap. The competition was put to the marketplace, and there were several competitors; from the Russian Antonov, to the Airbus Beluga, and also the C-17, which Boeing promoted through BAE. The requirements for the interim, short-term solution were relatively constrained, in comparison to what would probably have been required of a permanent, long-term solution. Hence, the requirements did not include airdrop, AAR, or short field landings. “*It was just a simple flying truck*” (Respondent B, 2010). The limited requirement was that MoD did not want a huge amount of handling equipment at

either end for deploying the aircraft. The comparatively limited requirements meant that the number of bidders was higher than would normally have been expected. However, there were, in practise, only two other aircraft with a capability similar to the A400M: the Antonov AN-124 Ruslan, a tactical military airlifter with a strategic capability; and the Boeing C-17 Globemaster III, a strategic military airlifter with a tactical capability (Roberts, 2004, p 5-28).

“What happened then was that the bids were whittled down to the Antonov and the C-17. It became obvious that the C-17 bid through Boeing, the bid through BAE, was horrendously expensive, very expensive, and couldn’t be afforded, and actually the Antonov bid was much cheaper. But I suspect that the customer didn’t particularly like the Antonov. There were problems with the Antonov, there were liability problems, its engines were unreliable, and it didn’t have Western avionics. So, it wasn’t just a question that they didn’t like it, there were practical problems, for accepting the Antonov in service, but it was cheap” (Respondent B, 2010).

So, the outcome of the competition was that one bid, the C-17, was considered to be far too expensive, whereas the other one, the AN-124, was considered to be too technologically inferior. For the C-17, it was not only the cost of the lease, i.e. covering the capital cost, that was considered to be too expensive, but the cost of the support solution was considered to be far too expensive.

“What happened then was that the RAF and MoD went to the US and said “Very sorry, but the C-17 is too expensive, the support cost... Even if we can make the lease work, covering the capital cost of the C-17, the support costs are too expensive”, and the US Air Force (USAF), said “Well, OK, clearly it’s too expensive to do C-17 through a UK support solution, but if you joined our support solution, and then basically continued to participate in that, that would really bring the cost down, because you would gain the economies of scale, supporting your aircraft as part of the USAF support solution”. Well, at that time the USAF had 60-70 C-17s in their fleet...” (Respondent B, 2010).

6.3.2 Value Propositions

Since it was only for a period of seven years, the US offer made a lot of sense to the UK, so the UK leased four C-17s for a period of seven years, and bought into the USAF contract with Boeing, which meant that the UK would have Boeing to support the C-17s, worldwide. Formally, DE&S used the US Department of Defense (DoD) Foreign Military Sales (FMS) program⁸⁰.

⁸⁰ The US DoD FMS program facilitates sales of US arms, defence equipment, defence services, and military training to foreign governments. The purchaser does not deal directly with the defence contractor; instead, the Defense Security Cooperation Agency (DSCA) serves as an intermediary,

“It still didn’t achieve cost parity with the Antonov bid, but the advantages of the C-17 as an operational platform, kind of like swayed the day, and the decision was taken to lease four C-17 aircraft for seven years. So, essentially, we bought into that solution. It was driven by the fact that it was a seven year lease, a very limited requirement for a strategic airlifter, and we were prepared, at that time, to accept some fundamental constraints for buying into the USAF C-17 support solution; one was configuration communality, that we would maintain absolute configuration communality with the USAF C-17 fleet” (Respondent B, 2010).

The contract meant “*unconditional adherence to configuration communality*”. The consequence of this was that the UK had no flexibility, and could not make any alterations on its own accord, but had to follow any development that the USAF desired to instigate. In addition to the limitations inflicted by the compulsory configuration communality, there was also another restricting issue associated with the contract. Because the UK didn’t do its own flight test, the UK had to rely on the US test and evaluation evidence, and consequently fly and operate within the limitations of the USAF flight envelope.

“If we didn’t like parts of their envelope, or their safety case, then, rather than re-qualify the aircraft, against UK evidence, what we said is that we would draw back our flight envelope from their flight envelope, so we would always operate within their flight envelope, but, if we didn’t want to go to the full limits of their flight envelope, for instance Air-to-Air Refuelling (AAR) and low-level flying, because of problems we had with the safety case for the aircraft, because they don’t do safety the same way as we do, notionally, then what we would do is, we wouldn’t go into those more risky flying machines, because we only needed a flying truck” (Respondent B, 2010).

Because of the seven year requirement and the desire to drive down the costs for support and introduction into service to the lowest possible level, the C-17 was a pure Military-Off-The-Shelf (MOTS) solution, without any UK adaptation. Hence, the BM was a leasing arrangement of a MOTS aircraft, and a MOTS support solution to that aircraft. Two or three years into the contract, i.e. in 2003 or 2004, it was realised that the A400M was going to be delayed two years, from 2008 to 2010. The date for introduction into service has since then been postponed again, and is now predicted to be around 2015. Hence, it was realised that the interim lease solution would no longer be enough. Because of the requirements of the current operations, the UK was not in any position to return

usually handling procurement, logistics and delivery and often providing product support, training, and infrastructure construction (such as hangars, runways, utilities, etc).

the C-17s, and so it was decided to buy the four C-17s at the end of the lease contract, for the residual value. The delay of the A400Ms was not the only reason for the decision to buy the C-17s. Besides the fact that the predicted capability gap had gone from the anticipated seven years to closer to 15 years, once the RAF got the C-17s, they decided that they liked the aircraft. Furthermore, DE&S recognised that the C-17 “*is a very good aircraft*” (Respondent B, 2010), and that the UK could take advantage of the huge amount of investment that the USAF had already made. So, at the end of the contract, in 2008, the four aircraft were bought at their residual value. Hence, in effect, the lease BM and the lease contract turned out to be a Lease-to-Buy (LTB) BM and a LTB contract. Since 2008, an additional three C-17s have been bought, by straight procurement, from Boeing.

“The fundamental issue is that we haven’t moved away from the configuration communality, operations within the USAF envelope, the pure MOTS solution. With the possible exemption of defensive aids and the paintwork, a UK C-17 is exactly the same as a USAF C-17” (Respondent B, 2010).

Having originally and intentionally been an interim, short-term lease solution for a predicted capability gap of seven years, with the accepted limitations of configuration communality with the USAF, and flying within the USAF flight envelope, the deal has now turned into a permanent, long-term MOTS air transport support concept, for the next 20 to 30 years. The limitations that were accepted for the interim solution, i.e. a “*flying truck*”, are now, with the exception of defensive aids, in place also for the permanent solution.

6.3.3 Channels

The C-17 is a strategic airlift resource. Hence, it is not relevant to discuss supply chains for the distribution of the C-17 to overseas operations or domestic training and exercises (see Table 4.20). Quite to the contrary, the C-17 is part of the Joint Supply Chain (JSC, see Section 4.8.7) for overseas operations, since it is used for strategic transportation. The C-17 does sometimes need Maintenance, Repairs and Overhauls (MRO), but this support is not done under the auspices of DE&S. Instead, this is all part of the USAF support solution. Hence, Boeing assumes the full responsibility for the support of the aircraft.

6.3.4 Key Activities

Because of the US DoD FMS program, the sharing of responsibilities becomes relatively complex for this BM. Formally, since the US Defense Security Cooperation Agency (DSCA), an agency within the US DoD, serves as an intermediary, they must be defined as the prime contractor to DE&S. Hence, the prime contractor is a public sector agency, not a private sector company. To

complicate matters further, it can be argued that the public sector prime contractor uses a private sector sub-contractor, Boeing, and a public sector sub-contractor, the USAF. Table 6.3 illustrates the sharing of responsibilities for the “*Key Activities*” in the STSA BM. In order to accommodate the added complexity⁸¹ of the FMS program, Table 6.3 has been expanded, compared to the corresponding tables for the other BMs described in this chapter.

Table 6.3: Sharing of responsibilities in the STSA Business Model.

X: Not applicable for this type of actor ---: Not applicable for this particular contract []: Not relevant for spares TPL: Third Party Logistics		Design (D)	Finance (F)	Lease (L) Buy (B)	Own (O)	Operate (O)	Manage (M)	Maintain (M)	Transfer (T)
Private sector responsibility	Prime contractor	---	---	---	---	---	---	---	---
	Sub-contractor	---	---	---	O	---	---	M	(T)
	TPL provider								
	Banks		F						
Public sector responsibility (seller: US DoD)	Prime contractor	---	---	---	---	---	---	---	---
	Sub-contractor	D	---	---	---	---	---	---	---
Public sector responsibility (buyer: UK MoD DE&S)		---	---	L (B)	(O)	O	M	---	(T)

In the STSA BM, the USAF, acting as a public sector sub-contractor, is responsible for the design (D) of upgrades of the aircraft and for the design of the support arrangement. This BM is not a PFI in any traditional sense of the concept. Further, the contractors are not involved in the financing. Banks are, however, through the bond market, directly involved in the financing (F). This BM was initially supposed to be a lease (L) BM, but in the end it turned out that the aircraft were bought (B) by DE&S. Throughout the leasing period, ownership (O) remained with Boeing, which acted as a private sector sub-contractor. After the leasing contract, there was a transfer (T) of ownership to DE&S. Responsibility for operation (O) and management (M) remained with DE&S throughout the duration of the leasing contract and also after the buy-out at the end of the contract. Responsibility for maintenance (M) remained with Boeing during the contract period. After the end of the contract, Boeing remains responsible for the support solution (through USAF).

⁸¹ This is not an exception or a special case, but rather the rule when a foreign Government buys defence equipment from any US defence industry. The PPP terminology (see Section 4.7.3) is not appropriate for transactions that are not between the public and the private sector, but for the STSA acquisition project, and for any other transaction between the US defence industry and any foreign Government, the terminology is applicable, but the description of sharing of responsibilities becomes more intricate.

Using PPP terminology (see Section 4.7.3), the distribution of “*Key Activities*” used in this BM was initially Finance-Own-Maintain, or FOM, which turned into Finance-Own-Maintain-Transfer, or FOMT, as depicted in Table 6.3.

6.3.5 Other Aspects of the Acquisition Project

When the leasing contract was begun in 2001, Boeing assumed some risk. According to the contract, DE&S could have returned the aircraft at the end of the contract, and Boeing would have had the risk of failing to sell the aircraft on to another buyer. When the UK leased the aircraft, MoD was the first export customer. Hence, in 2001, there was a risk that Boeing, in 2008, would have to explain to any potential export customers that the only previous export customer had leased four aircraft and then returned them, which would not have been the best of export arguments that Boeing could have wished for. However, during the contract, Australia, Canada, NAMA (NATO Airlift Management Agency⁸²), a couple of Middle Eastern countries, and India have also bought C-17s, so there is a good chance that Boeing would have been able to sell any returned aircraft in 2008, after all. The aircraft would only have been seven years old, and would probably have had a good twenty to twenty-five years of flying left in them. During the same period, the global C-17 fleet has grown from 70 aircraft to 230 aircraft. Incidentally, like DE&S, all new export customers have also decided to buy into the USAF C-17 support contract with Boeing.

There were initially three major cost components in the lease BM, but when the BM was eventually, in practice, turned into a LTB arrangement, an additional cost component was added to the transaction. Hence, eventually, there were four major cost components to the STSA BM; two fixed costs and two variable costs. The fixed costs were associated with the financial costs for loans that both DE&S and Boeing had to take. The variable costs consisted of one predictable component, directly connected to the consumption of flying hours, and one unpredictable

⁸² The NATO Strategic Airlift Capability (NSAC) concept originated from the NATO HQ in 2006. When Pfp nations signed a Letter-Of-Intent (LOI) to join, the name was changed to Strategic Airlift Capability (SAC). To acquire, manage and support strategic airlift capability for the SAC partners, the NATO Airlift Management Organisation (NAMO) was approved in 2007. In 2008 the Memorandum of Understanding (MoU) came into effect in order to: regulate the participation of the Pfp nations in NAMO; formally establish the SAC programme to acquire, manage and support three C-17s; and direct the formation of a Heavy Airlift Wing (HAW) to operate the C-17s out of Papa Air Base in Hungary. NAMOs executing agency for the MOU is the NATO Airlift Management Agency (NAMA), which was activated in 2008 and began supporting HAWs activation of the Papa Air Base, and acquiring the C-17 aircraft and their support from the USA under FMS arrangements to be delivered by the USAF.

component, connected to the upgrades commissioned by the USAF. In order to pay Boeing up front for a large part of the value of the aircraft, DE&S financed the lion's share of the cost of the C-17s on the bond market on the London Stock Exchange (LSE), and subsequently paid this loan by regular instalments over the seven year lease contract period. Boeing covered the financial costs associated with the residual value of the aircraft. When the lease arrangement morphed into a LTB arrangement, DE&S bought the aircraft from Boeing and thus covered the financial costs that Boeing had had for the residual value of the aircraft.

"Now, put that together, that's more expensive than buying the aircraft initially, outright at the beginning. So, we were told, very clearly, by the Treasury (HMT), that leasing more aircraft, or LTB arrangements, for five, six and seven⁸³, were not... Well, it's no longer allowed, actually, under accounting rules, and also the fact that, well, being able to explain to the treasury we have no intention of LTB these aircraft would be rather undermined by the fact that when we first bought aircraft, we did LTB them, or leased them and then bought them, so the idea, the fundamental argument, that, essentially, with five, six and seven, if we did lease them, we would eventually return them to Boeing, that didn't have any credibility" (Respondent B, 2010).

In the UK there is now a Value-for-Money (VfM, see Sections 4.7.2 and 4.9.9) argument that assets such as aircraft should be bought outright. Leasing arrangements are becoming more and more difficult to realise, and when they are allowed, it is only if the supplier of the asset *"maintains quite a large part of the risk and the residual value of the asset on their balance sheet"* (Respondent B, 2010). When DE&S bought the four leased aircraft, they continued to buy into the USAF support arrangement with Boeing. Hence, the support solution for the seven aircraft now in the UK fleet is identical to the support solution during the leasing period. The only change is the increase in the total number of aircraft around the globe, which has expanded from 70 to 240, which potentially produces even larger economies of scale for the support solution. The relatively predictable component of the variable cost is related to flying hours. The construction is that the USAF, at the end of each US fiscal year⁸⁴, calculates the total number of flying hours flown by all C-17s, worldwide. Since all operators of C-17s have joined the USAF C-17 support contract with Boeing, the USAF then multiply the total support cost by each individual operator's percentage of the total flying hours, and share out the

⁸³ This is a reference to the three additional C-17s that were bought after STSA acquisition project.

⁸⁴ In the US, the Government's fiscal year for 2012 begins on the 1st of October (2011) and ends on the 30th of September (2012). As a comparison, in the UK, the financial year for the Government runs from the 1st of April to the 31st of March, whereas in Sweden, the Government's budget year runs between the 1st of January and the 31st of December.

cost for support among the operators. The unpredictable component of the variable cost, on the other hand, is consistent with the agreement to “*maintain absolute configuration communality of the aircraft*”. Hence, whenever the USAF decides to upgrade the C-17, the RAF is obliged to upgrade their aircraft as well. However, the UK only has to pay for maintenance and upgrades of the individual aircraft. Under the FMS arrangements, the UK does not have to pay a portion of the development costs for the upgrades. The RAF does not utilise a majority of the upgrades, but DE&S has calculated that it is cheaper to upgrade the C-17s in accordance with the USAF developments and thus be able to participate in the USAF support arrangement, than to support a small fleet “*the UK way*”.

6.4 Case C: The HASP Acquisition Project

“HQ Land Forces is delighted that the excellent support solution provided by CRISP has now been renewed in HASP. This innovative contract will continue to give the Front Line Command (FLC) the service we require.”

The UK MoD DE&S (2010, p 14)

6.4.1 Background to the Acquisition Project

The HASP (Heavy Armour Spares Provisioning) acquisition project is the direct succession of the earlier CRISP (ChallengeR 2 Innovative Spares Provision) acquisition project. Both the CRISP and the HASP acquisition projects involved delivering spares to the Challenger 2 (CR2⁸⁵), which is the UK Main Battle Tank (MBT). The CRISP BM was an early representative of this type of acquisition project, i.e. an acquisition project for the delivery of spares to a complex system, in this case a platform. Furthermore, the CRISP contract was considered to be a successful representative of this type of contract. The CRISP contract was started in 2000, when BAE Systems Land Systems was awarded the contract. The contract was for the provision, procurement, storage and distribution of CR2 specific consumable spares (Roberts, 2004, p 5-14). Throughout its nine years of existence, CRISP remained one of the few support contracts to involve the delivery of spares directly to armoured units and depots in the UK and in Germany. BAE used

⁸⁵ The MBT Challenger 2 (CR2) was originally developed by Vickers Defence Systems (VDS), later Alvis Vickers Ltd, which is now part of BAE Systems Land Systems. The UK MoD bought 127 CR2 MBTs from VDS in 1991, and 13 Driver Training Tanks (DTTs). In 1994 the UK MoD bought another 259 CR2 MBTs and 9 DTTs, thus upgrading the entire UK MBT fleet. Delivery begun in 1998 and by 2002 the 386 CR2 MBTs and the 22 DTTs were all delivered (Roberts, 2004, p 5-14).

Multipart Defence as its sub-contractor for the CRISP contract. The CRISP contract was designed to *“improve equipment availability, reduce delivery times, reduce stockholdings from base depot to first line (see Section 4.8.2), and to offer better VfM compared to the traditional procurement and supply route”* (Multipart Defence, 2011b). According to Multipart Defence (2011b), DE&S considers CRISP to have successfully met all of these objectives. Not only in peacetime, but also in support of operations in Bosnia, Kosovo and Iraq, and for training and exercises in the UK, in Germany, and in Canada. According to Multipart Defence (2011b), during its existence, the CRISP contract reduced the inventory by 89%, increased spares availability by 27% (consistently achieving 95% availability, defined as on-time, in-full and delivered directly to the demanding unit or depot), reduced delivery lead times to units by 90%, and reduced costs to DE&S by 33%.

6.4.2 Value Propositions

The HASP contract, which is a direct continuation of the CRISP contract, involves Multipart Defence providing spares for the Challenger 2 MBT. Through the HASP contract, Multipart Defence is given direct responsibility for consumable spares specific to the tank, until 2011. Multipart Defence also provides pan-platform consumable spares for the remainder of the heavy armour fleet, e.g. the CRARRV (Challenger Armoured Repair and Recovery Vehicle), the Titan Armoured Vehicle Launcher Bridge (AVLB), the Trojan Armoured Vehicle Royal Engineers (AVRE) and the Driver Training Tank (DTT) (The UK MoD DE&S, 2010, p 14). The HASP contract started in April 2009, but it wasn't formally signed until August 2009. The contract is unusually short, only for 27 months, and will thus end in June 2011. The contract is for the provision of spares for training, exercises, and operations; in the UK and on overseas locations. In total, the contract includes 2,500 different spares. The written contract is very specific, and includes drawings of all the spares. The reason for the relatively short contract was that there was an initiative to bring in armoured vehicle support through to BAE Systems. This initiative was initially called the Armoured Vehicle Support Initiative (AVSI), but was later morphed into the Armoured Vehicle Support Transformation (AVST) Programme. AVSI and AVST were supposed to make BAE responsible for availability of the platform, which would have meant that DE&S wouldn't have had to have a number of lesser contracts.

In September 2009, the MoD Investment Approvals Board (IAB) gave the go-ahead to BAE Systems to frame a scheme, for the Challenger tank fleet, which would reduce costs by over 10%. The key objective of AVST was to provide improved availability of spare parts and technical support to MoDs fleet of armoured vehicles. The contract was supposed to be for eight years, and include the entire Challenger family, i.e. the fleet of CR2 MBTs, DTTs, CRARRV, AVLB

and AVRE. The scheme would, if successful, be extended to other armoured vehicle fleets in service with the British Army under the AVST programme (Army Technology, 2011). Because of AVST, HASP was only given a 27 month contract, since it was assumed that HASP was only going to constitute an intermediate contract, and that AVST would then be there to replace it. However, when BAE got the bid in, DE&S realised that it was unaffordable, so the programme was cut.

Through the HASP contract, Multipart Defence acts as a procurement agency, which is the same role as it had in the CRISP contract, but then BAE Systems acted as a middle-man between DE&S and the sub-contractor. In effect, with the CRISP and the HASP contracts, DE&S has outsourced the procurement of spares for heavy armour. Hence, Multipart Defence is responsible for purchasing and storing spares, and supplying the British Army with spares whenever and wherever spares are demanded. Multipart Defence buys the spares, and DE&S pays for the spares when they demand them. At the end of the contract, if Multipart Defence has an amount of stock left, DE&S would then be obliged to buy all of that stock from them. There is no freedom of action on the part of Multipart Defence in terms of what spares that they are allowed to buy. The design authority, i.e. the Original Equipment Manufacturer (OEM), will decide what components that are allowed to be fixed to the equipment. In the contract between DE&S and Multipart Defence, there is an annex that contains a list of all the spares that are included. The spares already exist, since they are spares to an existing platform, i.e. CR2, and the specifications of these spares, which Multipart Defence has to adhere to, are supported by drawings of each individual spare.

“Since Multipart Defence is not a governmental body, they are not constrained in the same way, and they are not held down by bureaucracy the same way either” (Respondent C, 2010).

Even if there is no freedom of action regarding *what* spares to buy, Multipart Defence is free to be innovative in terms of the procurement strategy they use, i.e. *from whom, how much and when*, as compared to traditional governmental defence acquisition. Hence, the only constraint that Multipart Defence has when they go out to invite competition is that DE&S supplies them with drawings, which specify the spares. Even so, there is nothing that stops Multipart Defence to use reverse engineering to increase the base of potential suppliers of the spares.

“They” (Multipart Defence) “can do reverse engineering to an extent, and obviously go to a wider market of suppliers for certain components, particularly when the drawings are out of IPL (Initial Provisioning List⁸⁶)” (Respondent C, 2010).

⁸⁶ The IPL is a list that includes critical spares which are difficult to procure (MoD, 2008g, p 23).

There is an incentive scheme for Multipart Defence to drive down prices, which enables them to get a share of what they've managed to reduce prices by. Multipart Defence sells the spares to DE&S at cost price, i.e. without any profit being added. At the end of each year of the contract, Multipart Defence then calculates the savings that have been made, and they get a percentage of those savings.

"There's nothing to stop anybody reverse engineering a spare, but the problem is then that you'd still got to go through them" (the OEM) "and have that spare trialled, to make sure that it does the job that the OEM spare would do, and that we've got the right effect, by doing it a lot cheaper and using cheaper materials which... And we'd pay for all of that; it's just cheaper, then, to get the OEM spare" (Respondent C, 2010).

Ownership of the spares is transferred from Multipart Defence to DE&S as a result of a demand from the customer, which is conveyed to Multipart Defence through the management Information System (IS). The information is accrued and batched, and based on this; DE&S is invoiced once every month at cost price. For overseas operations, the spares are delivered to the Purple Gate (PG, see Section 4.8.7), not directly to overseas units. The contract specifies that Multipart Defence must meet the target of achieving 95% availability, which means that they must have a certain stock on the shelves to match that target. If they fail to meet this availability target, the contract specifies how much they will be penalised.

6.4.3 Channels

By using the PG for overseas operations (see Figure 6.6), MoD avoids the risk of fragmentation (see Section 4.8.7) of the military supply chain into a supply network. For spares going to units on operations in Afghanistan, after the PG, the spares either go by surface means or by air. If surface means are used, the spares go by sea from a Sea Port of Embarkation (SPOE, see Section 4.8.6) in Europe to a Sea Port of Debarkation (SPOD, see Section 4.8.6) in Pakistan and then by land by way of Karachi and on through the Khyber Pass into Afghanistan. If the spares are transported by air, they go directly⁸⁷ from an Air Port of Embarkation (APOE, see Section 4.8.6) in Europe into Kandahar airport, the Air Port of Debarkation (APOD, see Section 4.8.6) in Afghanistan. From the APOD and the SPOD, the spares are transported forward, until they reach the Reception, Staging and

⁸⁷ Depending on the aircraft and Air-to-Air Refuelling (AAR) capability, it may not be possible to fly directly from Europe to Kandahar. Some aircraft, e.g. C-130s, may well have to stopover several times before reaching their final destination, in which case air crew may also become a limiting factor for the expected duration of the flight.

Onwards Movement (RSOM, see Section 4.8.6) area, before they are finally transported “the last mile”, to reach the military unit in the theatre.

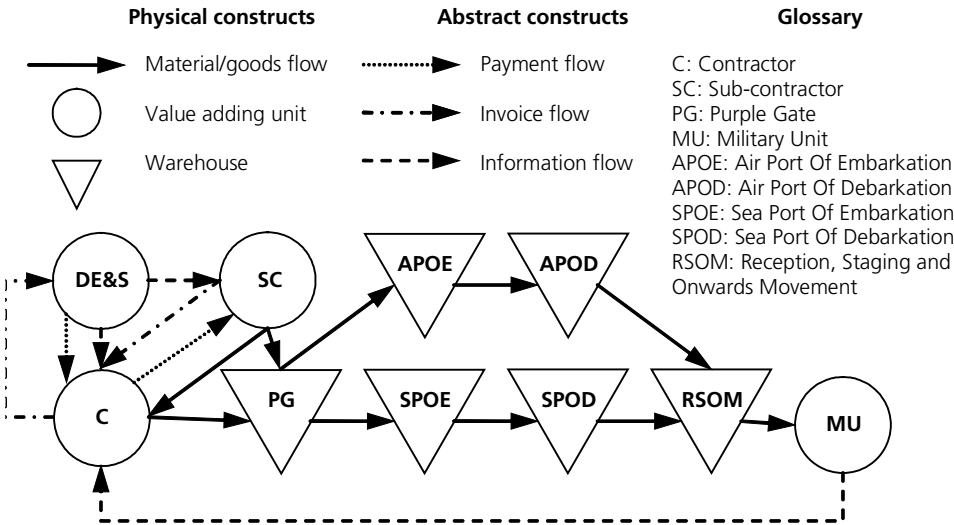


Figure 6.6: HASP distribution channel for spares for overseas operations.

For deliveries that are intended for units on overseas operations the supply chain functions smoothly because of the PG and the ensuing Joint Supply Chain (JSC see Section 4.8.7). For deliveries to units on domestic training or on exercises, there are, however, consequences with outsourcing, contracting out and partnerships. Through the supply chain, to units that are either on training or on exercises, spares are delivered to a static unit location, e.g. a Regiment, with a proper address, rather than to a location in the field. Even so, there are problems with these deliveries. Regiments are not always inclined to accept deliveries at any time of day, whichever may be suitable to the contractor. Figure 6.7 illustrates the distribution channel for spares for domestic training and exercises.

“From a unit perspective, there are security issues with “White-Van-Man”⁸⁸, coming at any time of the day, which is convenient to them, to deliver spares. A few years ago, we used to have central and regional distribution points, and so there was another hub, and there was a cycle, they would turn up on Tuesdays, or a certain time each day, and they knew the drivers, they knew the vehicle... There is this resistance to accept “White-Van-

⁸⁸ Used to refer to the sort of man who drives a white van in an aggressive way, “thought of as a symbol of the rude and sometimes violent way in which some men behave today” (Oxford, 2011).

Man” delivery at any time during the day, and that has caused some problems, and we still get people turned away to this day” (Respondent C, 2010).

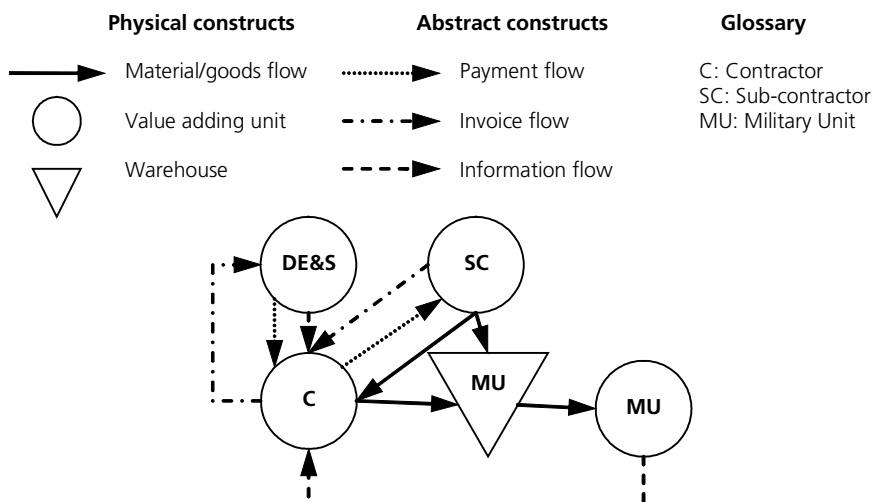


Figure 6.7: HASP distribution channel for spares for domestic training and exercises.

The implementation of the HASP BM is a contract *only* for the supply of spares. Hence it is not relevant to discuss the support chain for the HASP BM.

6.4.4 Key Activities

Even if OEMs provide the specification in the form of drawings, in the HASP BM, DE&S is responsible for the design (D) of the service, i.e. the provisioning of spares to the UK Main Battle Tank (MBT) Challenger 2 (CR2). The contractor, Multipart Defence, is responsible for financing (F), buying (B), owning (O) and storing the spares until the moment when they are ordered by DE&S. Once they are ordered, ownership of the spares is immediately transferred (T) to DE&S. Using PPP terminology (see Section 4.7.3), this is a Finance-Buy-Own-Transfer, or an FBOT, division of “*Key Activities*” between the public and the private sector. The sharing of responsibilities in the HASP BM is illustrated in Table 6.4.

In this BM, ownership is transferred to DE&S already once the spares have been ordered, i.e. when the spares are in the contractor’s warehouse. Regardless if the spares are then transported with contractor, DE&S or TPL resources to the PG, ownership and responsibility remains with DE&S. Since this BM only encompasses spares, the activities “*operate*”, “*manage*” and “*maintain*” are not relevant, which is why the responsibility for these components have been bracketed in Table 6.4.

Table 6.4: Sharing of responsibilities in the HASP Business Model.

X: Not applicable for this type of actor ---: Not applicable for this particular contract []: Not relevant for spares TPL: Third Party Logistics		Design (D)	Finance (F)	Buy (B)	Own (O)	Operate (O)	Manage (M)	Maintain (M)	Transfer (T)
Private sector responsibility	Prime contractor	---	F	B	O	---	---	---	T
	Sub-contractor	---	---	---	---	---	---	---	---
	TPL provider								
	Banks								
Public sector responsibility		D	---	---	O	[O]	[M]	[M]	T

6.4.5 Other Aspects of the Acquisition Project

There is no formal partnership between DE&S and the contractor in the HASP BM. The relationship can be characterised as arm's length, rather than any form of firmer, formalised partnership, but there are regular meetings, monthly and quarterly, and *"hours of phone calls on a daily basis"* (Respondent C, 2010). The issue of trust between buyer and supplier is also considered to be important, as is the issue of longevity of relationship:

"The longer that you are dealing with them, the better you get to know them, and also the longer contract we're able to place, the more cost savings we can usually drive from them" (Respondent C, 2010).

There is also the insight within the PT that longevity of relationship is an important aspect in terms of the contractor's willingness to make necessary investments. With short contracts, as the HASP contract, it is difficult for the contractor to motivate any investments that are necessary beyond the length of the contract. Regardless of the type of relationship between DE&S and a contractor, the formal, written contract will be important:

"We can't do things on a handshake, because it's taxpayers' money. We wouldn't get away with it. I mean you hope that you won't have to pull the contract out very often, but it's there in the background, as a stake, if things start to go wrong" (Respondent C, 2010).

There is a suspicion within DE&S that they could be as good, or maybe even better, than the contractors that they are employing.

"We've got equipment on operations now, which are being supported very well by traditional means, and we've got a contract with Multipart for a platform that is not on Ops, effectively. We do have... We've got a very small amount at the moment, but that's

only been since January (2010). So we've had five⁸⁹ vehicles out on operations" (Respondent C, 2010).

The contractor has provided a better level of service (see Section 6.2.5) than was previously possible. There is, however, also no question that this increased service level has come at a price.

"I think the reality is that when CRISP first came about, our divisional supply chain was not able to meet that service level, but since then, there has been enhancements and efficiencies made. So now, for deliveries within the UK and Northwest Europe, our depots will work for seven days maximum. So that would be the longest time it should take for an item being demanded to being delivered to those areas, and going back ten years that was probably 30 days. Of course the contractor was using TPL, courier systems, the tracking was there, but we've now caught up... Our infrastructure at our depots has caught up, and we can do that at a far lesser price. Not necessarily keeping the same service level in terms of availability..." (Respondent C, 2010).

As for strengths and weaknesses with the acquisition project, the distinguishing feature seems to be the level of service that is provided by the contractor.

"The strength of the contract is the service level, but we don't need that level of service, that's not justified" (Respondent C, 2010).

There are no major problems with the quality of the deliveries. The contractor is considered to be efficient, *"far more efficient than traditional modes of support"* (Respondent C, 2010). The contractor meets the Key Performance Indicators (KPIs) in general, but there are some problems with the relations to other actors in the provisioning of spares to the CR2. DE&S has had disagreements with the OEMs, regarding getting drawings or rights to those drawings. DE&S has also had problems with Multipart's sub-contractors, even though DE&S does not hold this fact against the prime contractor, quite to the contrary:

"They are very good, actually. I would recommend Multipart to anybody thinking of doing a similar sort of contract. I just think that, personally – I've been around a long time – I think that we should invest with our own traditional levels of support, because we can do it on a far larger scale, and we can do it cheaper. I am a fan of contracting out complex things that we, perhaps, would have difficulty keeping the skills to do, but for running a mere shopping and putting stuff in a cupboard somewhere for a rainy day, that should be easy business, really, for us" (Respondent C, 2010).

⁸⁹ As a comparison, there are 386 CR2 MBTs at the British Army's disposal. Consequently, in the neighbourhood of 1.3 percent of the MBTs were overseas on operations at the time of the interview, i.e. in October 2010. This is far from the original planning assumptions.

Despite the increased level of service, there are some negative aspects of the outsourcing of the procurement activity.

“Although that activity has been outsourced, you still don’t lose that responsibility. Actually, because it’s been outsourced, there are a lot of internal MoD functions that the PT would largely be spared, would be invisible to, because they happen routinely within MoD, but a lot of that... The company still needs somebody to be the decider. For a relatively few items, it tends to be quite a lot of effort internally...” (Respondent C, 2010).

The contract is probably a good contract from the point of view of the supplier. Even though Multipart Defence has funding tied up in what they procured, every order has to be countersigned by DE&S. Hence, at the end of the contract, even if DE&S were to end the contract early, DE&S would have to buy the remaining stock from Multipart Defence. So there is no actual risk taking on the part of the supplier. For this contract there is no formal risk register *per se*. The risks were articulated within the Initial Gate Business Case (IGBC, see Section 5.3.4). DE&S and the contractor now have monthly contract review meetings, where any concerns, issues or risks are considered, discussed, and appropriate actions subsequently taken. The main risk that DE&S identified for this acquisition project was the risk that the contractor would order more spares than the Army needed, order things that were not required, order things too soon, etc., and that DE&S would have to pay for these items. Hence, for this contract, DE&S has a designated officer, who effectively functions as an interface between the customer and the contractor. This designated officer manages risk, but also countersigns all orders for spares that the contractor issues, suggesting that DE&S will never have to pay for spares for which they haven’t approved the purchase in the first place. Another risk associated with the acquisition project is that it means lack of flexibility, since everything is regulated in the contract. As for transfer of risk in this contract, there is no transfer of risk at all. While not considered to be a risk as such, the handling of the drawings, i.e. the specifications of the spares, does present DE&S with a somewhat problematic situation. DE&S must provide the contractor with these drawings. There are, however, two other categories of actors involved in this transaction; the design authorities, i.e. the OEMs, and the sub-contractors.

“We supply the drawings at Multipart’s request, and that is another difficulty which we’ve had to accept, that contractors are working with sub-contractors... It’s not a match made in heaven. Some of them will struggle with nondisclosure agreements, and that sort of thing, particularly the design authorities, the OEMs. So what we’ve had to do is then to come in as a go-between, effectively, because we have different defence contract standards that we can apply, and therefore the design authorities, OEMs, are happier dealing with us directly, when it comes to moving drawings around. We then supply the drawings, not to Multipart; we supply them to the sub-contractors that they are going out to get quotes from. So, again, as far as the drawings are concerned, potential suppliers to

Multipart are dealing with us, and that's something that we've learnt over the last six months, because of problems with commercial sensitivities around drawings, and another civilian industrial company, maybe not being held to the same standards" (Respondent C, 2010).

Even though this particular acquisition project did not include much in the form of transfer of risk, risk transfer is considered by the PT to be an important aspect of PPPs and PFIs. The general idea is that you can always transfer risk, but that there is a price to it. However, in the military context, the actual transfer of operational risk is debatable.

"Actually, my personal view is that you can never actually contract out risk. The reality is you don't. You still own that risk. You might think you are paying for it, but you still own it. Because at the end of the day, if they deliver late, it's your programme that's at risk, and however much money you might pay them, you're still late. It's your capability that you are supporting, and the field army, if they can't deliver a capability, they'll come to you, they're not bothered who you've subcontracted to, and how much risk that you think that you've passed onto the contractor..." (Respondent C, 2010).

Reward sharing is also considered to be an important aspect of the relationship between the buyer and the seller. Gain sharing is considered to be a good incentive for the contractor to be innovative. Information sharing is also important in this acquisition project. It is understood in the PT that information sharing is a prerequisite for contracting out to be successful. The contractor and its subcontractors not only need the drawings with the specifications of the components in order to provide the necessary spares, they also need adequate forecasts of the consumption of these components, so that they can stock enough spares to meet the demands. It is also realised in the PT that information sharing is complicated:

"We do our best, but the problem is that it is so diverse and complex, that the information that we ought to be sharing, we can't get a handle on ourselves, and things like configuration control, so that they are buying parts that are still being used, and we can't get that information here, because there are so many people involved in the management of those platforms and systems. I mean, there's a risk that we end up shooting ourselves in the foot in letting them procure items that are never going to be fitted to a tank because they are obsolete, but we still end up paying for it, at the end of the day" (Respondent C, 2010).

There are no illusions within the PT regarding what motivates industry, i.e. making a profit. There is also a realisation within the PT that this industry goal is not always compatible with the objectives of MoD, i.e. to create capability in order to being able to create effect.

"You can't lose sight of the fact that industry is there to make profit, that's what they want to do, and that will always be a factor in any decision that industry is going to

make, which may not add up to the capabilities that we are trying to have available to us in the military” (Respondent C, 2010).

The contract is built on a monthly management fee, which is a set fee that does not change over time. In addition to the fixed management fee, the cost that the contractor invoices DE&S is the cost price for spares. The profit comes through the management fee and to a degree from the gain share mechanism in the contract. There are also hidden costs, which are not explicit in the contract:

“There’s a bigger cost to have a contract like that than just the visible cost of the management fees and the cost of the materiel. There are still resources within MoD required to manage the contract” (Respondent C, 2010).

At the end of the contract, DE&S will also have to pay for any remaining stock of spares, since the procurement strategy would have been countersigned by DE&S throughout the duration of the contract. Overinvestment could take place though, because of, e.g., decreasing usage of a spare or because of modifications making a particular spare obsolete. Hence, *“the only risk they are taking is that they have to stomp up money up front, but at the end of the contract that’s all bought back at the cost price”* (Respondent C, 2010). DE&S has no illusions regarding the possibility to save a lot of money by outsourcing the procurement of spares to a contractor. You have either to pay a lot of money when you buy the equipment, in order to ensure a degree of freedom further along the line, or pay less when you buy the equipment and be prepared to pay the OEM more for spares later.

“I would say that if you buy any complex equipment from an OEM, the price that you pay for that will depend on how limited you are in obtaining spares for that equipment later on down the line. If you are going to pay a great deal of money, then you are going to constrain to them making their profit through spares that they can only provide” (Respondent C, 2010).

The CRISP acquisition project that preceded the HASP acquisition project had an identical construction as the HASP described above. The only difference was that with the CRISP contract, Multipart was acting as a sub-contractor to BAE, the prime contractor. Multipart was, in effect, doing all the work also in the CRISP contract, and charging similarly as in the HASP contract, while BAE was only adding cost, not value, to DE&S. BAE did not charge a management fee, but added a percentage instead, their profit margin, on everything throughout. Tank tracks are probably the single most expensive component among the spares that were included in the CRISP, and in the HASP, contract. Tank tracks were delivered directly by the supplier to the military units, so the BAE did not have to do anything at all, besides adding their profit margin, based on the amount of tank tracks being ordered by the Army, to the monthly invoice. With the HASP contract, this cost adding aspect of the CRISP contract has been eliminated.

6.5 Case D: The ADAPT Acquisition Project

“The MoD has called for “dramatic changes to the way that industry and MoD operate” in the field of Complex Weapons. In response, it is clear that ADAPT is a major step forward in this direction. ADAPT is a Contract for Availability (CfA) at the weapon system level whereby MBDA and MoD will work co-operatively over the long-term to ensure the best possible outcomes for the Service user. By establishing a sustainable partnering relationship, ADAPT will enable better through-life decisions to be taken to deliver higher support performance, continuous improvement and consequently better Value-for-Money (VfM) for the UK’s Armed Forces”.

Barry Flower (MBDA, 2011)

6.5.1 Background to the Acquisition Project

Rapier is the UK Air Defence System (ADS) and provides defence against Unmanned Aerial Vehicles (UAVs), cruise missiles, and against fixed and rotary wing aircraft (Roberts, 2004, p 5-1). Rapier is a Surface-to-Air Missile (SAM) system and it was developed for the British Army and the Royal Air Force (RAF). The development of Rapier began as a private venture at the British Aircraft Corporation⁹⁰ (BAC) in 1961. Test firings took place in 1966, and the complete system was tested in 1968. Rapier entered service in the British Army in 1971 and in the RAF in 1974, which illustrates the long lead times of complex weapons system development. After 40 years in service, Rapier remains the UK primary air-defence weapon. Its expected Out-of-Service Date (OSD) is in 2020. Hence, when the system is retired from service, it will have been operational for 50 years, which illuminates the notorious longevity of many military systems. From cradle to grave, i.e. from concept stage to the ultimate disposal, nearly six decades will have passed for the system. The original system lacked all-weather capability. This shortcoming was remedied by the introduction of the thus enhanced Rapier Field Standard A (FSA) in 1979. Rapier Field Standard B (FSB) was soon introduced to add further, minor upgrades to the system. In 1990, Infrared (IR), or “dark fire”, capability was added to the system, as Rapier Field Standard B2 (FSB2), also known as Rapier 90, which retroactively also led to a re-labelling of the previous upgrades to FSB1. The development of Rapier Field Standard C (FSC), later also

⁹⁰ The British Aircraft Corporation (BAC) was formed in 1960, through the merger of English Electric Aviation Ltd, Vickers-Armstrong (Aircraft), Bristol Aeroplane Company and Hunting Aircraft. In 1977, BAC, the Hawker Siddeley Group and Scottish Aviation were nationalised and merged, and British Aerospace (BAe) was established.

known as Rapier 2000, was begun at MBDA⁹¹ in 1992, and FSC entered into service in 1996. By 2004, a total of 57 Rapier FSC Fire Units (FUs) had been delivered to the British Army and the RAF. Rapier FSC also has an export version, which is called Jernas. In the UK, Rapier FSC is now simply called Rapier. The Rapier FSC FU consists of a launcher, with eight ready-to-fire SAMs, electro-optical tracker radar, and surveillance radar. The complete Rapier FSC system also includes transportation resources, training equipment, and supporting services. The transportation resources are different types of trucks. The training equipment includes a dummy FU, and computer based trainers. The supporting services are workshops, spares, and technical publications.

After the Smart Procurement Initiative (SPI, see Section 5.2.2) was introduced in the 1998 Strategic Defence Review (SDR, see Section 5.2), DE&S sought ways of improving the Rapier support service. As early as in July 1998, a Partnering Framework Document was signed between DE&S and Matra BAe Dynamics (MBD, now MBDA). This agreement led to the TRADERS (The Rapier Direct Exchange of Repairable Spares) contract for Rapier FSB2, which was awarded to MBD, as the prime contractor, in 2000. The TRADERS BM was a Contractor Logistics Support (CLS, see Section 5.3.7) package for Rapier FSB2. The contract covered repair of repairable spares, and the procurement, storage and distribution of consumable spares (Roberts, 2004, p 5-2). Prior to the TRADERS acquisition project the spares were handled in the MoD Joint Supply Chain (JSC, see Section 4.8.7). The spares were managed by MoD and demands were processed by MoD, through the Defence Storage and Distribution Agency⁹² (DSDA) and the Defence Transport and Movements Agency⁹³ (DTMA), based on User Requirement

⁹¹ MBDA was formed in 2001 by a merger of European Aeronautic Defence and Space Company (EADS), Finmeccanica and Matra BAe Dynamics (MBD, now MBDA).

⁹² As part of the 1998 SDR, supply and distribution were brought together in the UK, and the Defence Storage and Distribution Agency (DSDA) was created. In 2003, Defence Munitions and DSDA merged into one agency. In 2005, DSDA won the Future Defence Supply Chain Initiative (FDSCI). In 2010, DSDA was renamed the Joint Support Chain Services (JSCS). As DSDA before it, JSCS manages a range of storage, processing and distribution tasks on behalf of its customer in defence and industry. The role of DSDA (JSCS) is to store, maintain, issue, process and distribute materiel for MoD and other users. DSDA provides the gateway to MoD distribution network, i.e. acts as the Purple Gate. Hence, DSDA (JSCS) operates the link between the commercial and military supply systems.

⁹³ As a consequence of the 1998 SDR, the Defence Transport and Movements Agency (DTMA) was created as a merger of the Defence Transport and Movements Executive (TMX), part of the Joint Transport and Movements Staff (JTMS), elements of the former Air Movements Executive (AME), the Defence Freight Distribution Service (DFDG) and other components from MoD. As part of the FDSCI in-house solution, DFDG was transferred to DSDA in 2005. In conjunction with the establishment of DE&S in 2007, DTMA ceased being an independent agency.

Documents (URD) (Roberts, 2004, p 5-2), from the 1998 SDR. With the TRADERS contract, the spares remained in the MoD shed, but MBD leased the shed, and Lex Multipart (sub-contractor to the prime contractor) took over storage, processing of demand and distribution of those spares directly to demanding units in the UK. For overseas units, Lex Multipart delivered the spares to the Purple Gate (PG) in Bicester (see Section 4.8.7), thus avoiding Contractors Deployed on Operations (CONDOs, see Section 4.8.7), in line with the Future Defence Supply Chain Initiative (FDSCI) *modus operandi* (Roberts, 2004, p 5-2). The prime contractor did not only take over the responsibility to manage the repairable and consumable spares, but also to manage the stock levels. However, ownership of the spares, and of the shed, remained with MoD. Furthermore, prior to the TRADERS contract, MoD had contracts with various MoD agencies, and with several sub-contractors, to repair different parts of the weapon system. With the inception of the TRADERS contract, responsibility for repairs was also handed over to the prime contractor. Based on Forecast Quarterly Demand (FQD), the prime contractor would then make informed decisions regarding how many of the different repairable spares to repair, and how many of the consumable spares to procure, in order to meet the projected demand for these items. In addition, prior to the TRADERS contract, Measures of Performance (MoPs) or Key Performance Indicators (KPIs) (see Section 4.9.3), were not used for Rapier. The introduction of MoPs and KPIs was a fringe benefit of outsourcing. The incentive for introducing performance measures was the potential benefits of gain (reward) share (Roberts, 2004, p 5-3). Another fringe benefit of TRADERS was the introduction of Asset Visibility and Asset Tracking, which were not previously used for the Rapier system (Roberts, 2004, p 5-4).

In 2003, MBDA awarded Multipart Defence the TRADERS subcontract, under which Multipart Defence assumed custodianship of MoDs entire stock of repairable spares and consumable items for the Rapier FSC. So Multipart Defence held the warehouse at Bicester, and also provided workshop facilities to MBDA at Bicester (Multipart Defence, 2011c). When Rapier FSB2 was to be replaced by Rapier FSC in 2004, the TRADERS contract had to be renewed. This time, the process started with MoD formally developing an in-house cost model, i.e. a Public Sector Comparator (PSC, see Section 4.7.2), within MoD also called a Best Value Benchmark (BVB). MBDA submitted a bid that undercut the PSC and the TRADERS contract for Rapier FSC was awarded to MBDA in September 2003. In March 2004, the contract was operational (Roberts, 2004, p 5-2). Since the prime contractor was the same for both TRADERS contracts, i.e. for Rapier FSB2 and for Rapier FSC, the contract smoothly morphed over to support the Rapier FSC. In 2007, following the Defence Industrial Strategy (DIS, see Section 5.2) of 2005, there was yet another cost driving exercise within MoD. By this time, the

TRADERS contract had been operational for three years, but it was thought that the contract could be improved upon, and that more money could be saved.

“This time we were looking at fewer Army personnel, that was never included before, the Army always stayed as they were. Fleet management and training was also included now; they never did fleet management or training under TRADERS; and we didn’t contract for equipment readiness; we only contracted for on-demand-fulfilment; now we’re looking at readiness of the whole weapon system, and measuring that” (Respondent D, 2010).

So, the new contract should not only include spares, like TRADERS, but also support, fleet management, and training. In addition, the contract should provide equipment readiness, rather than on-demand-fulfilment. At the time of the ideas for a new contract, with a drastically increased scope, the Rapier fleet was reduced by nigh on 37 per cent by a defence review, which resulted in the RAF losing its SAM capability altogether, while the Army kept their Rapier system. This reduction resulted in a lot of spare FUs, since the RAF Regiment had 21 Rapier systems, and consequently made repairs less of an issue.

6.5.2 Value Propositions

The ADAPT (Air Defence Availability Project for Rapier) contract for Rapier FSC was awarded to MBDA in September 2007. MBDA was selected as the preferred bidder because they showed that they would provide the best Value-for-Money (VfM) at the required readiness and availability levels against demanding service criteria, while providing huge savings for DE&S. The contract was initially supposed to save DE&S £175 million in Whole-Life-Costs (WLC, see Section 5.3.8), or Cost of Ownership (COO), and with incentive mechanisms further savings were expected. Hence, DE&S expects ADAPT to reduce the cost by more than 50%. The ADAPT acquisition project is the direct successor to the TRADERS acquisition project. Following the principles outlined in the DIS, the new Business Model (BM) adopted novel concepts in order to make Contracting-for-Availability (CfA, see Section 5.3.7) mutually beneficial to DE&S and MBDA. The novel concepts included co-location of DE&S and contractor support, fleet management, a joint management team, the use of Sponsored Reserves (SRs, see Section 4.8.7), outsourcing of training, and a first-to-fourth line (see Section 4.8.6) maintenance policy on operations. The ADAPT BM was intended to incentivise industry to develop the products to become more reliable. Under the TRADERS contract, the more the products broke down, the more spares were needed, and the more work and money the contractors would receive. Under the CfA arrangement within the ADAPT contract, the idea was that in order to maintain the availability, it would be in the contractor’s interest to keep the equipment reliable.

The duration of the contract is to 2020, which is the expected OSD for Rapier. The ADAPT contract includes fleet management, storage, spares, publications, and the training equipment. The contract also includes on-the-job training for the Royal Artillery (RA). The missile and the trucks that tow the trailers are not included in the contract. The ADAPT contract reached Initial Operating Capability (IOC) in November 2007 and Full Operating Capability (FOC) in August 2008. The previous TRADERS contracts provided the Armed Forces with supply of repairable and consumable spares to 57 Rapier systems in the Army and the RAF. In addition to supply of spares, the ADAPT contract also includes repairs, fleet management and training. However, ADAPT only support 32 Rapier systems, since the number of operational systems has been reduced because the RAF no longer has SAM capability. Of these 32 systems three are deployed to the Falkland Islands, and one system is in reserve for this operation. The remaining 28 systems have different requirements for system state of readiness in the ADAPT contract. Hence, the systems have to be available in 2 days, 5 days, 30 days, or 6 months, depending on the state of readiness for each system. For the lower states of readiness, availability is estimated through a paper exercise as either one or nil.

Prior to the ADAPT contract, second line repair facilities (L2, see Section 4.8.2) were manned by the Royal Electrical and Mechanical Engineers (REME) of the British Army. These facilities were ready to be deployed forward. So, if during an operation, the FSC or the RSC (see Section 4.8.7), for some reason, was not functioning well enough to ensure availability of the Rapier system, these assets could be deployed to somewhere near the front. This way, the spares could be repaired near or in the theatre, without having to be transported back to the UK. Under ADAPT, this responsibility was taken off of the military, which created some of the envisioned military manpower savings, and L2 were instead manned by engineers from MBDA. However, these engineers needed to be deployable, in uniform. This was made possible by making these engineers SRs, i.e. paid to be prepared to be deployed in uniform at short notice. Consequently, these engineers were both employees of MBDA and SRs in the Territorial Army⁹⁴ (TA). These SRs are not only deployable civilian engineers, but when they are deployed, they are in

⁹⁴ The Territorial Army (TA) is the part time volunteer force of the British Army. The TA was created in 1908, and it has about 35,500 members, which constitute roughly one forth of the British Army. The TA is part of Britain's reserve land forces. Together with the Regular Reserve the TA provides support to the Regular Army at home and overseas. More than 1,000 TA soldiers are deployed overseas on operations each year. The TA is the largest of the Reserve Forces, the others being the Royal Naval Reserve (RNR), the Royal Marines Reserve (RMR) and the Royal Air Force Volunteer Reserve (RAFVR). The TA is divided into three types of unit; National, Regional and Sponsored (The British Army, 2012e).

uniform, as combatants, under military command, and they can carry and use a rifle if necessary. Once in the theatre, SRs are just like soldiers. In total, there are eight SRs in the ADAPT contract, of which four must be deployable all the time.

Before the ADAPT contract, responsibility for carrying out training of personnel lay exclusively with MoD. Under ADAPT the responsibility for training has also been transferred to the prime contractor. Hence, MBDA is contracted to deliver training courses for REME tradesmen that are just out of basic training. The REME personnel are given a Rapier specific first line repair (L1, see Section 4.8.2) maintainer course on the weapon system. The ADAPT Delivery Team (DT) realised that when this personnel were deployed to the Falkland Islands, they did a better job of ensuring the necessary availability on the system if they were given a refresher course before they were deployed. Hence, without being contracted to do so, MBDA is also delivering refresher courses to these personnel. While giving these courses, it was realised that the personnel was a bit wanting in terms of basic vehicle mechanics training. Hence, yet another course was brought in to remedy this deficiency. So, while the contract is only for one course, the course portfolio has been expanded in order to more easily reach the KPI levels. It helps MBDA if the REME personnel are as good as they can be at L1, since MBDA will otherwise have to come in sooner than necessary to assist the REME. This training deficiency was unknown and not envisioned in the contract, but was discovered when MBDA assumed responsibility for availability of the Rapier system. The ADAPT contract is about support to an already existing system. Hence, the “*Value Propositions*” is not concerned with different ways of acquiring a new product to satisfy a user requirement, but rather with how to provide service (support) to an operational product. The ADAPT contract is a Contract for Availability (CfA).

“All this kit goes everywhere, with a Priming Equipment Pack (PEP), which is a model set of spares, to support it. So, all you should be doing, really, is replacing your spares and equipment pack. You shouldn’t have assets down. If your equipment pack is right, you should just be replacing spares in them” (Respondent D, 2010).

Demands are placed in the Joint Supply Chain (JSC) with various priorities, corresponding to different Supply Chain Pipeline Times (SCPTs, see Section 4.8.7). The performance metric that was used initially (for TRADERS) was on-demand-fulfilment; the ratio of demands that were satisfied. The requirement for this performance measure was initially set to 70%. Hence, the contractor was supposed to deliver the spares in one SCPT in 70% of the cases. This value was, however, far too easy to reach for the contractor, so it was later incrementally increased to 85%. Under the ADAPT contract, on-demand-fulfilment is no longer measured. In order to ensure the required availability, and avoid being penalised, the contractor used FQDs to make sure that they had the necessary stock of repairable and consumable spares in the TRADERS contract, but under the

ADAPT contract, there are a number of KPIs. Equipment readiness, broken down into various states of readiness, including availability of Fire Unit (FU) and training equipment in barracks, is measured at unit level at the RA, at the TA, on the Falkland Islands, etc. The availability of deployable SRs is also measured. The most important KPI is equipment availability on operations. The contract stipulates that this KPI has to exceed 85%. As of September 2010, ADAPT was achieving 92% availability in the Falkland Islands.

6.5.3 Channels

For the TRADERS BM, units within the British Army and within the RAF were target customers. For the ADAPT BM, the RAF is no longer a customer, but there are several target customers for this BM within the UK Armed Forces. In the UK, the Rapier system is on one location with the RA, and on two locations with the TA. The Rapier FSC is also deployed in the Falkland Islands. Through the separation, enabled by the TRADERS (now ADAPT) contract, of the supply of Rapier spares from the MoD supply chain at the “*swivel chair interface*”, i.e. at the Purple Gate (PG) at Bicester, only Rapier units could be supplied with Rapier spares, which reduced supply errors (Roberts, 2004, p 5-4).

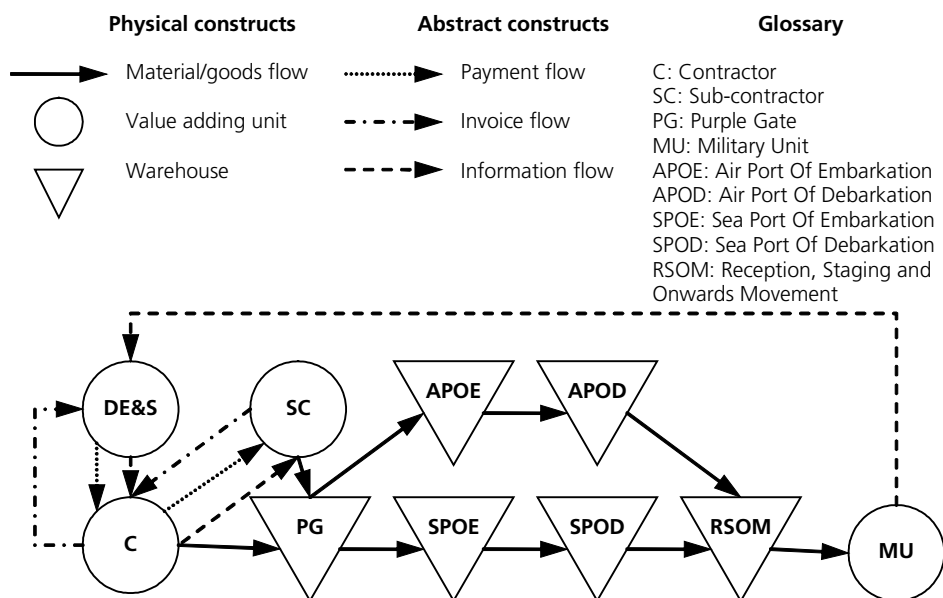


Figure 6.8: ADAPT distribution channel for equipment and spares for overseas operations.

“The contract is transparent to the user. The user still places his demand on his system, whatever system he uses. The demand goes through to Bicester. There’s a girl there, who sits at a machine, it’s called a swivel chair. She takes the details and puts them on another machine. MBDA gets those details and then process the demand. If it’s a domestic demand, the kit is delivered to location in a white van. If the demand is from abroad, the kit is delivered to the PG, and then the MoD Joint Supply Chain (JSC) takes over” (Respondent D, 2010).

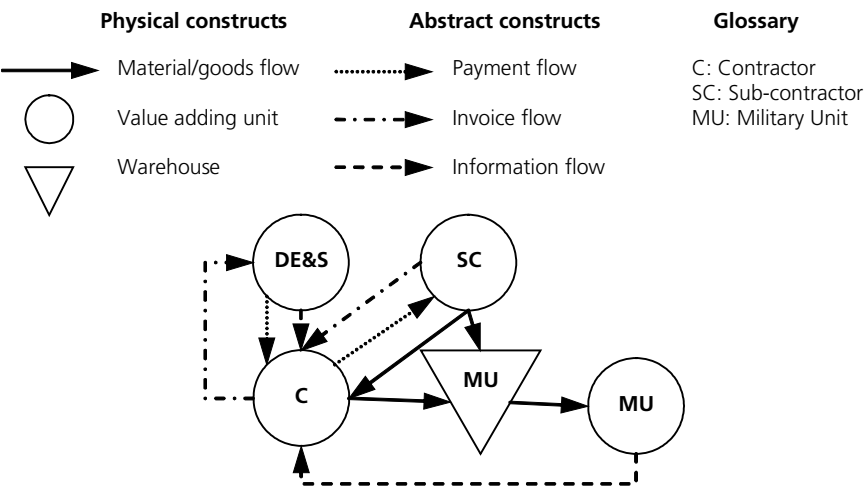


Figure 6.9: ADAPT distribution channel for equipment and spares for domestic training and exercises.

The TRADERS (now ADAPT) contract has increased the efficiency of the Reverse Supply Chain (RSC, see Section 4.8.7). In the new system, the replaced repairable spare goes back down the supply chain on the return journey, which reduced the logistic delay time, and took 1,000 hours *per annum* out of the repair loop (Roberts, 2004, p 5-4). In general, for the support to Front Line Command (FLC, see Section 4.8.7) and operational theatres with high cost, low population repairable spare parts; the RSC is as critical to MoD as the Forward Supply Chain (FSC, see Section 4.8.7), and the Standard Priority System (SPS, see Section 4.8.7) is designed to meet the requirement of both the FSC and the RSC (UK MoD, 2011e, p 7). The ADAPT contract does not allow direct, electronic information flow from unit level to the contractor. Instead, there is a “*swivel chair interface*”, at which information (data) is manually transferred between different Information Systems (ISs). However, there is an initiative within the ADAPT contract to make the information flow directly. Figure 6.8 shows the ADAPT distribution channel for equipment and spares for overseas operations.

The flow of equipment and spares from the PG to a military unit in theatre has been thoroughly described in Sections 4.8.6 and 4.8.7, and exemplified in Sections 6.2.3 and 6.4.3. Therefore, this flow will not be repeated again. However, the flow of information is different from that description. The military unit puts the demands through the normal channels. The demands are routed to the MoD Supply Chain Operations Centre (SCOC), where they are manually (the “*swivel chair interface*”) entered into the MBDA Information System (IS), which automatically passes them onto Multipart Defence (Multipart Defence, 2011c). The ADAPT distribution channel for equipment and spares for domestic training and exercises is illustrated in Figure 6.9.

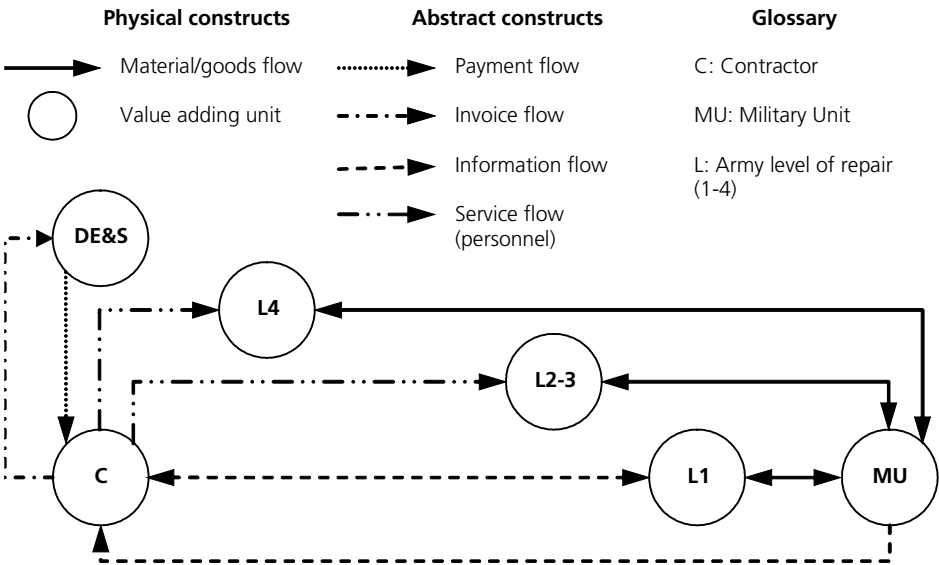


Figure 6.10: ADAPT distribution channel for Maintenance, Repairs and Overhauls (MRO) for overseas operations, and for domestic training and exercises.

The Regiment collects equipment and spares directly from MBDA warehouse, inside the Regimental area, whenever they need them. Hence, there are no problems with the Regiment having to receive “*White-Van-Man*” (see Section 6.4.3) deliveries. When this solution was first implemented in the ADAPT contract, it was a novelty to MoD and the UK Armed Forces. The ADAPT BM includes a CfA. Hence, the support chain is of the utmost importance in this BM. This fact is emphasised even more by the circumstance that some of the units that are to be supported are as far afield as on the Falkland Islands, where they, incidentally, have been deployed ever since the war in 1982. Distance does, however, not affect the schematic representation in Figure 6.10 of the ADAPT distribution channel for Maintenance, Repairs and Overhauls (MRO) for overseas

operations, and for domestic training and exercises. In the ADAPT BM, employees of MBDA can, as SRs, be deployed as far forward as the second line repair facilities (L2, see Section 4.8.2). At the first line repair facilities (L1, see Section 4.8.2), the REME remains responsible for MRO.

6.5.4 Key Activities

DE&S is responsible for Financing (F) in this BM and retains Ownership (O) of facilities, equipment and spares, as soon as they are bought. All other responsibilities rest with the private sector. The prime contractor, i.e. MBDA, is responsible for Designing (D) the service, Managing (M) the system, and Maintaining (M) the equipment. The sub-contractor is responsible for Buying (B) spares and Operating (O). There is no Transfer (T) of responsibilities in the ADAPT BM. The sharing of responsibilities is illustrated in Table 6.5.

Table 6.5: Sharing of responsibilities in the ADAPT Business Model.

X: Not applicable for this type of actor ---: Not applicable for this particular contract []: Not relevant for spares TPL: Third Party Logistics		Design (D)	Finance (F)	Buy (B)	Own (O)	Operate (O)	Manage (M)	Maintain (M)	Transfer (T)
Private sector responsibility	Prime contractor	D	---	---	---	---	M	M	---
	Sub-contractor	---	---	B	---	O	---	---	---
	TPL provider								
	Banks								
Public sector responsibility		---	F	---	O	---	---	---	---

Using PPP terminology (see Section 4.7.3), the distribution of “*Key Activities*” used in this BM is Design-Buy-Operate-Manage-Maintain, or DBOMM.

6.5.5 Other Aspects of the Acquisition Project

At DE&S there is a Supplier Relations Team (SRT). Through the auspices of the SRT, DE&S and MBDA formally score each other, on a scale from one to ten, once a year. In 2010, MBDA scored the relationship with DE&S as a ten, so the relationship is exceptionally good. The value of the ADAPT contract is £156 million, in the form of a firm price agreement, over the duration of the contract, i.e. the 13 years remaining to OSD. The only thing that can change this firm price is an increase or decrease in the usage of the Rapier system. The firm overall price is translated into a fixed monthly price, which is paid on a quarterly basis. Hence, DE&S pays MBDA a Fixed-Price every quarter to provide the contracted service. As long as MBDA provides the agreed upon service everything is fine, but, even so, DE&S will periodically (at least once every year) ask MBDA how much that has been spent. If MBDA has spent less money than stipulated in the contract, DE&S

makes an analysis of any outstanding risks that have not been mitigated yet and any opportunities that have not been materialised yet, and the potential costs for handling these risks and opportunities.

In the BM, there is an incentive, or gain (reward) share mechanism, so if it is decided that it is safe to do so, any excess money is taken out of the contract, and shared between DE&S and MBDA. The gain sharing mechanism in the ADAPT contract is relatively sophisticated. There is a variable gain share line, but that is going to change to a fixed split, with DE&S receiving 70% of any unspent money. DE&S pays MBDA the Fixed-Price based on running hours, or availability. Based on extensive historical data, DE&S came up with *usage bands* to price the contract, and this mechanism has been used since the contract was placed with MBDA. The *base usage band* is 10,000 hours *per annum*. Every year the usage bands for the next two years are negotiated, so that MBDA has sufficient time to plan resources accordingly. The base usage band can be expanded, in increments of 2,000 hours, up to 18,000 hours, where each increment costs extra money. As many as 18,000 hours has never been required. Quite to the contrary, the prediction for 2010 was 8,400 hours, but there is not a lower band than 10,000 hours in the contract, so DE&S has to pay for 10,000 hours anyway. If the usage of the Rapier system should drop significantly, there is a clause in the contract that allows for a renegotiation for a 8,000 hour band, but that has not been used as of yet. Hence, any under usage will result in excess money, which, in turn, will result in gain share between DE&S and the contractor.

Before the ADAPT acquisition project, it was not especially important to DE&S to know exactly what usage they had. Since DE&S is now paying MBDA for usage hours, Performance Measurement have become of paramount interest. Hence, the usage hours on the Falkland Islands, by the AR, the TA and all other users is measured manually by the users, and reported to DE&S once a month. DE&S monitors the usage hours carefully in order to make sure that the users are not overshooting the hours. The increased knowledge regarding MoPs and KPIs is a fringe benefit of the ADAPT acquisition project. The most important KPI is equipment availability on operations, and the contract stipulates that this must exceed 85%. If this KPI was to drop below 85%, but higher than 75%, over a quarter, an agreed percentage of the quarterly payment would be withheld. If, over the next two quarters, performance would be at least 85%, the contractor would get the money back. If, on the other hand, the performance continued to be in the band between 75% and 85%, the contractor gets penalised every quarter, and DE&S keeps the money. If the performance drops to below 75%, there is a higher percentage of money withheld, and there is no chance for the contractor to get it back. However, the performance on equipment availability on operations, i.e. the Falkland Islands, has never been anywhere near as low as 75%, and DE&S does

not anticipate that this will ever happen. Quite to the contrary, the contractor is consistently reaching more than 95% overall system availability. Part of the explanation for this outstanding result is that the contractor, as a result of the redundant FUs after the reduction of operational FUs, has been able to replace the FUs at the Falkland Islands with the best of the superfluous FUs at their disposal. The contractor intends to repeat this rotation a couple of more times through the duration of the contract. It's a long way to go, but since ships depart for the Falkland Islands every six weeks, it's a quite feasible solution.

The contract has an open book accounting, so, in principle, DE&S can look at MBDA accounts at any time they so choose. MBDA has to show DE&S detailed information regarding how much manpower they use, and what the skill codes are, i.e. how many engineers and how many managers they have you got working on the contract. In practise, however, DE&S does not concern itself with, e.g., how much money that MBDA pays its sub-contractors.

"Under ADAPT, MBDA are the prime, so we do all our dealings with MBDA, and all the sub-contractors are their responsibility. I don't talk to sub-contractors direct anymore. MBDA has contractor meetings, which I go to. So I sit in on their meetings. I sat in on one this week, one of the sub-contractors... So I know what's going on. But, you know, they pay them the money, they've got availability agreements with them, or, in fact, sometimes I don't know how they agree to... It's not my business, really" (Respondent D, 2010).

The overall costs of the contractor are, however, transparent to DE&S, and, consequently, DE&S is well aware of how much the contract should be costing. The Rapiere system is an electronic system. Hence, the issue of obsolescence was of major concern to DE&S once the ADAPT contract was negotiated. DE&S managed to persuade MBDA to assume the entire risk of obsolescence within the firm price contract. Hence, the entire risk of obsolescence was transferred to the private sector, at a Fixed-Price. Risks are identified, analysed and mitigated jointly by DE&S and MBDA. Until the end of 2010, each party has held its own risk register. This is, however, about to change, and the objective is to create a joint risk register.

7 Analysis and Synthesis

“The delivery of new and enhanced military capability requires orchestrated action across complex change programmes in addition to the equipment itself”.

The UK MoD (2005, p 134)

7.1 Introduction

The research purpose: to *“study, analyse, and evaluate BMs regarding how they can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept”*, was used to formulate three Research Questions (RQs):

- Research Question 1: How can a generic Business Model for a non-profit, governmental, Defence Procurement Agency be described?
- Research Question 2: Which strengths and weaknesses do different Business Models have in the context of defence acquisition?
- Research Question 3: Which risks are associated with different Business Models in the context of defence acquisition?

In this chapter, the RQs are used to structure the analysis and the ensuing synthesis, although the structuring is done differently in the analysis than in the synthesis (see Section 7.6). *“Analysis is defined as the procedure through which an intellectual or substantial entirety is decomposed into its components”*, and *“every analysis requires an ensuing synthesis in order to control and correct the results”* (Ritchey, 1991, p 1). *“Synthesis is defined as the opposite procedure to analysis, i.e. to combine and merge separate elements or substances in order to form a comprehensive entirety”*, and *“every synthesis rests on the results of a preceding analysis”* (Ritchey, 1991, p 1). For each of the within-case analyses, and for the subsequent cross-case synthesis, three subsections, corresponding to the RQs, are used. An additional subsection is inserted in order to accommodate the analysis of the applicability and the appropriateness of the proposed generic Public Private Business Model (PPBM) for defence acquisition. Hence, in the within-case analyses, the following section headings are used: Business Model configuration (connected to RQ 1); Applicability of the PPBM (connected to RQ 1); Acquisition project performance (connected to RQ 2); and Acquisition project risks (connected to RQ 3). RQ 1 was partially answered in Section 4.12. In this chapter, the PPBM is submitted to testing and evaluation. The PPBM (see Table 7.1) consists of nine Business Model (BM) building blocks, *“Customer Segments”*, *“Customer Relationships”*, *“Channels”*,

“Value Propositions”, “Key Activities”, “Key Resources”, “Key Partnerships”, “Revenue Streams” and “Cost Structure” (Osterwalder and Pigneur, 2010, pp. 16-17). Two of the building blocks, “Key Resources” and “Revenue Streams”, are excluded from the analysis (see Sections 1.5 and 4.12).

Table 7.1: A generic Public Private Business Model for defence acquisition.

Key Partnerships Spectrum of degree of Public buyer (decider) – Private supplier (provider) Cooperation (PPC): Contracting out of services (Facility Management, Contractor support to operations (CSO), Outsourcing), Alternative financing solutions (Leasing, PFI solutions), Partnership solutions (Project Alliances, Strategic Partnerships (PPPs)) Process for selection of partner Identity of partner Network of suppliers	Key Activities Public buyer (decider) or private supplier (provider) responsibility, as well as Transfers (T) of responsibility, for activities such as: Design (D), Finance (F), Buy (B) / Rent (R) / Lease (L), Construct (C) / Build (B), Develop (D), Own (O), Operate (O), Manage (M), and Maintain (M) for products (equipment) and services (support).	Value Propositions Two dimensions: Equipment: Existing – Standard (OTS) – Adaptation – Foreign Development – Domestic Development Support: Traditional – Contractor Logistics Support (CLS) – Contract-for-Availability (CfA) – Contract-for-Capability (CfC)	Customer Relationships Spectrum of degree of compliance with – opposition to the user requirements: Colleague, Procurer, Challenger	Customer Segments Section or department within the Armed Forces Permanent Joint Headquarters (PJHQ) or the Front Line Command (FLC) Or Service within the Armed Forces Or Branch, Corps, Regiment, or Military unit within the services
	Key Resources “The most important assets required to make a business model work”. <div style="text-align: center;">NOT included in this thesis</div>	CfAs and CfCs will also influence most of the other Defence-Lines-of-Development (DLoDs): Training (T), Equipment (E), Personnel (P), Information (I), Concepts and Doctrine (D), Organisation (O), Infrastructure (I), Logistics (L)	Channels Two dimensions: Type (Supply – Support); Destination (Overseas – Domestic): Overseas supply chain (operations) Overseas support chain (operations) Domestic supply chain (training and exercises) Domestic support chain (training and exercises)	
Cost Structure Only different forms of the external costs (i.e. FFP, FPI, CPIF, CPFF, PBC) have been explicitly included. Internal costs are NOT included in this thesis		Revenue Streams “The cash a company generates from each customer segment”. <div style="text-align: center;">NOT included in this thesis</div>		

In this chapter, the PPBM is used to categorise and analyse the four acquisition projects that were presented in the previous chapter. In the within-case analyses, the analyses will concern the contents of seven of the nine individual PPBM building blocks, i.e. the PPBM configuration, and validation of the PPBM, i.e. to test and evaluate the appropriateness and applicability of the PPBM for the particular acquisition project. In the ensuing cross-case synthesis, the synthesis will strive to identify patterns between the PPBMs in the different cases, and any

patterns regarding the applicability of the PPBM. Hence, regarding RQ 1, the analyses and synthesis in this chapter is about categorisation of BMs, analysis of building blocks, and analysis of to what extent the suggested PPBM is appropriate to differentiate between different defence acquisition projects.

The analyses and synthesis are about identifying common patterns for different configurations of building blocks, *not* about identifying strengths, weaknesses and risks for the individual BMs that are utilised in the four cases. Consequently, the reported research concerns itself with intrinsic strengths, weaknesses and risks that are inherent with the specific BMs in the four cases, i.e. the configurations of the PPBM; not the skills of the personnel at DE&S at writing contracts; not the skills of the contractors to deliver what has been agreed upon; and not the influence of external factors, e.g. political decisions, on the performance of the acquisition projects. Consequently, for RQ 2 and RQ 3, the analyses and synthesis are about identifying the strengths and weaknesses (RQ 2) and the risks (RQ 3) that are directly connected to the BMs themselves, not the contractual implementation of them or the contextual delivery by the contractors. Hence, the analyses strive to separate and differentiate between any potential success factors, or imperfections, with the applied BMs themselves, the application of these BMs in the different written contracts, and contextual events that are to be regarded as *force majeure*, over which DE&S cannot be expected to have any power.

In Figure 6.1, the interrelationships between the acquisition project, the BM and the written contract are schematically illustrated. The acquisition project is a project that exists from the “*cradle to the grave*”, from the “*concept to the disposal of equipment*” (CADMID, see Section 5.3.4), or from the “*concept to the termination of support*” (CADMIT, see Section 5.3.4). The specific BM, which is reconstructed based on the results of the interviews, is construed to be a theoretical construct, which captures how DE&S wants to do business in a particular case, and based on which a contract can be negotiated and subsequently written. The written contract is understood to be the practical implementation, i.e. the physical manifestation, of such a theoretical construct. The written contract accordingly defines what the agreements are, i.e.: availability targets, and explicit goals for increased speed, reduced cost and/or increased quality; duration; incentive mechanisms; penalty mechanisms; payment mechanisms; renegotiation clauses; etc. The written contracts have not been analysed *per se*. Consequently, any references to the contents of the contracts are based on results of the interviews. The contextual events, which have been identified during the interviews and through secondary sources of information, are issues that are external to DE&S, e.g. defence reviews, which influence the outcome of the acquisition project, but over which neither DE&S nor the contractor has any authority. Consequently, a fundamentally sound BM can, through unfortunate contractual application or inopportune surrounding

conditions, result in an unforeseen failure, whereas an essentially below-par BM, through fortuitous circumstances, may contribute to a successful performance. Hence, the analysis reflects success and failure for the acquisition project, and why it was a success or failure, i.e. if the BM, the written contract, or, e.g., political decisions are to congratulate for any successes, or to blame for any failures.

In order to analyse RQ 2 and RQ 3, two different models for analysis have been created. In Section 4.14 a model for analysis of acquisition project performance was presented, and in Section 4.15 a model for analysis of acquisition project risks was presented. The models for analysis are reproduced in Table 7.2 and Table 7.3.

Table 7.2: A model for analysis of acquisition project performance.

Goals		Strengths	Weaknesses
Effective- ness	Availability target	Ops	
		T&E	
	Reduced delivery time	Ops	
		T&E	
	Reduced delivery cost	Ops	
		T&E	
	Increased delivery quality	Ops	
		T&E	
Efficiency	Monetary resources	Ops	
		T&E	

Acquisition project performance and risks are analysed from the point of view of DE&S. The outcomes of the individual acquisition projects that are of primary interest to this analysis are those that can be considered to be the consequences of rational choices and decisions made by DE&S. Consequently, the analysis of the acquisition project performance and risks is focused on strengths and weaknesses that have occurred because of such rational choices and decisions. Hence, the analysis regarding acquisition project performance is not about the performance of the contractors *per se*, but about the performance of the contractors as a result of choices and decisions made by DE&S, when designing the BM, selecting the contractor and writing the contract. The analysis of the acquisition project risks is also made from the point of view DE&S; not the prime or sub-contractor that delivers a product (i.e. equipment) or a service (i.e. support to equipment).

In the model for analysis (see Sections 4.9 and 4.14.) of acquisition project performance (see Table 7.2), effectiveness is divided into four overarching goals, or effectiveness components: the specific availability target, and the more generic goals of reduced delivery time, reduced delivery cost, and increased delivery quality. Efficiency is studied in terms of one solitary efficiency component: monetary resources, i.e. Value-for-Money (VfM, see Sections 4.7.2 and 4.9.9). Each of the

components of effectiveness and efficiency are analysed both for overseas operations (Ops) and for domestic training and exercises (T&E).

In the within-case analyses, the model for analysis in Table 7.2 is used to analyse the acquisition project performance, i.e. the effectiveness and the efficiency, for each of the different cases, and to identify any particular strengths and/or weaknesses that are inherent in the utilisation of the underlying BMs. In the ensuing cross-case synthesis, the objective is to ascertain whether or not there are any detectable patterns between the strengths and weaknesses of the different BMs.

In the model for analysis (Sections 4.10 and 4.15) of acquisition project risks (see Table 7.3), supply chain risks and uncertainties are identified based on source and on type. The sources of supply chain risks and uncertainties are divided into risks that are external to the supply chain (environmental risks) and risks that are internal to the supply chain (organisational and network risks, where network risks are divided into supply and demand risks). The type of supply chain risks and uncertainties are divided into operational accidents, operational catastrophes and strategic uncertainties. Each of the types of risks and uncertainties are analysed both for overseas operations (Ops) and for domestic training and exercises (T&E).

Table 7.3: A model for analysis of acquisition project risks.

Ops: Overseas operations T&E: Domestic Training and Exercises			Sources of supply chain risks and uncertainties			
			External	Internal		
			Environ- mental risks	Organi- sational risks	Network risks	
					Supply risks	Demand risks
Type and consequence of supply chain risks and uncertainties	Operational accidents	Ops				
		T&E				
	Operational catastrophes	Ops				
		T&E				
	Strategic uncertainties	Ops				
		T&E				

In the within-case analyses, the model for analysis in Table 7.3 is used to analyse the risks and uncertainties, i.e. any operational accidents, catastrophes or strategic uncertainties, for each of the four cases, and to connect them to the appropriate source. In the cross-case synthesis, the objective is to determine if there are any common patterns among the BMs.

Analogous to the within-case analysis and cross-case synthesis for RQ 1, the results of the analysis and any established patterns discovered through the cross-case synthesis for RQ 2 and RQ 3, can either be due to inherent aspects of the BMs, be a result of similarities in the contractual or contextual implementations of the BMs, or be a combination of the three.

7.2 Analysis of the C Vehicle Acquisition Project

7.2.1 Business Model Configuration

The PPBM configuration used by the DE&S Project Team (PT) in the C Vehicle (Construction Vehicle) acquisition project is illustrated in Table 7.4.

Table 7.4: The C Vehicle Business Model configuration.

Key Partnerships PPC: Alternative financing solution (PFI) Selection of partner: Through competition Prime contractor: ALC Sub-contractor: Multipart Defence Other important actors: Consortium of banks (PFI)	Key Activities Private sector: Finance – Buy – Own – Operate – Manage – Maintain, (FBOOMM) Public sector: Design	Value Propositions Equipment: Adapted COTS Support: Cfa Included DLoDs: Training, Equipment, Personnel, Information and Logistics Other affected DLoDs: None	Customer Relationships Procurer	Customer Segments The British Armed Forces, i.e. the British Army, the Royal Navy and the Royal Air Force (RAF)
Key Resources			Channels Overseas supply (JSC, PG) and support chains Domestic supply and support chains	
Not included in this thesis				
Cost Structure Firm Fixed Price (FFP)			Revenue Streams Not included in this thesis	

The “*Business Model Canvas*”, on which the PPBM is based, is described in Table 4.12; the operationalisation (see Section 4.2) provided by Osterwalder and Pigneur (2010) is described in Table 4.13 and Table 4.14; and the operationalisation used in the PPBM is presented in Table 4.23 and duplicated in Table 7.1.

Customer Segments

The “*Customer Segments*” (see Section 4.12.1) in the C Vehicle BM, was initially all the Corps and Regiments within the British Army, e.g. the Royal Engineers (RE), but has been expanded to include the Royal Navy and the Royal Air Force (RAF).

Customer Relationships

The “*Customer Relationships*” (see Section 4.12.2) in the C Vehicle BM is the role of the “*procurer*”. The C Vehicle PT plays its role as an intermediary between the customers and the prime contractor when that is required, and assumes a more passive, monitoring role when everything is running smoothly.

Channels

In the C Vehicle BM, all four different types (see Table 4.20) of “*Channels*” (see Section 4.12.3) are utilised in order to reach the military customers. Hence the overseas supply chain and the overseas support chain for operations, and the

domestic supply chain and the domestic support chain for training and exercises (see Section 6.2.3) are all in use. The MoD does not allow contractors in its Joint Supply Chain (JSC, see Section 4.8.7) beyond the Purple Gate (PG, see Section 4.8.7) and through the Coupling Bridge (CB, see Section 4.8.7). Consequently, MoD no longer accepts fragmentation (see Section 4.8.7) of its JSC. Equipment and spares for overseas operations must go through the JSC, which means that the contractor must deliver the goods to the PG.

In order to reduce costs, MoD strives to run on a lean fleet of vehicles, i.e. without any redundancy. One of the consequences of this is that the Reverse Supply Chain (RSC, see Section 4.8.7) has to be as fast as the Forward Supply Chain (FSC, see Section 4.8.7), otherwise broken down vehicles will start piling up somewhere in the RSC. However, this is often an insoluble equation in a dynamic operation. In order to have a minimum of vehicles in the system, an alternative solution is to push repairs of these vehicles as far forward as possible in the FSC, and this is what MoD strives to do. Hence, in order to make the solution as cheap as possible, MoD uses contractors in the military support chain. However, these contractors are so called Sponsored Reserves (SRs, see Section 4.8.7), and they are employed by the contractor, but partially financed by DE&S, and partially employed in the Territorial Army (TA, see Section 6.5.2). When they are needed on an operation, they suit up in a military uniform and place themselves under military command as combatants, equally ready to use a wrench to do Maintenance, Repairs and Overhauls (MRO) as they are to use a rifle in order to do their part in the protection of their camp, or whatever the task at hand may be.

Value Propositions

The “*Value Propositions*” (see Section 4.12.4) in the C Vehicle BM is availability of construction and Mechanical Handling Equipment (MHE, see Section 6.2.2). The vehicles are militarily adapted Commercial-Off-The-Shelf (COTS) construction vehicles. In essence, DE&S has outsourced the acquisition of vehicles and spare parts, the production of necessary publications, and maintenance and most levels of repair, to the contractor. However, the Royal Mechanical and Electrical Engineers (REME) retain responsibility for front line, i.e. first level (L1, see Section 4.8.2), repairs. The C Vehicle PT audits that the contractor follows the correct processes for equipment selection, trialling, codification and level of repair analysis.

The C Vehicle BM is a Contract for Availability (CfA, see Section 5.3.7), but it is not clear when, where or how availability should be delivered, at least not for overseas operations. The introduction of the PG in the JSC has complicated matters to a large extent, insofar as delivery of availability goes. The answers to the questions regarding when, where and how availability is being delivered are ambiguous. The contractor cannot be expected to be responsible for what happens after the PG. Since the contractor is not allowed to transport the vehicles to the

Joint Operations Area (JOA, see Section 4.8.6) as he sees fit, but is required to utilise the JSC and enter this through the PG, the consequence is that the contractor is not allowed to deliver availability to the JOA. This means that it is debatable whether or not this is a CfA. If it is to be regarded as a CfA, then it is not clear where availability is being delivered. Is it at the PG, or is it within the prime or the sub-contractor's premises? Availability is required in the JOA, when the British Army needs it. But because of the PG, the contractor is not allowed to deliver availability to the JOA, so when is availability being delivered? Is it when it arrives at the PG, is it within the prime or the sub-contractor's premises, or is it merely as a positive response to the requirement from the RE, even if there will be a time delay because of the transportation to the PG and through the JSC?

The BM includes most of the Defence Lines of Development (DLoDs, see Section 5.3.6) more or less directly. Training, Equipment, Personnel, Information and Logistics are all affected by the BM, but Equipment and Logistics are the two most important DLoDs in the C Vehicle BM. None of the remaining DLoDs, i.e. Concepts & Doctrine, Organisation, and Infrastructure, are affected indirectly.

Key Activities

In the C Vehicle BM, the responsibilities for the “*Key Activities*” (see Section 4.12.5) are divided (see Section 6.2.4) between the public and private sector as follows. The public sector, i.e. MoD, is responsible for designing (D) the service, i.e. the provision and support of C Vehicles, whereas the private sector assumes responsibility for the rest of the “*Key Activities*”. A consortium of banks are responsible for financing (F) and the prime contractor assumes responsibility for buying (B), owning (O), operating (O), managing (M), and maintaining (M) the equipment throughout the duration of the contract. Hence, there is no transfer (T) of ownership or any responsibilities involved. From this aspect, the sharing of responsibilities for “*Key Activities*” in this BM can be categorised as Finance-Buy-Own-Operate-Manage-Maintain, or FBOOMM. This division of responsibilities for “*Key Activities*” in the C Vehicle BM is illustrated in Table 6.2. There is a complication with this categorisation of the BM. While the responsibilities, *in principle*, lies with the public and private sector as described above, the existence of the PG complicates matters yet again. Even if ownership for the equipment remains with the contractor even after the equipment has passed the PG, the full responsibility, e.g. risk taking, associated with ownership cannot lie with the contractor, since the contractor has no influence over the equipment after that node in the chain. The implication of the introduction of the PG is that there can, in practise, be no transfer of risk to the private sector beyond this point in the JSC, even if theory, i.e. the contract, states that there is, formally, a transfer of risk. Hence, the PG, while solving some problems, also creates new ones.

Key Partnerships

“*Key Partnerships*” (see Section 4.12.7) concerns the type of cooperation between the buyer, the supplier and other important actors in the supply chain, how the partners were selected, and the identity of the partners. The type of Public-Private-Cooperation (PPC, see Section 4.7.5) in the C Vehicle BM is a Private Finance Initiative (PFI, see Section 4.7.7), which is an “*Alternative financing solutions*” (see Figure 4.15). The prime contractor in the C Vehicle BM is an SPV (Special Purpose Vehicle, see Section 4.7), called ALC (see Section 6.2.1), which was created specifically and exclusively for this contract. Multipart Defence is ALC’s sub-contractor, and is responsible for providing the spares to keep the fleet of C Vehicles operational. Since the origins of this BM predate the Defence Industrial Strategy (DIS, see Section 5.2), even if the contract was not signed until 2005, i.e. the same year as the DIS was published, the contractor was selected through competition, rather than selected by other means (see Section 5.3.10). In order to provide the necessary capital, a consortium of six banks was established.

That the BM is a PFI has turned out to be the principal problem for DE&S with this acquisition project. In a partnership or an alliance, i.e. a long-term relationship, between DE&S and a contractor from the defence industry, it is quite possible that the partners could come to a mutually beneficial agreement if/when something out of the ordinary that was not anticipated, i.e. not included and regulated in the contract, occurred. It would be in the interest of the contractor to maintain a good relationship with DE&S, if the contractor was interested in receiving contracts in the future, so DE&S would expect some flexibility and compliance on the part of the contractor. In a PFI there is also the consortium of banks to take into consideration. In this BM, and in all likelihood in all BMs that are based on a PFI, it turned out that the banks are only interested in receiving their Return on Investment (ROI). The banks are not interested in any changes in defence or security policies that MoD has to address. All of the banks are not even UK banks, and have, from a UK defence and security policy perspective, no reason to feel sympathetic towards any impending predicament of MoD. Regardless of their nationality, from the point of view of the banks, the contract will have to be pursued according to its paragraphs, letters and intents. Alternatively, the contract will have to be renegotiated or prematurely cancelled. In either case the banks will expect and demand a compensation corresponding to their calculated ROI.

In the late 1990s, PFIs were recommended for MoD acquisition of equipment and support. However, it is now realised by Her Majesty’s Treasury (HMT) that a PFI, even though it is able to even out the investment curve over time, rather than to have the initial major investment to force into the budget, does mean that the equipment, or support to that equipment, that is acquired will be more expensive in the end, i.e. that the Total Cost of Ownership (TCO) will be increased. Since

this is not Value-for-Money (VfM, see Sections 4.7.2 and 4.9.9), PFIs are no longer recommended for defence acquisition. As illustrated above, there are also other problems with PFIs. In combination, this means that BMs that contain PFIs are no longer particularly attractive BMs in the UK defence sector.

Cost Structure

The “*Cost Structure*” (see Section 4.12.9) building block only includes external costs, not internal costs. There is only one external cost associated with this BM, a firm and Fixed-Price over the duration of the contract (see Section 6.2.5). Hence, the C Vehicle BM is based on a Firm Fixed-Price (FFP, see Section 4.6.7) type “*Cost Structure*”. The C Vehicle BM contains a CfA type “*Value Propositions*”, which is supposed to incentivise industry to take responsibility for increasing reliability and consequently system availability. However, even if the FFP involves the transfer of risk to the supplier and an incentive for the supplier to deliver as quickly as possible, there are no explicit contractual incentive mechanisms such as in a Fixed-Price Incentive (FPI) or a Cost-Plus Incentive Fee (CPIF). A partial explanation for the selection of a FFP may be found in the fact that even if it is a BM that includes much of the ideas from the DIS, it is a First Generation Defence Acquisition BM (see Section 5.3.10).

The “*Cost Structure*” building block disclosed an indistinctness concerning with what the external costs for the contractor should be compared. Whether or not the cost of the contractor should be compared to the past, present or future cost for DE&S, if the responsibility had been retained within MoD, is unclear (see Section 1.5). Similarly, it is not clear whether or not comparison should be made with an enhanced capability of DE&S. A radical learning effect within DE&S could be one of the likely fringe benefits of allowing a private contractor to perform the services.

Even though the PPBM does not explicitly include the internal costs in the reported research, it is justified to say a few words about the internal costs in order to illustrate what sort of issues that future research could address. Despite the outsourcing, the C Vehicle PT must retain resources in the form of personnel. There is a team of 16 people to monitor the contract, audit the efforts of the contractor, and to pay the contractor for the services rendered. The team must also assess DE&S requirements for new equipment, assess sustainability across the DLoDs, and match the demands from the military units with the limitations of the contract. These activities represent additional, DE&S internal, costs and time delays, which means that the contractor must be even “*faster, cheaper, better*” than what would have been the case without this partial duplication of efforts. DE&S must also preserve competence enough to be able to renegotiate, if need be, during the contract, and to negotiate a new contract, when the current one has run its course. The costs for this competence must also be added to the cost against which the baseline cost, i.e. the cost if DE&S did everything by itself, is compared

through the Public Sector Comparator (PSC, see Sections 4.7.2, 4.7.9 and 4.10.3), which ought to precede every sourcing decision. The internal costs for managing a complex contract are significant and should thus be included in future research.

Configuration of the most differentiating building blocks

In Table 7.4, the configuration of the most differentiating building blocks of the C Vehicle BM building blocks is presented. The PPBM consists of nine building blocks, of which two are not included in the reported research. The more complex of these building blocks are configurations themselves.

Table 7.5: The configuration of the four most differentiating building blocks in the C Vehicle Business Model.

Key Partnerships				
Contracting out of Services				
Facility Management		Contractor Support to Operations		Outsourcing
-----		-----		-----
Alternative financing solutions				
Leasing		PFI Solutions		
-----		C Vehicle		
Partnership solution				
Project alliances		Strategic partnerships		
-----		-----		

Value Propositions					
Equipment	Domestic development	----	----	----	----
	Foreign development	----	----	----	----
	Adapted OTS	----	----	C Vehicle	----
	Standard OTS	----	----	----	----
	Existing	----	----	----	----
		Traditional	CLS	CfA	CfC
Support					

Key Activities									
		Design (D)	Finance (F)	Buy (B)	Own (O)	Operate (O)	Manage (M)	Maintenance (M)	Transfer (T)
Private sector	----	C Vehicle	C Vehicle	C Vehicle	C Vehicle	C Vehicle	C Vehicle	C Vehicle	-----
Public sector	C Vehicle	-----	-----	-----	-----	-----	-----	-----	-----

Cost Structure					
Contractor's motivation	High				PBC

	Medium	CPFF		CPIF	
		----		----	
	Low	FFP		FPI	
	C Vehicle		----		
		Low	Medium	High	
Client's assurance					

It is probably safe to say that the two least elaborate of the seven included building blocks, i.e. “Customer Segments” and “Customer Relationships”, are unlikely to be differentiating in any significant way between the BMs in the four cases. While the “Channels” building block, in theory, can differentiate between the BMs for domestic training and exercises, it cannot be differentiating for overseas operations because of the PG in the JSC and because of MoD reluctance to allow contractors in the support chain. Any differences in the performance and risks between different acquisition projects are more likely to be connected to the contractor and external events than the “Channels” building block. Consequently, in order to expedite the ensuing comparison between the different BMs, the configuration of

the four most differentiating build blocks in the C Vehicle BM is presented in Table 7.5, which displays the configuration of the “*Value Propositions*”, the “*Key Partnerships*”, the “*Key Activities*”, and the “*Cost Structure*” building blocks.

7.2.2 Applicability of the PPBM

The Customer Segments building block

The “*Customer Segments*” building block is based on defence acquisition tradition, rather than on the possibilities illustrated in Section 4.12.1. Consequently, in its current version of the PPBM, this building block identifies the military customer and nothing more. It is not difficult to apply the “*Customer Segments*” building block and it contributes to categorising the C Vehicle PPBM as directed towards all three services within the British Armed Forces, i.e. the British Army, the Royal Navy, and the RAF. It is possible that another operationalisation, e.g. the spectrum of peace, crises and war, could enhance the contribution of this building block.

The Customer Relationships building block

The “*Customer Relationships*” building block is also based on defence acquisition tradition, rather than on the possibilities illustrated in Section 4.12.2, which makes it relatively trivial to apply. It contains a scale of three possible values. In this case, it was straightforward to categorise the relationship as “*procurer*”. It is possible that also this building block would benefit from an alternative operationalisation.

The Channels building block

In the “*Channels*” building block four different “*Channels*” can be used to reach the military customers. It is uncomplicated to identify which “*Channels*” that are being used, and in this case all four “*Channels*” are used. The “*Channels*” building block demonstrates its usefulness by revealing how, i.e. through the introduction of the PG and the SRs, MoD avoids private contractors in the supply and support chains, thus consequently avoiding fragmentation of the JSC and the support chain. It also reveals that problems have been created and solved by these inventions.

The Value Propositions building block

The “*Value Propositions*” building block is one of the most essential components of the PPBM since it describes what it is that is delivered to the customer. The two proposed dimensions cover the equipment and the support solution. In combination with a description of the effected DLoDs this building block captures what it is that is offered to the military customer. The application in this case, i.e. the identification of adapted COTS equipment and a CfA support solution, did not present any problems. It was also undemanding to identify the DLoDs that were included in, or affected by, the BM. The “*Value Propositions*” building block proves its worth by, in combination with the “*Channels*” building block, providing

insights regarding the negative effects of the PG. It is not clear when, where and how availability is being delivered, since the contractor cannot be responsible for what happens after the PG, despite retaining ownership of the equipment.

The Key Activities building block

The “*Key Activities*” building block describes the division of responsibilities between the public and the private sectors and is of principal interest. In this case it was easy to define the sharing of responsibilities for “*Key Activities*” in this BM as Finance-Buy-Own-Operate-Manage-Maintain, or FBOOMM. The “*Key Activities*” building block demonstrates its significance by, in combination with the “*Channels*” building block, illustrating another downside to the introduction of the PG. Risk transfer is severely interfered with by the existence of the PG. It is far from obvious how contractor ownership of equipment and spares, implying a significant risk taking on the part of the contractor, can be combined with the PG, which means that MoD is responsible for transportation beyond the PG.

The Key Partnerships building block

The “*Key Partnerships*” building block describes the form of PPC, selection of partner and identity of partners. To provide this information was straightforward for this case. ALC was selected by competition, and the PPC is conducted in the form of a PFI. The “*Key Partnerships*” building block has been constructive in order to understand the problem a PFI can entail. This building block shed light on the fact that it is problematic to renegotiate a contract with a consortium of banks that are primarily interested in their ROI. The PFI is, however, no longer a preferred PPC alternative in the UK defence sector.

The Cost Structure building block

In the “*Cost Structure*” building block, one of five possible “*Cost Structures*” describes how the contractor is paid. In this case the “*Cost Structure*” in the BM was easily identified as a FFP. The “*Cost Structure*” sheds some light on an interesting feature of this case, namely a potential mismatch between the FFP and the CfA, i.e. a misalignment between the contents of two of the building blocks in the BM. The “*Cost Structure*” building block also reveals the ambiguity regarding with what the external costs for the contractor should be compared. It is not clear if these costs should be compared against the past, present or future costs for DE&S if the responsibility had been retained within MoD. Further, it is not clear if comparison should be made against an enhanced capability of DE&S, or not. Despite the fact that, in the reported research, the “*Cost Structure*” building block does not include internal costs, this case provides an opportunity to illuminate the observation that, even when acquisition itself has been outsourced, internal costs are not negligible. The internal costs for management, monitoring, paying the contractor, etc., are significant and ought consequently to be explicitly included in future research.

7.2.3 Acquisition Project Performance

Table 7.6: The C Vehicle acquisition project performance.

Goals		Strengths	Weaknesses
Effectiveness	Availability target	Ops	The contractor reaches the contracted level of service. It is unclear whether or not the availability target has been arbitrarily selected, or not. Because of the Purple Gate it is unclear where, when and how availability should be measured. The contracted level of service is no longer required. Hence, it is too easy for the contractor to reach the target.
		T&E	The contractor reaches the contracted level of service. It is unclear whether or not the availability target has been arbitrarily selected, or not. Regiments do not appreciate deliveries at their gates at the contractor's leisure. Because of the lack of requirement for availability for overseas operations, it is too easy for the contractor to reach the domestic target.
	Reduced delivery time	Ops	---
		T&E	The contractor has reduced the delivery time. The contractor can not reduce the delivery time because of the Purple Gate. It is unclear if delivery time should be compared to the past, present or enhanced future ability of the MoD.
	Reduced delivery cost	Ops	---
		T&E	---
	Increased delivery quality	Ops	---
		T&E	Best level of service ever delivered to the Royal Engineers.
Efficiency	Monetary resources	Ops	Because of the contract, the MoD DE&S now has a much better understanding of its overall costs. The contract has not been tested to its full capacity. It is unclear if delivery quality should be compared to the past, present or enhanced future ability of the MoD DE&S.
		T&E	Because of the contract, the MoD DE&S now has a much better understanding of its overall costs. The contract has not been tested to its full capacity. It is unclear if delivery quality should be compared to the past, present or enhanced future ability of the MoD DE&S.

In Table 7.6, the performance, i.e. the effectiveness and efficiency (see Section 4.9.5), of the C Vehicle acquisition project is described, by presenting the strengths and weaknesses of the acquisition project. The assessment of the performance of

the acquisition project is illustrated in Table 7.7. The strengths and weaknesses of the C Vehicle BM are summarised in Table 7.8. “*Ops*” stands for Overseas Operations, and “*T&E*” stands for Domestic Training and Exercises.

Availability

The contractor in the C Vehicle acquisition project is a SPV established with the sole purpose of delivering C Vehicles in accordance with the contract. Since this was an SPV, with a single customer, it was necessary for DE&S to guarantee a certain level of service in the contract, regardless of the actual activity rate, below which it would not be economically feasible for the contractor to conduct business. The planning assumption at the time when the contract was signed was that the UK would continuously participate in two medium scale operations, one small scale operation, and simultaneously conduct normal training and exercises. Based on this assumption, the contract stipulates a minimum level of service. The planning assumption held true in the beginning of the contract period, when the UK was participating in Op Telic and in Op Herrick, was active in the Balkans, and conducting training and exercises. However, over the first five years of the 15 year contract, the reality of UK participation in overseas operations has changed. The extent of the activities in Iraq and on the Balkans has been reduced, and the activities in Afghanistan have changed its character. The consequence of these changes is that the UK occasionally runs below the contracted service level, which means that the contractor has no problem to meet its obligation.

The predominant requirement from the RE is to have contractor vehicles available for training and exercises. The level of service from the contractor surpasses what the RE has ever seen before. Unsurprisingly, the RE is satisfied with the service. The problem is that the contracted level of service was set a level that is far too high compared to what is needed at present. The contractor is guaranteed a certain amount of work each month, in order to keep the vehicles at the contracted availability. Compared to what the contract stipulates, the contractor is delivering the contracted availability. Compared to what is needed, this level of service is far too high. The contractor delivers the level of service that DE&S required when the contract was signed, but that is no longer the level of service that is required.

The contractor reaches the contracted level of service, for overseas operations and for domestic training and exercises. However, the contracted level of service is no longer required for overseas operations. Hence it is too easy for the contractor to reach the target also for domestic training and exercises. This is not a negative assertion regarding the level of service that the contractor delivers; merely an observation that the contracted level of service is no longer required for overseas operations, which means that it is comparatively easy for the contractor to deliver what is required for domestic training and exercises. Hence, this observation refers exclusively to the problem of accurate forecasting on the part of DE&S, especially

in the light of contextual events like political decisions; not the quality or quantity of what the contractor is delivering at present. In addition, because of the PG, it is unclear where, when and how availability should be measured for overseas operations. Availability cannot be measured in the JOA, since the contractor cannot be held responsible for the transportation to the theatre. Hence, it is open for discussion if availability should be measured at the PG, within the prime or sub-contractor's premises, or elsewhere. For domestic training and exercises there is yet another complication for the availability target. In order to optimise its delivery schedules, the prime contractor would preferably deliver equipment and spares to the Regiments when it is convenient to the contractor, or the TPL provider that is responsible for the distribution. Regiments do not appreciate deliveries at their gates at the contractor's leisure, and deliveries are sometimes turned away.

Delivery time

For training and exercises, the contractor appears to have reduced delivery time compared to what DE&S could previously deliver. Whether or not the contractor is faster now than what DE&S could have been today is, however, debatable, and beyond what is possible to answer in this thesis, since it remains unclear if delivery time should be compared to the past, present or enhanced future ability of DE&S.

For operations, the contracted level of service is not required. If the service *was* required, it is unlikely that the contractor would have been able to reduce the delivery time because of the PG. The contractor would have been referred to the JSC, obliged to use the PG and necessitated to follow the military scheduling. Since the contractor is not allowed beyond the PG, speed is only of interest up to this point in the JSC. Hence, it does not seem reasonable to expect the contractor to be able to reduce the delivery times for overseas operations. In addition, it is unclear if the delivery time should be compared to the past, present or enhanced future ability of DE&S. For the contractor to be faster than DE&S, the contractor would have to reach the PG early enough to make an earlier transport than DE&S could have done. In theory, the contractor could then be faster than DE&S. In practice, transportation from the APOE or SPOE is in all likelihood so thoroughly planned and scheduled that it would be difficult to make an earlier transport, which means that the contractor could only be considered to be faster than DE&S if the contractor had the equipment ready for use, when DE&S would not have had the equipment ready for use. The operational requirements are currently not exacting enough for this to be an issue at all in this case.

Delivery cost

For cost reductions, it is difficult to decide what to compare against. The contractor may deliver the contracted level of service more cheaply than what DE&S would have been able to do. However, that level of service is no longer required, which means that DE&S is paying for a higher level of service than they

need. From this point of view, the cost is now higher compared to what it would have been without the contract, since there is no built in flexibility to easily reduce the level of service. However, the delivery cost should be compared against DE&S cost for delivering the contracted level of service. Even so, it is unclear if delivery cost should be compared to the past, present or enhanced future ability of DE&S.

Delivery quality

The contract has not been tested to its full capacity. It is unclear if delivery quality should be compared to the past, present or enhanced future ability of DE&S. If higher quality is measured as customer satisfaction, the contractor has succeeded in making the RE content. The RE considers the delivery quality to be the best level of service that has ever been delivered to them for domestic training and exercises. Whether or not the customer would have been equally happy with the service if they required the service for overseas operations as anticipated in the planning assumptions is impossible to answer, since the contractor has not been tested.

Effectiveness

To summarise the effectiveness component of the performance of the acquisition project: the contractor delivers the agreed availability (even if this level of service is no longer required); the contractor may deliver the service faster to domestic training and exercises, but not to overseas operations (since they are required to use the JSC, the contractor can hardly be expected to be faster than DE&S could have been); the contractor is not cheaper than DE&S would have been (since DE&S has to pay for a level of service they are not using); and the contractor delivers the level of service with a high quality (but the contractor is not tested to the full capacity, especially not for overseas operations). It is quite likely that if DE&S had performed the service, it would have dimensioned its service based on the same planning assumptions as the C Vehicle contract was based on. However, it is also likely that it would have been easier and cheaper for DE&S to adapt such a solution to new circumstances than what it has proved to be to adapt the PFI with its consortium of banks, which only focus on their ROI. Even so, the underlying generic problem would have been exactly the same; the predicted requirements would still have been far away from what is now required.

There were four goals for this acquisition project: contracted availability, increased speed of service, decreased cost of service and increased quality of service. All of these goals were not reached. Hence, this acquisition project is not 100% effective. On the scale “*Low – Medium – High*”; the effectiveness of this acquisition project is assessed to be “*Medium*”. However, the actual value, i.e. “*Low*”, “*Medium*” or “*High*” is not the main focus, but is, in combination with the corresponding assessment of the efficiency, used as a vehicle in order to assess the acquisition project performance, in order to determine the strengths and weaknesses of the underlying BM. The two main reasons behind the “*Medium*” effectiveness are the

existence of the PG and that the planning assumptions are no longer valid. Because of the changed planning assumptions, the contracted level of service is no longer required. Hence it is too easy for the contractor to satisfy the customer. Because of the PG: the contractor cannot deliver the service faster to overseas operations; DE&S is not transferring any risk in practise, since the contractor is not allowed to use any other route than the JSC; and it is debatable whether or not it is possible for the contractor to deliver availability, at least to the theatre.

There are also plausible rival (see Section 3.5.4) explanations for the results produced in this analysis: a potential “*measurement problem*” and a potential “*comparison problem*”. It is not clear when, where and how availability should be measured. Furthermore, it is not clear how changes in delivery time, delivery cost and delivery quality should be measured. In addition, it is not unambiguous what the baseline is, i.e. against what to compare these measurements. Delivery time, cost and quality could be compared to the past, present or future (enhanced) ability of DE&S. These alternative explanations suggest that a partial explanation to the “*Medium*” effectiveness could lie with the KPIs. Another way of interpreting the alternative explanations is that the contract does not include the specific clauses and paragraphs, e.g. incentive mechanisms, which would have been necessary in order for the contractor to continuously strive to improve in all the different aspects of effectiveness. Hence, it may well be that the effectiveness is “*High*”, perhaps even 100%, when considering what is included in the written contract. This could be an example of sub-optimisation, where the contractor focuses his efforts on those goals that are explicitly specified in the written contract, and ignores, or allocates less resources to, fulfilling those goals that are not equally explicitly specified. Since the written contract has not been analysed, it is not possible to provide an answer to this reflection, merely to offer it as a possible, rival explanation to the less than 100% effectiveness.

Efficiency

The efficiency component of performance deals with how the resources were used to reach the goals. The availability goal is reached in this acquisition project. However, since the original planning assumptions are no longer valid, the contractor does not have to deliver equipment to overseas operations. In turn, this means that it is relatively easy for the contractor to meet the availability target for domestic training and exercises. The contractor is guaranteed a minimum level of service. Since the C Vehicles are not required for overseas operations, the contractor is in a position to give full attention to providing vehicles to domestic training and exercises. It is unlikely that training and exercises produce the contracted minimum amount of work. Hence, it is relatively easy for the contractor to deliver the required service to training and exercises. The RE is not using the equipment as much as formerly anticipated, while DE&S has to pay for

the contracted level of service. Of the remaining three goals (“faster, cheaper, better”), only the goal for increased quality has been (partially) reached.

Since this acquisition project does not reach goal fulfilment, and since it is more expensive that it would have been if DE&S had performed the service, it is not an efficient acquisition project and not an optimum use of money. On the scale “Low – Medium – High”; the efficiency of this acquisition project is assessed to be “Low”. Similarly to the reasons behind the “Medium” effectiveness, the main reasons behind the “Low” efficiency are the PG and the changes regarding the planning assumptions. However, if they exist, the rival explanations, i.e. the “measurement problem” and the “comparison problem”, would have effects also on the efficiency. Similarly, the lack of contract specificity may be a rival explanation also for the “Low” efficiency. Even though the C Vehicle acquisition project is not efficient, it has contributed to enhancing DE&S awareness concerning its costs. It is also likely that the acquisition project will have had a learning effect on DE&S, so that its ability is enhanced because of the benchmark that the contractor has provided. These two fringe benefits, or spin-off effects, are not included as effectiveness goals, but perhaps they should have been explicit goals for the acquisition project.

Performance

The C Vehicle acquisition project is neither effective nor efficient. All goals are not reached, and the goals that are reached could have been reached with less use of monetary resources. Consequently, the effectiveness and efficiency, and therefore also the performance, of this acquisition project are far from as good as they could have been. The C Vehicle PT is (in October 2010) considering different ways of terminating the contract prematurely, even if this would mean that DE&S would have to pay a substantial premium, i.e. corresponding to the banks expected ROI over the contract period, to buy out of the contract.

Table 7.7 The performance of the C Vehicle acquisition project.

Effectiveness	High	Average Performance	Above average Performance	Good Performance
	Medium	C Vehicle: Below average Performance	Average Performance	Above average Performance
	Low	Poor Performance	Below average Performance	Average Performance
		Low	Medium	High
Efficiency				

The effectiveness was assessed to be “Medium” for this acquisition project, and the efficiency was assessed to be “Low”. The performance was then obtained by using the combination suggested in Table 3.2. The performance of the C Vehicle acquisition project is illustrated in Table 7.7. The performance was assessed to be “Below average” on the scale “Poor – Below average – Average – Above average –

Good". Even though some elements (e.g. the availability target and delivery quality for domestic training and exercises) of effectiveness are better than ever, when aggregated, the overall effectiveness is assessed to be *"Medium"*. Since the efficiency is assessed to be *"Poor"*, the overall performance is assessed to be *"Below average"*. Despite the fact that the RE is more satisfied than ever with the service, the acquisition project is neither effective nor efficient.

Business Model strengths and weaknesses

In Table 7.8 the strengths and weaknesses in the C Vehicle BM are summarised.

Table 7.8: Summary of strengths and weaknesses in the C Vehicle Business Model.

Building block	Building block component	Major strengths	Major weaknesses
Channels	Purple Gate (PG)	Eliminates fragmentation of the supply chain Reduces theft in the supply chain Reduces problems with operational planning	Not clear when, where and how availability is being delivered by the contractor The effect on private ownership and private responsibility for, e.g., risk in the JSC is not clear The effect on transfer of risk to the contractor is not clear Delivery times to operations can not be reduced by the contractor Not clear if contractor delivery times should be compared to past, present or future ability of the MoD, if the service had been kept in-house
Channels	Sponsored Reserves (SRs)	Allows contractors in the support chain without fragmentation	Loss of competence within the British Army
Value proposition	Contract for Availability (CfA)	<i>Potential strengths are achieved through the contractual implementation of the business model</i>	White van deliveries not appreciated by regiments and consequently frequently stopped at the gate
Key activities / Key partners	Private responsibility for financing – Private Finance Initiative (PFI)	The investment in new equipment could presumably be made much earlier than what would otherwise have been possible	No flexibility since it involves a consortium of banks Not Value-for-Money (VfM) – No longer recommended by HMT for defence acquisition in the UK
Cost structure	Firm Fixed Price (FFP)	The price is known in advance	Misalignment between business model and contract (CfA) No incentive for the contractor to reduce delivery time No incentive for the contractor to increase delivery quality Not clear if contractor delivery costs should be compared to past, present or future cost of the MoD, if the service had been kept in-house

In this case, the overall *"Below average"* performance of the C Vehicle acquisition project can be attributed to the configuration of the BM (i.e. the theoretical construct), to the contractual contents (i.e. the written contract), and to the unfortunate contextual circumstances (i.e. external events such as political

decisions). The configuration of the BM is a partial explanation to the “*Below average*” performance, primarily due to the PFI, the PG, the CfA and the FFP. The “*Key Partnerships*” building block includes a PFI, the “*Channels*” building block includes the PG in the overseas supply chain for equipment and spares, the “*Value Proposition*” building block includes a CfA, and the “*Cost Structure*” building block utilises FFP. Because of the PFI there is no flexibility. Because of the PG, delivery time to operations cannot be decreased by the contractor. Because of the CfA, deliveries are sometimes turned away at the Regiments’ gates. Because of the FFP, it is debatable if the contractor is as incentivised as he could have been with, e.g., a PBC. This configuration, i.e. the combination of a PFI, the PG, the CfA and the FFP appears to represent a mismatch, or a misalignment, in the C Vehicle BM.

As soon as banks are involved, which they normally are in a PFI, any potential flexibility is severely reduced. The banks are only interested in their ROI. They have no direct stakes in the defence sector, and they do not have to act as a long-term defence industry partner with DE&S probably would, i.e. display a certain degree of flexibility and if necessary renegotiate the terms, even if this was not in exact accordance with the contract. In this acquisition project, the PFI was part of the reason for the less than successful performance. With banks involved, it is difficult to obtain approval for any actions that will jeopardise their ROI. The existence of the PG is another partial explanation to the “*Below average*” performance. While it addresses and solves some operational problems, the PG simultaneously introduces new issues of serious concern. The PG raises the question of how a contractor can be expected to assume responsibility for the availability of a system in theatre if he is referred to the JSC. If he is referred to the JSC and military scheduling, it is also difficult to comprehend how the contractor should be able to reduce the delivery time. In addition, even if a significant portion of responsibility, including equipment ownership, has been outsourced to the contractor, there can, in practise, not be any risk transfer as long as the contractor is obliged to use the JSC, where MoD retains full responsibility.

The C Vehicle BM includes a CfA. One of the implications of this is that the contractor is supposed to deliver spares directly to the Regiments. While this may be a good idea in theory, in practise, deliveries are turned away at the Regiments’ gates, since the military units do not appreciate “*White-Van-Man*” (see Section 6.4.3) deliveries at times that are more suitable to the distributor than to them. Another interesting feature of the C Vehicle BM, which may shed some light on parts of the “*Below average*” performance of the acquisition project, is that the “*Cost Structure*” is a FFP. The reason for this is probably due to the fact that this BM is a First Generation Defence Acquisition BM, i.e. the preparation of the Initial Gate Business Case (IGBC, see Section 5.3.4) was begun already in 1999, soon after the SDR 1998. Since the contract was delayed until 2005, there are, however, elements

of a Second Generation Defence Acquisition BM in the C Vehicle BM. It is, *inter alia*, a CfA, even though it formally predates the DIS, through which the CfA was introduced. Since the “*Value Propositions*” involves CfA, this suggests that this is a relatively complex acquisition. CfAs are supposed to incentivise industry to increase system reliability and availability. Even if CfAs do not have to be accompanied by a PBC, one would, perhaps, expect a FPI or a CPIF “*Cost Structure*”, for a CfA, rather than a FFP. The selection of a FFP “*Cost Structure*” means that there is no incentive for the contractor to reduce delivery times or increase delivery quality. As long as the availability target is delivered, and since there is no reward sharing mechanism in the BM, the only incentive for the contractor is to reduce costs and increase his own profit margin, without having to share anything with DE&S.

The written contract is to blame for several reasons, which can be aggregated to say that: the agreed duration of the contract is too long in comparison to the genuine strategic uncertainty regarding future requirements in combination with the lack of explicit, formalised terms for renegotiation; there seems to be unresolved questions regarding KPIs and with what to compare these; there seems to be a lack of incentive mechanisms; and there seems to be an insufficient mechanism for renegotiation. However, since the written contract has not been analysed *per se*, it is not possible to be more categorical regarding potential flaws in the contracts. A contractor that has to invest, e.g. in infrastructure or new equipment, requires a long contract to be willing to accept the risk of the investment. Against this stands the genuine strategic uncertainty that ought to make DE&S strive for short contracts, since it will be impossible to predict the future development with any precision or accuracy. If and when the longer contract wins, it is necessary to either have mechanisms for renegotiation, or explicit incentive mechanisms for risk and gain (reward) sharing, built into the contract. Whether or not that would have been possible in a PFI, with the bank consortium as an additional actor, is not at all certain. Regardless of this, in retrospect, the duration of the contract was too long, in an uncertain world, not to have renegotiation clauses built into it.

Even if the BM had not included a PFI, the PG, a CfA, and a FFP, and even if the contract had had the necessary renegotiation clauses built into it, there is no guarantee that this acquisition project could have ensured a better performance in its present form. The changes in operational requirements would probably not have been foreseen; and if they had, a PFI would presumably not even have been considered as an alternative.

7.2.4 Acquisition Project Risks

In Table 7.9, the C Vehicle acquisition project risks are summarised. The table illustrates the types of risks and uncertainties, and their sources (see Section 4.10.2). In Table 7.10, the C Vehicle BM risks are summarised.

Table 7.9: The C Vehicle acquisition project risks.

			Sources of supply chain risks and uncertainties			
			External		Internal	
			Environmental risks	Organisational risks	Network risks	
					Supply risks	Demand risks
Type and consequence of supply chain risks and uncertainties	Operational accidents	Ops	---	The existence of the Purple Gate	Codification of spares Spares management in theatre Lean fleet (slow reverse supply chain) Failure to follow process Risks retained by the MoD DE&S	Peace time assumptions (if not exactly right) Peace time training solutions (contractor involvement) Insufficient spares visibility Corruption of levels of repair Change in use of equipment
		T&E	---	---	Codification of spares Deliveries of spares stopped at regiment's gate	Change in use of equipment
	Operational catastrophes	Ops	---	---	---	Obsolescence
		T&E	---	---	---	Obsolescence
	Strategic uncertainties	Ops	Reduced operational requirement The SDSR	Contractual risk taking (specificity versus risk)	---	---
		T&E	The SDSR	Contractual risk taking (specificity versus risk)	---	---

In Table 7.9, “Ops” stands for Overseas Operations, and “T&E” stands for Domestic Training and Exercises (see Section 4.8.5).

Operational accidents

In order to remedy the risks of theft, fragmentation and problems with operational planning, MoD invented and implemented the PG. However, in doing so, MoD concurrently created a number of other risks. Because of the PG, there is now a risk that CfAs have, in practice, been rendered meaningless, at least for overseas operations. Hence, there is a risk that even if DE&S has a CfA with a contractor, because of the PG, the contractor can adduce that he cannot be held responsible if/when he fails to deliver the contracted availability to theatre. In addition, the PG also instigates the risk that a contractor will be incapable of reducing delivery times for overseas operations. Furthermore, the PG makes transfer of ownership of equipment and spares, and consequently also transfers of risk, to a contractor debatable. If the contractor is not allowed to assume responsibility for transportation to the JOA, it is doubtful whether DE&S can be considered to have transferred any risk to the contractor.

Codification of spares is one of the responsibilities that have been outsourced to the contractor in this acquisition project. The risk that something will go wrong with the codification of spares is high on certainty and frequently occurs also for this contract. A mistake is easily done, and the consequences are immediate and predictable. If the code is wrong, the item cannot be found in the Information System (IS). The risk of coding spares wrong is closely related to the risk that spares management in the theatre will not function optimally. It does not matter if an article is physically in the neighbouring shed, or not. If it is not to be found in the IS, because it has been coded incorrectly, it does not exist. Similarly, if the IS does not provide information in the form of Total Asset Visibility (TAV, see Section 1.2.3), i.e. information regarding at which node in the distribution system that the item is to be found, and, for items that are in transit between nodes at present, In-Transit Visibility (ITV, see Section 1.2.3), the item is likely to be ordered several times, even if it could have been found in a nearby warehouse or was scheduled to be arriving the next day. Problems with codification of spares and management of spares in theatre, which are both examples of failures to follow procedure, potentially flood the JSC with spares. The JSC is not designed to contain excesses of spares. Consequently, any superfluous deliveries of spares may inadvertently lead to delays in deliveries, or necessitate unwanted and expensive redundancy in the JSC. The risk that spares are lost in theatre is also high.

In order to save money, MoD runs on as lean a fleet of vehicles as possible. During operations, the front line tends to move quite quickly, which means that the Forward Supply Chain (FSC, see Section 4.8.7) has to be adjusted accordingly. Frequently, the requirements of the FSC is prioritised higher than the requirements of the Reverse Supply Chain (RSC, see Section 4.8.7), which means that the RSC is slower than the FSC. The combination of a lean fleet and a relatively slow RSC presents MoD with the risk that vehicles will soon start piling up in the system, rather than being repaired and maintained. The risk of broken down vehicles piling up throughout the JSC has led to the idea of pushing support, i.e. MRO of vehicles, forward in the support chain. Since support is a part of the CfA, and therefore outsourced, and since MoD strives to minimise the presence of Contractors on Deployed Operations (CONDOS, see Section 4.8.7), the solution was the invention of a new concept, i.e. SRs. Even so, there is a risk. There are only a few individuals in this contract. Consequently, there is a risk that the demand will exceed the supply. There is also the risk that some of the SRs will not be available, even if the demand is not higher than anticipated.

By retaining risk, e.g. responsibility for some aspects of the availability, DE&S is risking that the contractor will blame any shortcomings on his part on the performance of the responsibilities that DE&S has retained responsibility for. There is also a risk that deliveries of supplies will occasionally be stopped at the

Regiment's gate. A Regiment will not always be prone to accept deliveries when the contractor thinks that it is convenient to deliver. Another risk is that the design of supply and support chains tends to be based on peace time assumptions. If these assumptions are not exactly right, the supply and support chains will not be dimensioned correctly. This risk is increased when contractors are given responsibilities in peace time, which they are not given the war time, since it becomes more problematic for DE&S to have the necessary information in order to dimension the supply and support chains appropriately.

A further aspect of peacetime training solutions where contractors are involved and assume responsibility for MRO is that the Armed Forces is unable to build up and retain the necessary competence within the appropriate military units. Hence, if the wartime solution requires the military units to support their equipment themselves during overseas operations, there is a significant risk that they will not be able to do so if they have not practised this during peacetime domestic training and exercises. On operations, unfulfilled demands for repair create innovative solutions. If a vehicle is not repaired by the contractor as soon as the military unit needs it, inventive soldiers will start to repair it themselves, thereby corrupting the system. There is a risk associated with innovative actions such as these. The risk is that the contractor will say that the inventive soldiers have corrupted the system so that the contractor is unable to fulfil his commitment, i.e. to ensure the contracted availability of the equipment. For operations, and for training and exercises, there is always the possibility that the Army will change the way in which it uses the equipment. If the changes lie outside of a particular predicted interval for some specific parameter, it may constitute a risk to the acquisition project.

Operational catastrophes

The RE represents a non-combatant, supporting function within the British Army. Hence, even if the original planning assumptions would have held throughout the acquisition project, the acquisition project would probably not have involved much in the way of potential operational catastrophes. However, sometimes the British Army will fundamentally change its requirements. If such changes are too severe, the risk is that they lead to obsolescence, i.e. that the equipment is no longer needed. From the point of view of a long-term, expensive CfA, without any adequate renegotiation clauses, a development that resulted in the equipment becoming obsolete could be regarded as an operational catastrophe, or a strategic uncertainty.

Strategic uncertainties

The reduced requirement for availability on overseas operations is no longer a strategic uncertainty, since it has already transpired. However, from the outset of the acquisition project, this was a strategic uncertainty. If DE&S had had any inkling regarding the faint possibility that the planning assumptions would turn

out to be so far off the mark, it seems unlikely that DE&S would have entered into the C Vehicle contract with its limitations in terms of capacity and duration. The reduced requirement for availability is an example of how DE&S is at the mercy of decisions by its owner, the government, i.e. the political level of society. DE&S can only plan for what the politicians determine is dimensioning for the Armed Forces. The fact that the politicians may at any point in time adjust those planning assumptions is a genuine strategic uncertainty, which military planners and decision makers will always have to take into consideration. In addition, the reduced requirement for availability is also an example of contractual risk taking, i.e. how specific the written contract should be, versus the risk that is being taken by not being specific enough. Everything that is not specified and regulated in the contract is a potential risk, conceivably even a strategic uncertainty. Risks that are not even identified, and consequently neither assessed nor managed, cannot be mitigated, and are appropriately categorised as strategic uncertainties.

In late 2010 the expected Strategic Defence and Security Review (SDSR, see Section 5.2) was an example of the type of strategic uncertainties that characterise defence planning, defence management, and defence acquisition. From one day to the next, by the publication of a document, planning assumptions, and defence budgets, etc., can be altered so drastically that all planning will have to be revised, existing contracts changed, planned contracts cancelled or postponed, etc.

Business Model risks

In Table 7.10, the C Vehicle BM risks are summarised.

Table 7.10: The C Vehicle Business Model risks.

Building block	Building block component	Major risks
Channels	Purple Gate (PG)	There is a risk that Contracts for Availability (CfA) have been rendered meaningless in practise There is a risk that transfer of ownership and risk have been rendered meaningless in practise
Channels	Sponsored Reserves (SRs)	There is a risk that the demand for SRs will exceed the supply There is a risk that not all SRs will be available when required
Value proposition	Contract for Availability (CfA)	There is a risk that something will go wrong with the codification of spares There is a risk that the Joint Supply Chain (JSC) will be flooded with deliveries of multiple orders of spares There is a risk that, by retaining some risk, in practise, the MoD DE&S is not transferring any risk at all There is a risk that deliveries will be stopped at the regiment's gate

Of the risks and uncertainties summarised in Table 7.9 neither operational catastrophes nor strategic uncertainties are directly associated with the inherent C Vehicle BM risks. Most of the operational accidents are, however, primarily related to the BM, and are consequently included in Table 7.10, even if they have been rephrased to better fit the building block components.

7.3 Analysis of the STSA Acquisition Project

7.3.1 Business Model Configuration

The PPBM configuration used by the DE&S PT in the STSA (Short Term Strategic Airlift) acquisition project is illustrated in Table 7.11.

Table 7.11: The STSA Business Model configuration.

Key Partnerships PPC: Alternative financing solution (Leasing) Selection of partner: Through competition Prime contractor: Boeing (via the US DoD FMS Program) Other important actors: The US DoD DSCA, USAF and LSE	Key Activities Private sector: Finance – Own – Maintain, (FOM) Public sector: Design – Lease – Operate – Manage Key Resources Not included in this thesis	Value Propositions Equipment: Standard MOTS Support: CfA (MOTS) Included DLoDs: Training, Equipment, Personnel, Information and Logistics Other affected DLoDs: None	Customer Relationships Challenger Channels Not applicable for this business model	Customer Segments The Royal Air Force (RAF)
Cost Structure Cost Plus Fixed Fee (CPFF)		Revenue Streams Not included in this thesis		

The “*Business Model Canvas*”, on which the PPBM is based, is described in Table 4.12; the operationalisation provided by Osterwalder and Pigneur (2010) is described in Table 4.13 and Table 4.14; and the operationalisation used in the PPBM is described in Table 4.23 and duplicated in Table 7.1.

Customer Segments

The only “*Customer segment*” (see Section 4.12.1) is the Royal Air Force (RAF).

Customer Relationships

As for the “*Customer Relationships*” (see Section 4.12.2) with the customer, i.e. the RAF, the STSA PT has to assume the “*Challenger*” role. Since the UK has had to accept unconditional adherence to configuration communality, the RAF has a hard time suggesting UK adaptations and improvements to the aircraft. Even if it is not impossible, any such thoughts of developments and adjustments would have to go by the USAF, which would have to be convinced and subsequently integrate the suggestions into their own plans for further development of the C-17. Should the UK be successful in such a proposal, the USAF would finance the development, and the UK would have to implement the improvement, without knowing in advance how much these upgrades were going to cost them. Consequently, the STSA PT has become good at saying “*No*” to the RAF.

Channels

The C-17 is a strategic airlift platform for long-distance transportation. Hence, it is not relevant to discuss “*Channels*” (see Section 4.12.3) for this BM.

Value Propositions

The STSA was intended to be a seven year long interim solution. Hence, crudely put, the “*Value Propositions*” (see Section 4.12.4) of the BM was to deliver a “*flying truck*” (see Section 6.3.2) to the RAF, as a temporary solution, through a leasing arrangement, until the permanent solution, the A400M, could make its way from the drawing boards to the assembly lines and subsequently into service. In order to make this interim solution affordable, the lease BM was for a MOTS platform, without UK adaptation, and a MOTS CfA (see Section 5.3.7) support solution. As a consequence of the MOTS support solution, the “*Value Propositions*” entailed unconditional adherence to configuration communality, which meant that the UK had no flexibility at all, but had to follow any development that the USAF desired to initiate. The RAF could not even produce its own safety case. This exception to normal procedure was accepted since it was only a seven year interim contract.

The permanent solution was delayed, so the interim solution, i.e. the “*flying truck*”, became the permanent solution when the lease contract turned into a LTB contract. The reason was that the UK, because of the requirements of its on-going overseas operations, could not afford to lose its strategic airlift capability. Hence, the four aircraft were bought at their residual value. HMT was not amused and made its position abundantly clear when it in no uncertain terms declared that the sort of contract that could turn into a LTB contract would never be allowed again. The current position of HMT, as opposed to the standpoint in the late 1990s, is that leasing, or at least LTB, like PFIs, lead to an increase in cost for the government, not a decrease. For this reason, LTB and PFIs are not considered to be VfM, which is why “*Alternative financing solutions*” (see Section 4.7.7) such as these, should not be considered for future defence acquisition in the UK.

Because it was only a seven year interim solution: there were hardly any requirements for this acquisition; C-17 was selected although it was more expensive than the Antonov; unconditional adherence to configuration communality was accepted; it was also accepted to fly within the US safety case, rather than to develop a UK safety case, which drastically limits the way the UK can use the aircraft; and the UK settled for a “*flying truck*”, a pure MOTS platform, without adaptations for any UK requirements, and with a pure MOTS support solution. When the interim solution turned into a permanent solution, which, unless the aircraft are disposed of prior to their OSD, will last several decades, everything that was accepted because it was only a relatively short-term interim solution, have now turned into aspects of the long-term permanent solution.

The STSA BM explicitly includes the following DLoDs: Training, Equipment, Personnel, Information and Logistics. None of the remaining DLoDs (i.e. Concepts and Doctrine, Organisation, and Infrastructure) are implicitly affected.

Key Activities

In the STSA BM, because of the involvement of the US DoD FMS program (see Section 6.3.2), the sharing of responsibilities becomes relatively complex since the US DSCA serves as an intermediary. Consequently, formally, the STSA acquisition project *could be* regarded as a Government-to-Government acquisition project, rather than as an example of PPC. When a foreign country wants to acquire something from the US defence sector, the application of the US DoD FMS program is mandatory (see Section 6.3.4). Hence, if a deal with the US is going to be analysed with the PPBM, the analysis of the sharing of responsibilities will have to be adapted accordingly (see Table 6.3). Consequently, in this analysis, the acquisition project *is* considered to be a PPC, and is analysed as *if it were* a PPC.

In the STSA original leasing BM, the responsibilities for the “*Key Activities*” (see Section 4.12.5) were divided (see Section 6.3.4) so that the USAF was responsible for the design (D) of upgrades of the aircraft and the support solution. Through the bond market at the London Stock Exchange (LSE), banks were responsible for the financing (F) of the contract. The MoD was responsible for leasing (L) the aircraft from Boeing, which owned (O) the aircraft throughout the leasing contract, while MoD was responsible for operation (O) and management (M). Boeing was also responsible for the maintenance (M) of the aircraft. Hence, in the original leasing arrangement, the sharing of responsibilities for “*Key Activities*” in this BM was intended to be Finance-Own-Maintain, or FOM (see Table 6.3).

At the end of the contract, MoD bought the four aircraft that they had leased for seven years. This means that the leasing arrangement turned into, or at least from the point of view of HMT in practise appeared to turn into, a LTb arrangement. The implication of this is that the contract, in practise, contained a transfer (T) of ownership from the private to the public sector. Hence, in reality, the sharing of responsibilities for “*Key Activities*” in the STSA BM turned out to be Finance-Own-Maintain-Transfer, or FOMT (see Table 6.3).

Key Partnerships

The “*Key Partnerships*” (see Section 4.12.7) in the STSA BM are Boeing, the US DoD DSCA, the USAF and the LSE, while the type of PPC is leasing, which is an “*Alternative financing solutions*” (see Figure 4.15). After competition and subsequent negotiations Boeing was awarded the contract, a leasing arrangement, for the aircraft, and, via the USAF, also the contract for the support of the aircraft. Formally, MoD used the US DoD FMS program for the leasing contract and for the support solution, which is the mandatory procedure for a foreign government

when dealing with the US defence industry. In order to finance the initial leasing contract, MoD had to go to the LSE and raise the money through a bond.

Cost Structure

The “*Cost Structure*” (see Section 4.12.9) building block consisted of three cost components for the original leasing contract, one fixed cost and two variable costs. The fixed cost component consisted of the regular instalments that had to be made to pay the loan on the bond market. The relatively predictable variable cost was the total support cost for all C-17s worldwide, divided by the total number of flying hours worldwide, and multiplied by the number of UK flying hours. The totally unpredictable variable cost component was for the upgrades of the aircraft that the USAF ordered from Boeing.

Vis-à-vis the contractor, i.e. Boeing, the STSA BM does not contain a Fixed-Price “*Cost Structure*”, since it involves paying for variable costs. It is, however, not a straightforward Cost-Plus “*Cost Structure*” either, since there is no “*plus component*”. For the purpose of categorising the STSA “*Cost Structure*” building block as one of the two, the “*Cost Structure*” is categorised as Cost-Plus Fixed Fee (CPFF, see Section 4.6.7), where the fixed fee is identical to nought. In essence, this contract was a contract for C-17 availability. The underlying assumption was that the contractor could support the STSA solution “*faster, cheaper, better*” than what MoD would have been able to do. In order for MoD to have something to compare the Boeing support solution against, it had to estimate the cost to build up an entire infrastructure to support the C-17. The MoD did the necessary calculations and realised that a UK support solution would have been unaffordable.

DE&S must retain a certain competence to monitor the contract, to pay the fixed and variable costs, and to be able to negotiate for a continuation, or an alternative, of the support solution, once the contract is terminated. Though not insignificant, the cost for monitoring and maintaining competence is, however, negligible in comparison to the cost of acquiring and supporting seven C-17s.

Configuration of the most differentiating building blocks

The configuration of the four most differentiating building blocks in the STSA BM is presented in Table 7.12.

Table 7.12: The configuration of the four most differentiating building blocks in the STSA Business Model.

Key Partnerships					Value Propositions							
Contracting out of Services					Equipment							
Facility Management		Contractor Support to Operations		Outsourcing		Domestic development		---	---	---	---	
						Foreign development		---	---	---	---	
						Adapted OTS		---	---	---	---	
						Standard OTS		---	---	STSA	---	
						Existing		---	---	---	---	
					Traditional		CLS	CfA	CfC			
					Support							

Key Activities									
		Design (D)	Finance (F)	Buy (B)	Own (O)	Operate (o)	Manage (M)	Maintain (M)	Transfer (T)
Private sector	---	STSA	---	STSA	---	---	---	STSA	(STSA)
Public sector	STSA	---	STSA	(STSA)	STSA	STSA	---	---	(STSA)

Cost Structure					
Contractor's motivation	High				PBC

	Medium	CPFF	CPIF		
		STSA	---		
	Low	FFP	FPI		
		---	---		
Low		Medium	High		
Client's assurance					

worthwhile to further explore the “*Customer Relationships*” building block in any future developments of the PPBM, both in terms of the number of possible values and in terms of what the values represent, in order to investigate if another operationalisation could increase the contribution of this building block.

The Channels building block

Since the C-17 is a resource for strategic airlift, it is not relevant to discuss “*Channels*” for distribution in this case.

The Value Propositions building block

There was no problem to categorise the “*Value Propositions*” for the STSA BM as MOTS equipment, with a MOTS CfA support solution, which influenced the Training, Equipment, Personnel, Information and Logistics DLoDs. This building block proved its worth by assisting to illustrate how an interim leasing solution turned into a permanent solution, thus turning relaxed requirements, or the absence of requirements, for a short-term interim solution, into fixed requirements for a long-term permanent solution. Furthermore, the “*Value Propositions*” building block also demonstrated that a similar leasing arrangement, which could be turned into a LTB arrangement, will never be endorsed by HMT again.

The Key Activities building block

In this case, the responsibilities in the “*Key Activities*” building block were divided into two different sets, one for the leasing arrangement, and one for the subsequent LTB arrangement. For the former, the sharing of responsibilities for “*Key Activities*” in the BM was identified as Finance-Own-Maintain, or FOM, and for the latter, the sharing of responsibilities was identified as Finance-Own-Maintain-Transfer, or FOMT. The application of the “*Key Activities*” building block was not uncomplicated in this case. Because of the US DoD FMS program, it turned out to be rather problematic to unravel the involvement of two governments in the acquisition project. However, after some modification (see Section 6.3.4), the building block was made applicable also to this acquisition project. If the Key Activities building block had not been applicable for this case, the PPBM would not have been applicable for defence acquisition projects involving the US defence industry. With the modification, a potential limitation to the PPBM was avoided.

The Key Partnerships building block

Even though there were many actors involved in the STSA leasing arrangement, the key partners of MoD, i.e. Boeing, the US DoD, the USAF and the LSE, were easy to identify. To establish that the PPC was leasing, which is a type of “*Alternative financing solutions*”, was also straightforward. This building block was essential in order to understand the implications of the US DoD FMS Program.

The Cost Structure building block

After some deliberations, the STSA leasing arrangement was categorised as a CPFF “*Cost Structure*”, where the fixed fee is nought. The STSA case exposed that internal costs should not to be omitted from the research. DE&S must retain competence to monitor the contract, to pay the contractor, and to be able to negotiate for a continuation, or an alternative, once the contract is terminated. However, in this case, the costs for acquiring and supporting strategic airlift dwarf the costs of maintaining competence within DE&S.

7.3.3 Acquisition Project Performance

In Table 7.13, the performance, i.e. the effectiveness and efficiency, of the STSA acquisition project is illustrated. The assessment of the performance of the acquisition project is illustrated in Table 7.14. Strengths and weaknesses of the STSA BM are summarised in Table 7.15.

Table 7.13: The STSA acquisition project performance.

	Goals		Strengths	Weaknesses
Effectiveness	Availability target	Ops	The contractor reaches the contracted level of service.	The availability target is stated by the supplier, not the buyer.
		T&E	Not Applicable	Not Applicable
	Reduced delivery time	Ops	The four C-17s were delivered relatively quickly.	It is unclear with what the delivery time should be compared to. No UK adaptation, not even a UK safety case. Limited operational usability (flying truck).
		T&E	Not Applicable	Not Applicable
	Reduced delivery cost	Ops	The acquisition of MOTS is cheaper than development or adaptation of MOTS. The support solution is much cheaper than a UK solution would have been for C-17.	It is unclear with what the delivery cost should be compared to. The Lease-to-Buy solution was more expensive than traditional procurement would have been. The unpredictable cost component.
		T&E	Not Applicable	Not Applicable
	Increased delivery quality	Ops	Probably the best aircraft available for strategic air lift.	It is unclear with what the delivery quality should be compared to. The unconditional adherence to configuration communality. No UK adaptation, not even a UK safety case. Limited operational usability (flying truck).
		T&E	Not Applicable	Not Applicable
Efficiency	Monetary resources	Ops	The short term interim leasing solution was probably VfM.	The permanent long term lease to buy solution was probably not VfM.
		T&E	Not Applicable	Not Applicable

In Table 7.13, “*Ops*” stands for Overseas Operations and “*T&E*” stands for Domestic Training and Exercises (see Section 4.8.5).

Availability

The contractor reaches the contracted level of service. However, the target is set by the contractor, i.e. Boeing, not by MoD. Through the USAF support solution, Boeing guarantees a certain amount of flying hours, i.e. “*power-by-the-hour*” (see Section 4.6.7) per year *if* upgrades and MRO are performed by Boeing.

Delivery time

The STSA acquisition project provided the RAF with a platform fairly quickly. Since the platform was a standard MOTS solution, no adaptations had to delay the delivery time, and there were no time at all for development. Since the UK was allowed to “*cut the line*” (see Section 6.3.1), i.e. to take priority over the existing US orders, the only waiting time, once the contract had been signed, was the production time. Hence, the acquisition project probably provided a flying platform for strategic transports faster than any alternative solution could ever have done, with the obvious exception of buying used aircraft. Since the UK bought into the USAF support solution, there was no delay regarding making this service operational. However, it is unclear what the delivery time should be compared to. It is neither relevant to compare with the old solution, i.e. the C-130s, nor the intended new solution, i.e. the A400Ms. The only relevant comparison would have been the Antonovs, but they were disqualified during the competition because of inferior quality. It is also unknown how quickly they could have been delivered. There was also a downside to leasing MOTS that could be delivered relatively quickly. There was no UK adaptation of the aircraft. There was not even a UK safety case, which means that there is a limitation to the operational usability. To all intents and purposes, in the UK, the C-17 is a “*flying truck*” (see Section 6.3.1).

Delivery cost

It is difficult to decide against what to compare the cost of the STSA acquisition project. The old solution, i.e. the C-130s, was approaching its OSD, and it was a tactical airlift resource, not a strategic one, so the new cost cannot be compared against the old cost, and the STSA contract was an interim contract because it was not possible to find a permanent solution at the time when the contract was signed. Hence, there is no cost with which to compare the cost of the C-17s. What is clear is that the LTB solution was more expensive than what it would have been to buy the aircraft outright from the beginning. It is also clear that HMT will not endorse another leasing solution that runs the risk of becoming a LTB solution. There is also an unpredictable cost component due to the unconditional adherence to configuration communality. The only thing that is certain is that with irregular intervals, the aircraft will have to be returned to Boeing to be upgraded at an uncertain cost to DE&S. It is also clear that the MOTS solution is less expensive than what it would have been to invest in the development of a new strategic aircraft, or to adapt the C-17 to UK standards. The acquisition of MOTS means

that DE&S did not have to pay development costs at all, since those costs are taken on by its transatlantic counterpart, i.e. the US DoD.

The support solution is also dependent on the platform. Support for the C-17 is best compared to other arrangements of support for the C-17. Had the UK bought the C-17s, the cost of the US support solution could, e.g., have been compared against the cost of handling the support in-house in the UK. From this perspective, there would have been a significant cost reduction with the STSA contract. Even today, when several countries have bought C-17s, no one has come up with a more cost-effective support solution than the one that Boeing provides through the USAF. Hence, all C-17 operators maintain absolute configuration communality with the USAF C-17 fleet. The drawback is the unconditional adherence to configuration communality, which means that the cost of having the C-17 cannot be predicted, and that the upgrades are the ones that the USAF requires. As it is, the only cost that the STSA contract can be compared to is the Antonov bid. Since the Antonov bid was lower, the STSA contract is more expensive than the alternative. However, the Antonov was considered to be so technologically inferior that it was no real option anyway. Therefore it is difficult to compare the cost of the STSA acquisition project to anything at all. However, the US support solution is cheaper than what a UK support solution would have been.

Delivery quality

The C-17 is probably the best aircraft for strategic airlift on the market. Hence, the delivery quality could hardly be any higher. On the other hand, it is not clear what the delivery quality should be compared to. The C-130s were too old, and not for strategic airlift. The A400M has yet to get into service. In addition, the quality of the Antonovs was not good enough. Compared to its predecessors, the C-130s, there has been an increased delivery quality through the C-17s, but it is not a fair comparison. The C-17s should probably be regarded as representing a new capability rather than the replacement of an already existing capability. The C-17 is a MOTS aircraft that has not been adapted for the UK at all. Since it does not even have a UK safety case, the operational usability is somewhat restricted.

Effectiveness

Effectiveness deals with to what extent the goals are met. In this case, the goal for availability is dictated by the supplier, but also met by the supplier. The leasing solution was probably the fastest way that DE&S could acquire strategic airlift capability, so the goal for reduced delivery time is also met. The support solution is cheaper than if DE&S had tried to create a support solution of its own, but since the leasing contract, which turned into a LTB contract, was more expensive than if the aircraft had been bought at the outset, the goal of reduced delivery cost is not met. Since the RAF has received what is probably the best aircraft for *strategic* airlift in the world to replace its old aircraft for *tactical* airlift, there is no denying that

there has been an increased delivery quality. Since all four goals are not met, the effectiveness, though relatively high, is not quite 100%. However, on the scale “*Low – Medium – High*”; the effectiveness of this acquisition project is assessed to be “*High*”. In this case, the main reason for the less than perfect effectiveness is the goal for reduced delivery cost, which draws down the effectiveness.

Even though delivery time, cost and quality have been given the benefit of the doubt, and have been considered as goals that have been met, or goals that are close to having been met, there is a potential “*comparison problem*” for the C-17s. It is not clear with what delivery time, cost and quality should be compared. For the support solution to the C-17s, given that the C-17s were already there, the USAF support solution is the “*fastest, cheapest and best*” solution that could have been provided. However, the STSA acquisition project is for a new capability, i.e. strategic airlift, rather than the replacement of an existing capability, i.e. tactical airlift. It is hardly relevant to compare the new capability with the one that it is substituting. Hence, there cannot be any existing internal base lines with which to compare delivery time, cost or quality. Furthermore, there are hardly any external alternatives, through which any external benchmarks could be obtained. The only competitor on the short list, i.e. the Antonov, was so technologically inferior that it could hardly constitute a bench mark. This observation highlights the existence of a “*comparison problem*” for the acquisition of new capability.

Efficiency

Efficiency deals with how resources are used to reach the goals. If the acquisition project had remained a short-term interim leasing solution for the duration of the contract, the efficiency of the acquisition project could probably not have been higher. It is difficult to envisage how DE&S could have used its money better in order to secure a high quality strategic airlift capability so fast and at a better price, once the decision to acquire strategic airlift capability had been made, if they had selected another alternative than the C-17. Strategic airlift capability is expensive, the suppliers are few, and the cost of supporting the aircraft is high. The fact that all other nations and organisations that have since opted to acquire C-17s have decided to utilise the USAF support solution indicates that the UK choice was probably the most cost-effective one. However, since the acquisition project turned into a permanent long-term LTB solution, which is more expensive than buying the aircraft from the beginning, the acquisition project is not quite 100% efficient. It would have been less expensive to buy the aircraft outright from the beginning. On the scale “*Low – Medium – High*”; the efficiency of this acquisition project is assessed to be “*Medium*”.

Performance

The STSA acquisition project is close to being both 100% effective and 100% efficient. Had the aircraft been bought by DE&S already at the beginning of the

acquisition project, it is likely that it would have been categorised as both 100% effective and 100% efficient. As it is, the effectiveness was assessed to be “*High*”, and the efficiency was assessed to be “*Medium*”. The performance of the STSA acquisition project is illustrated in Table 7.14.

Table 7.14: The performance of the STSA acquisition project.

Effectiveness	High	Average Performance	STSA: Above average Performance	Good Performance
	Medium	Below average Performance	Average Performance	Above average Performance
	Low	Poor Performance	Below average Performance	Average Performance
			Low	Medium
Efficiency				

Using Table 3.2, the performance was assessed to be “*Above average*” on the scale “*Poor – Below average – Average – Above average – Good*”.

Business Model strengths and weaknesses

Table 7.15 summarises the strengths and weaknesses in the STSA BM.

Table 7.15: Summary of strengths and weaknesses in the STSA Business Model.

Building block	Building block component	Major strengths	Major weaknesses
Value proposition	Commercial-Off-The-Shelf (COTS)	Relatively quick delivery of the aircraft Cheaper than development or adaptation of MOTS	No UK adaptation, not even a UK safety case Limited operational usability (flying truck)
Value proposition	Contract for Availability (CfA)	Much cheaper than an in-house support solution would have been	---
Key activities / Key partners	Private responsibility for financing – Leasing and bonds	Faster acquisition than with traditional financing	Not Value-for-Money (VfM) – No longer recommended by HMT for defence acquisition in the UK

Despite the “*Above average*” performance of the acquisition project, there are a few problems with the BM. Furthermore, while the contract was probably as good as it could get, there were unfortunate circumstances for this acquisition project.

Because of the MOTS equipment and MOTS support solution, there is no UK adaptation. There is not even a UK safety case, which means that there are limitations in the operational usability. Furthermore, even if it does not affect the performance of the acquisition project *per se*, the BM is an “*Alternative financing solutions*”, i.e. leasing, which morphed into LTB, which is not VfM, and thus no longer endorsed by HMT. The unfortunate circumstances, i.e. the unexpected delay of the permanent solution, “*forced*” MoD to turn the leasing contract into a LTB contract. HMT is not likely to allow a BM that is based on a similar leasing arrangement, with the risk of turning into a LTB arrangement, ever again. Had

MoD bought the C-17s in the first place, and bought into the USAF support solution at the same time, this would probably have been an example of a sound BM and a sound contract in a well performing acquisition project. As it is, the delay of the Airbus turned the leasing contract into a LTB contract, which is not acceptable to HMT, and the UK now has an interim solution which has turned into a permanent solution, and which turned out to be more expensive than what was necessary. However, that major defence equipment projects are fraught with time delays, and with increased costs, should hardly come as a surprise to MoD.

7.3.4 Acquisition Project Risks

In Table 7.16, the STSA acquisition project risks are summarised. The table illustrates the types of risks and uncertainties, and their sources (see Section 4.10.2). In Table 7.17, the STSA BM risks are summarised.

Table 7.16: The STSA acquisition project risks.

			Sources of supply chain risks and uncertainties			
			External		Internal	
			Environmental risks	Organisational risks	Network risks	
					Supply risks	Demand risks
Type and consequence of supply chain risks and uncertainties	Operational accidents	Ops	---	---	USAF support solution based on 60-70 aircraft (not 230). Aircraft upgrades. Changes in USAF operational requirements. US DoD in-sourcing strategy. Adjustments of USAF availability requirements due to costs.	Increased requirements.
		T&E	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Operational catastrophes	Ops	---	---	---	---
		T&E	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Strategic uncertainties	Ops	Reduced operational requirement The SDSR	---	---	---
		T&E	Not Applicable	Not Applicable	Not Applicable	Not Applicable

In Table 7.16, “*Ops*” stands for Overseas Operations and “*T&E*” stands for Domestic Training and Exercises (see Section 4.8.5).

Operational accidents

When the leasing contract was signed by DE&S in 2001, the USAF, which was the only Air Force in the world that possessed and operated C-17s at that time, had about 60-70 aircraft. A decade later, nigh on ten nations, and pan-national organisations, were flying in excess of 240 C-17s. Hence, through the USAF support solution that DE&S bought into, Boeing was initially supporting a fleet of 60-70 aircraft. Since the total number of C-17s has increased by close to 300% and since all nations and organisations with C-17s have bought into the USAF support solution, there is a risk that Boeing's ability to support the almost quadrupled fleet will be negatively affected. Because of the USAF support solution and the unconditional adherence to configuration communality, through which DE&S has bought into every future USAF upgrade of the C-17, the aircraft must be returned to Boeing at irregular intervals for MRO, and upgrades. This presents the RAF with the risk that there will not be enough C-17s at any particular point in time.

Through the unconditional adherence to configuration communality, the RAF is totally in the hands of the USAF when it comes to operational requirements. There is a risk that the aircraft will be given upgrades that are not required by the RAF, but which will have to be paid for by DE&S anyway. The support solution that DE&S has bought into is based on the fact that the US DoD had outsourced support to Boeing. However, while DE&S has an outsourcing strategy for support, the US DoD now has an in-sourcing strategy, where support is brought back in-house. There is a risk that the support of the C-17 will be in-sourced in the US. If that happens, the UK will stand without a support solution, alternatively a more expensive support solution. When the leasing solution was initially investigated a decade ago, it was decided that a UK support solution would be too expensive to contemplate. The risk is that DE&S will now have to pay a substantial amount of money in order to ensure support for their C-17s if the US in-sources the support.

What the UK has seen the last couple of years are increased requirements for strategic airlift capability. Since the UK cannot easily increase the availability of the existing aircrafts, the only possible solution has been to buy more C-17s. In addition to the original four aircraft, the UK has already had to buy another three C-17s in order to satisfy the increased requirements. There is a risk that more C-17s will have to be bought if the requirements are further increased.

Despite the fact that the US DoD is a big spender in terms of worldwide military expenditure, it has to save money. However, while the US is reducing its military expenditure, it is not reducing it as quickly as many other countries. In the year 2000, the US accounted for about 50% of the NATO members' total defence spending. A decade later, the US share was closer to 75% and continuing to grow (NATO, 2011b). Nevertheless, the US DoD is constantly investigating different ways of reducing cost while maintaining the necessary availability. Since the USAF

has about 200 C-17s, which is more than even they need, they have a particular option with this system. The USAF can reduce the requirement for availability, and have sufficient flying hours for strategic airlift anyway. The RAF is not so lucky. With “only” seven C-17s at its disposal, the RAF requires all the flying hours that they can get from their aircraft. The risk that the UK is running is that the US will reduce its requirement for availability, in order to save money, which would mean that the UK would simultaneously also have a reduction in the availability of the C-17s. In this scenario, the risk is that the UK would have to buy more C-17s in order to maintain the same number of flying hours at its disposal.

Operational catastrophes

There are no operational catastrophes envisioned for the STSA acquisition project.

Strategic uncertainties

The major strategic uncertainty is that the operational requirements should be reduced. If that were to happen, the UK would find itself with seven expensive aircraft that were no longer required, and with an expensive support solution that was no longer required. In late 2010, SDSR was about to be published. Bearing in mind the dramatic changes that the SDR brought about, the forebodings of the looming SDSR were justly to be characterised as strategic uncertainties.

Business Model risks

Table 7.17 summarises the STSA BM risks.

Table 7.17: The STSA Business Model risks.

Building block	Building block component	Major risks
Value proposition	Contract for Availability (CfA)	<p>There is a risk that Boeing’s ability to support the growing fleet will eventually be negatively affected</p> <p>There is a risk that the UK will not have enough aircraft because of maintenance and upgrades</p> <p>There is a risk that the UK will have to pay for upgrades that are not required</p> <p>There is a risk that the US will in-source the support, leaving the UK with a much more expensive support solution</p> <p>There is a risk that the US will reduce the requirement for availability, which would reduce the number of flying hours for the UK, which might force the UK to invest in more aircraft</p>

Even if it is not clear how to separate the BM risks from the contract risks in this case, most of the operational accidents described in Table 7.16 are related to the BM, which is illustrated in Table 7.17. They are, however, rephrased to better fit the building block component. There are neither operational catastrophes nor strategic uncertainties associated with the STSA BM.

7.4 Analysis of the HASP Acquisition Project

7.4.1 Business Model Configuration

The PPBM configuration used by the DE&S PT for the HASP (Heavy Armour Spares Provisioning) acquisition project is displayed in Table 7.18.

Table 7.18: The HASP Business Model configuration.

Key Partnerships PPC: Contracting out of services (outsourcing) Selection of partner: Prolongation of existing contract Prime contractor: Multipart Defence Other important actors: OEMs	Key Activities Private sector: Finance – Buy – Own – Transfer, (FBOT) Public sector: Design – (Own) Key Resources Not included in this thesis	Value Propositions Equipment: Existing (i.e. no new acquisition) Support: CfA Included DLoDs: Information and Logistics Other affected DLoDs: Equipment	Customer Relationships Procurer Channels Overseas supply (JSC, PG) chain Domestic supply chain	Customer Segments The British Army
Cost Structure Cost Plus Incentive Fee (CPIF)		Revenue Streams Not included in this thesis		

The “*Business Model Canvas*”, on which the PPBM is based, is described in Table 4.12; the operationalisation provided by Osterwalder and Pigneur (2010) is described in Table 4.13 and Table 4.14; and the operationalisation used in the PPBM is described in Table 4.23 and duplicated in Table 7.1.

Customer Segments

The “*Customer segment*” (see Section 4.12.1) in the HASP BM is the British Army.

Customer Relationships

The “*Customer Relationships*” (see Section 4.12.2) in the HASP BM is that of a “*procurer*”. The Army orders the spares directly from the contractor, and the HASP PT pays for the spares once they are ordered.

Channels

In the HASP BM, two types, i.e. overseas and domestic supply chain (see Table 4.21), of “*Channels*” (see Section 4.12.3) are used to distribute the spares to the British Army. Since the introduction of the Purple Gate (PG, see Section 4.8.7), there is not much difference between the military supply chain for overseas operations, i.e. the Joint Supply Chain (JSC, see Section 4.8.7), and the civilian supply chain, since the latter is forced to merge with the former at the PG. Hence, spares for overseas operations have to be delivered to the PG. For deliveries to units on domestic training or exercises, on the other hand, there are unforeseen consequences with Public Private Cooperation (PPC, see Section 4.7.5). These

deliveries either go to a Regiment or a training ground. For consumable spares, like in the HASP BM, deliveries are likely to go to the Regiment. Even though this involves delivering to a proper address, rather than to a location in the field, there are problems with these deliveries. There is a definite reluctance at Regiments to accept “*White-Van-Man*” (see Section 6.4.3) deliveries at any time of the day, when it is convenient to the contractor.

Value Propositions

The “*Value Propositions*” (see Section 4.12.4) for the HASP BM is availability of spares for the CR2 (Challenger 2) MBT (Main Battle Tank). The quintessence of the HASP BM is that DE&S has outsourced the acquisition, storage, and distribution of 2,500 different types of consumable spares for the CR2 and to the remainder of the heavy armour fleet. The HASP BM is a Contract for Availability (CfA, see Section 5.3.7). However, it is not clear when, where or how availability should be delivered. Because of the PG, the contractor cannot be held responsible for what happens after that node in the JSC. Consequently, the contractor cannot deliver availability to the Joint Operations Area (JOA, see Section 4.8.6) for overseas operations, but whether availability is to be measured at the PG, or at the contractor’s or sub-contractors’ warehouses, is far from clear.

The predecessor of HASP, i.e. the CRISP (Challenger 2 Innovative Spares Provision) contract, followed more or less immediately after the SDR (see Section 5.2) in 1998. Hence, it was a First Generation Defence Acquisition BM (see Section 5.3.10), in line with the development that was commenced with the Smart Procurement Initiative (SPI, see Section 5.2.2). When the HASP BM was developed to succeed CRISP, it had the prospect of becoming a Second Generation Defence Acquisition BM (see Section 5.3.10), in line with the Defence Industrial Strategy (DIS, see Section 5.2). In addition to being a CfA and selecting the contractor by other means than competition, this would have meant that DE&S should have been able to build on the Lessons Learned (LL) from the First Generation Defence Acquisition BM and also demonstrate that DE&S had retained the capability to acquire equipment and support, although even acquisition had been outsourced through CRISP. Since acquisition had changed between the First and the Second Generation Defence Acquisition BMs, DE&S should, however, not only confirm that it had retained capability, it should also exhibit that it had even been able to attain new capability while monitoring the CRISP contract. Since it was no longer necessary to have competitions, and since DE&S should now not only consider, but actively strive for, CfAs or even Contracting for Capability (CfC, see Section 5.3.7), DE&S was supposed to possess an enhanced capability in comparison to what they had when they signed the CRISP contract. The implication is that DE&S should now consider engaging in mutually beneficial partnerships or alliances, i.e. “*Partnership solutions*” (see

Section 4.7.8) with industry, rather than “*just*” initiate competitions, and also contemplate acquisition of availability and capability, rather than “*merely*” procure equipment, or “*simply*” acquire equipment and support.

As it turned out, the process of getting a Second Generation Defence Acquisition Contract in place, which in the UK is regarded as being a part of what is called “*Sector Transformation*”, was not initiated early enough. The CRISP contractor, i.e. BAE, was either asked too late to produce a bid, or took too long time in producing a bid, since it was discovered that there was going to be a two year gap between the termination of the CRISP contract and the point in time when the successor, formally initially known as the Armoured Vehicle Support Initiative (AVSI), but later morphed into the Armoured Vehicle Support Transformation (AVST) Programme, could come into service. As a consequence, the CRISP sub-contractor, Multipart Defence, which was the contractor that was delivering the service in the CRISP contract, was invited to keep delivering this service, as an interim solution, for a period of 27 months (with an option for a one year extension), while BAE produced its bid for AVST. The interim contract, which is called the HASP contract, is a direct continuation of the original CRISP contract, the main differences being that the “*middle man*”, i.e. BAE, was no longer in the loop for the interim solution, and that the HASP contract is formally considered to be a CfA, rather than a CLS, which the CRISP contract is considered to have been. When BAE produced its bid, it was realised by DE&S that it was unaffordable, and the AVST programme was cut. Hence, DE&S had nothing more than an interim solution, and apparently (see Section 1.5) no contingency plan regarding what to do once the HASP contract came to its conclusion after 27 months.

Through the HASP contract, Multipart Defence acts as a procurement agency. In practice, this is the same role that Multipart Defence had in the CRISP contract, with the exception that BAE Systems was then acting as an unnecessary middle-man between DE&S and the sub-contractor. With the CRISP and the HASP contracts, DE&S has outsourced the acquisition of spares for heavy armour, which means that Multipart Defence is responsible for procuring and storing spares, and supplying the British Army with spares when and where they are required. Interestingly enough, in practise, Multipart Defence is restricted to buying the spares that the OEMs will allow them to buy. The OEM of the CR2 is BAE, i.e. the previous prime contractor. In theory, Multipart Defence is not obliged to buy from the OEMs. Multipart Defence could use reverse engineering and go out to a wider market than the designated suppliers, but in order to have another supplier’s spares trialled and approved by the OEMs, ultimately BAE, and fit onto the MBTs, there would be a long and strenuous and costly process. Furthermore, the HASP contract is for spares to equipment that is not out on operations. At the same time, the UK has equipment that is out on operations that is being supported

well by traditional means. When the CRISP contract was originally signed, MoD was not able to meet the level of service (see Section 6.2.5) that the contractor could provide. The HASP PT is of the opinion that they could match the level of service that a civilian contractor can offer, at least for this type of outsourcing of relatively trivial services such as procuring, storing and distributing spares.

There is no doubt that the CRISP contract outperformed what MoD was able to provide at the time when the original contract was signed. There is also no doubt that MoD has improved since then. By now, MoD has had the opportunity to study the performance of private sector contractors for almost 15 years, and has been able to learn from the private sector best practises. In addition, MoD has also introduced new Information Systems (IS) to enhance its abilities in the area of storage and distribution. Technological support in this area was previously an area where MoD was lagging behind the abilities of private sector contractors. First and foremost, however, MoD has been able to transform a “*Nine-to-five*”, “*Working-days-only*”, peacetime storage and distribution organisational culture into a “*24-7*” operational organisational culture, which is now up to speed to support the British Armed Forces on its worldwide endeavours. Hence, it is debatable whether or not the HASP contract is “*faster, cheaper, better*” than what MoD could be today.

The HASP BM is about outsourcing a rather trivial service such as buying consumable spares and storing them until they are needed. This sort of service ought to be a core business at DE&S. The MoD should be able to attain significant advantages in the form of economies of scale across the different types of spares that are needed for their enormous portfolio of different types of equipment. In addition, DE&S does not have to produce a profit for its shareholders. However, in this case, the HASP contract ought to be able to outperform its predecessor quite easily. The main difference between the two contracts is that BAE has been eliminated as the middle man. The only contribution by BAE, once Multipart Defence had been contracted as its sub-contractor, was that BAE added a percentage on every spare that was ordered by the British Army. Since this added percentage has now been eradicated, the HASP contract ought to be able to provide the service cheaper than the CRISP contract.

The Defence Lines of Development (DLoDs, see Section 5.3.6) that are directly included in the HASP BM are Information and Logistics. Since the BM is for the availability of spares to a previously existing piece of equipment, i.e. the CR2 MBT, the Equipment DLoD is not directly included, but it is indirectly affected. The remaining DLoDs, i.e. Training, Personnel, Concepts and Doctrine, Organisation and Infrastructure, are not affected by the HASP acquisition project.

Key Activities

In the HASP BM, the public and the private sector share the responsibilities for the “*Key Activities*” (see Section 4.12.5) as follows. DE&S is responsible for the design (D) of the service. Multipart Defence is responsible for financing (F), buying (B), owning (O) and storing the spares. Once the spares are bought by MoD, ownership is instantaneously transferred (T) to MoD. Hence, the sharing of responsibilities for “*Key Activities*” in this BM is Finance-Buy-Own-Transfer, or FBOT. The division of responsibilities in the HASP BM is illustrated in Table 6.4.

Key Partnerships

The “*Key Partnerships*” (see Section 4.12.7) in the HASP BM include the prime contractor, i.e. Multipart Defence; the sub-contractors in the supply chain; and the OEMs, which play a significant role, since, at the end of the day, they must have their say, i.e. give their approval, if there is going to be “*new*” spares, i.e. spares from a new supplier, allowed on the platforms. The type of Public Private Cooperation (PPC, see Section 4.7.5) is outsourcing, which is an example of “*Contracting out of services*” (see Figure 4.15). Because of commercial sensitivities, the HASP PT has to act as an intermediary between the OEMs and the sub-contractors, even though the acquisition of spares has been outsourced to the prime contractor. When it comes to the drawings of the spares, the prime contractor is, cut out the loop, despite the fact that it is the responsibility of the prime contractor to buy the spares, which includes identifying suitable suppliers and providing them with the required specifications regarding what they are supposed to deliver. Even if the HASP BM is a Second Generation Defence Acquisition BM, Multipart Defence was selected as an interim prime contractor since they had played that part during the CRISP contract, rather than as a consequence of the DIS.

Cost Structure

In this thesis, the “*Cost Structure*” (see Section 4.12.9) building block includes the external costs. In the HASP contract, Multipart Defence buys the spares, and DE&S pays for the spares, at cost price, when the British Army demands them. The contract further stipulates that when the contract is terminated, if there are any spares left in the warehouses, DE&S will buy all of that stock from Multipart Defence at cost price. There is also a fixed monthly management fee in the contract. Since the spares are invoiced at cost price, the profit comes through the management fee and to a certain degree also from the gain share mechanism in the contract. Since MoD has contracted to buy the stock from Multipart Defence once the contract is terminated, the HASP PT has decided that it must act as the decider, and countersign every order that Multipart Defence makes. The HASP PT has a designated officer who effectively countersigns the procurement of every single item, which prevents the contractor from ordering spares that are not required, ordering spares too early, etc. Consequently, the HASP PT has elected to

have costs for the designated officer during the contract in order to avoid having unwanted costs for excess spares when the contract is terminated. The HASP PT also has other hidden costs to manage the contract throughout its duration. The HASP PT must act as a mediator between the contractor, the contractor's sub-contractors, and the OEMs regarding commercial sensitivities such as drawings of the spares. This requires recourses in the form of personnel and money.

There is an incentive mechanism in the contract which means that at the end of each year, Multipart Defence calculates the savings that have been made and they receive a percentage of those savings. The contract also has a penalty mechanism. If Multipart Defence does not live up to the target of 95% availability the contract specifies how much Multipart Defence will be penalised. The "*Cost Structure*" in the HASP BM is Cost-Plus, but not a pure Cost-Plus Fixed Fee (CPFF, see Section 4.6.7) and not a pure Cost-Plus Incentive Fee (CPIF, see Section 4.6.7) either, but rather a combination of the two. Since the BM has an incentive mechanism, the "*Cost Structure*" building block is categorised as a CPIF.

Configuration of the most differentiating building blocks

The configuration of the four most differentiating building blocks in the HASP BM is presented in Table 7.19.

Table 7.19: The configuration of the four most differentiating building blocks in the HASP Business Model.

Key Partnerships			
Contracting out of Services			
Facility Management	Contractor Support to Operations	Outsourcing	
----	-----	HASP	
Alternative financing solutions			
Leasing		PFI Solutions	
----	-----		
Partnership solution			
Project alliances		Strategic partnerships	
----	-----		

Value Propositions					
Equipment	Domestic development	----	----	----	----
	Foreign development	----	----	----	----
	Adapted OTS	----	----	----	----
	Standard OTS	----	----	----	----
	Existing	----	----	HASP	----
		Traditional	CLS	CfA	CfC
Support					

Key Activities									
		Design (D)	Finance (F)	Buy (B)	Own (O)	Operate (O)	Manage (M)	Maintain (M)	Transfer (T)
Private sector	----	HASP	HASP	HASP	----	----	----	----	HASP
Public sector	HASP	----	----	HASP	----	----	----	----	HASP

Cost Structure					
Contractor's motivation	High				PBC

	Medium	CPFF	CPIF		
		----	HASP		
	Low	FFP	FPI		
		----	----		
		Low	Medium	High	
Client's assurance					

Table 7.19 presents the configuration of the “*Value Propositions*”, the “*Key Partnerships*”, the “*Key Activities*”, and the “*Cost Structure*” building blocks.

7.4.2 Applicability of the PPBM

The Customer Segments building block

It is straightforward to identify the British Army as the sole “*Customer Segment*” for the HASP BM. It is, however, perhaps too artificial to regard the customer as an “*external party*” in the case of segmentation of a DPAs customers. Consequently, it would probably be worthwhile to investigate an alternative operationalisation.

The Customer Relationships building block

It is undemanding to categorise the relationship between the HASP PT and the customer as the role of “*procurer*”. It may be appropriate to investigate an alternative operationalisation also for this building block.

The Channels building block

It is uncomplicated to identify the “*Channels*” that are in use, i.e. the supply chain for overseas operations and the supply chain for domestic training and exercises. This building block shows its expediency by illuminating that the PG, while contributing to the solution of some problems in the JSC, e.g. avoiding fragmentation, also causes a couple of new problems. It was also useful for the revelation that civilian deliveries to Regimental areas are far from friction free.

The Value Propositions building block

The application of the “*Value Propositions*” building block was unproblematic, and was identified as a CfA support solution. It was also undemanding to identify which DLoDs that were affected in this case. The “*Value Propositions*” building block demonstrates its significance by contributing to enhanced insights into the disadvantages of the PG. Because of the PG, it is far from obvious when, where and how availability is being delivered. This building block also illuminates three practical problems with outsourcing of acquisition of spares and contractor provision of availability. The first problem has to do with OEMs, which have to approve of any alterations in the provision of spares to the equipment that they have manufactured. The second problem has to do with what the performance of the contractor should be compared; past, present or future performance of DE&S. The third problem has to do with the question regarding the complexity of the outsourced service. Is there a lower boundary, i.e. a lowest degree of complexity, below which outsourcing should not be considered?

The Key Activities building block

It was not associated with any problems to identify the sharing of responsibilities for the “*Key Activities*” in the HASP BM as Finance-Buy-Own-Transfer, or FBOT.

The Key Partnerships building block

The application of the “*Key Partnerships*” building block was straightforward, and the prime contractor (Multipart Defence) and the other important actors (the OEMs) were easily identified. It was also uncomplicated to classify the PPC as outsourcing, i.e. an example of “*Contracting out of services*”. This building block was useful in order to understand that the HASP PT, despite the outsourcing of acquisition of spares, has to be active and act as an intermediary in the dialogue between the OEMs and the prime contractor’s sub-contractors.

The Cost Structure building block

It was not without complications to identify the “*Cost Structure*” in the HASP BM as a CPIF. However, in the end, the author settled for a CPIF, rather than a CPFF. Notwithstanding the fact that internal costs are not included in this thesis, this case demonstrates that the internal costs are not insignificant. Hence, these costs ought to be explicitly included in future research.

7.4.3 Acquisition Project Performance

In Table 7.20, the performance, i.e. the strengths and weaknesses, of the HASP acquisition project are illustrated. The assessment of the performance of the acquisition project is illustrated in Table 7.21 and the strengths and weaknesses of the HASP BM are summarised in Table 7.22. “*Ops*” stands for Overseas Operations, and “*T&E*” stands for Domestic Training and Exercises.

Availability

Like for all First Generation Defence Acquisition Contracts (see Section 5.3.10), the planning assumption the first years after the SDR was that the UK would continuously simultaneously participate in two medium scale operations, one small scale operation, and conduct normal training and exercises. Based on this assumption, the CRISP contract stipulated a minimum level of service (see Section 6.2.5), based on which the management fee, i.e. the contractor’s profit, was calculated. Since the HASP contract is a direct continuation of its predecessor, the minimum level of service was not changed for this short-term, intermediate contract. However, while the planning assumptions held reasonably true for the CRISP contract, circumstances have changed since 1998. In October 2010, only five MBTs, or the equivalent of 1.3%, were overseas on operations. Hence, the actual requirement for service is no way near the contracted level of service. The contractor has provided the targeted availability, i.e. 95%, for overseas operations and for domestic training and exercises. The problem is that the requirement for availability was based on the assumption that the MBTs would be used on operations to a larger extent than what has in reality been the case.

Table 7.20: The HASP acquisition project performance.

Goals		Strengths		Weaknesses	
Effectiveness	Availability target	Ops	The contractor reaches the contracted level of service.	It is unclear whether or not the availability target has been arbitrarily selected, or not. Because of the Purple Gate, availability can not be delivered to the Joint Operations Area. Availability is measured in the contractor's warehouse. The contracted level of service is no longer required. It is too easy for the contractor to reach the target.	
		T&E	The contractor reaches the contracted level of service.	It is unclear whether or not the availability target has been arbitrarily selected, or not. Regiments do not appreciate deliveries at their gates at the contractor's leisure. Because of the lack of requirement for availability for overseas operations, it is too easy for the contractor to reach the domestic target.	
	Reduced delivery time	Ops	---	The contractor can not reduce the delivery time because of the Purple Gate. It is unclear if delivery time should be compared to the past, present or enhanced future ability of the MoD. The MoD has to act as a middleman between the OEMs and the prime contractor's sub-contractors.	
		T&E	---	It is unclear if delivery time should be compared to the past, present or enhanced future ability of the MoD. The MoD has to act as a middleman between the OEMs and the prime contractor's sub-contractors.	
	Reduced delivery cost	Ops	---	Since the MoD DE&S is now paying for a level of service that it no longer requires, the cost is actually probably higher than it would have been if it had been conducted by the MoD DE&S. It is unclear if delivery cost should be compared to the past, present or enhanced future ability of the MoD DE&S. The MoD has to act as a middleman between the OEMs and the prime contractor's sub-contractors.	
		T&E	---	Since the MoD DE&S is now paying for a level of service that it no longer requires, the cost is actually probably higher than it would have been if it had been conducted by the MoD DE&S. It is unclear if delivery cost should be compared to the past, present or enhanced future ability of the MoD DE&S. The MoD has to act as a middleman between the OEMs and the prime contractor's sub-contractors.	
	Increased delivery quality	Ops	The contractor has increased the delivery quality.	The contract has not been tested to its full capacity. It is unclear if delivery quality should be compared to the past, present or enhanced future ability of the MoD DE&S.	
		T&E	The contractor has increased the delivery quality.	The contract has not been tested to its full capacity. It is unclear if delivery quality should be compared to the past, present or enhanced future ability of the MoD DE&S.	
	Monetary resources	Ops	The MoD DE&S now has a much better understanding of the costs.	The MoD DE&S is paying for a level of service that is not required. Hence it is not an optimum use of money.	
		T&E	The MoD DE&S now has a much better understanding of the costs.	The MoD DE&S is paying for a level of service that is not required. Hence it is not an optimum use of money.	

Since the requirement has been so drastically reduced, it is relatively easy for the contractor to provide 95% availability of the spares. Because of the PG, availability cannot be delivered by the contractor to the JOA. Availability of spares is

apparently very different from system availability. In this case, availability is measured in the contractor's warehouses. If the contractor has the spares on the shelves when they are required, they are considered to be available. There is another problem for domestic training and exercises. While the contractor would like to deliver spares in a schedule that is convenient to him, this is not always appreciated by the Regiments, and deliveries are occasionally turned away.

Delivery time

During the CRISP contract, the contractor reduced the delivery time significantly. For the HASP contract, the HASP PT is of the opinion that DE&S could have been as effective as the contractor. Since the HASP PT has to countersign every order, and act as a middle man between the OEMs and the sub-contractors, it can be argued that the contract has brought about two time components that increase the delivery time, rather than reduces it. It is, however, not clear if delivery time should be compared to the past, present or enhanced future ability of DE&S. At present, the contracted level of service is not required for overseas operations. Even if it were required, the contractor would not be able to reduce the delivery time. Because of the PG and the JSC, all deliveries will have to follow the military schedule, and subsequently be loaded on military transportation resources, in order to reach the JOA. Since the HASP PT, because of commercial sensitivities concerning the drawings of the spares, has to act as a middleman between the OEMs and the prime contractor's sub-contractors, there is an added time component included in the process of identifying and selecting suppliers of spares.

Delivery cost

The CRISP contract reduced the delivery costs for the provision of spares to the CR2. However, according to the HASP PT, DE&S would now be able to perform this service cheaper than what the HASP contract is costing. Furthermore, the level of service that DE&S is paying for is not required. Consequently, the cost is higher than it would have been if DE&S had provided the service. In addition, it is not clear if delivery cost should be compared to the past, present or enhanced future ability of DE&S. Since the HASP PT, because of commercial sensitivities, has to act as a middleman between the OEMs and the prime contractor's sub-contractors, there is an added cost component, for internal activities within DE&S.

Delivery quality

While the CRISP contract increased the delivery quality, the HASP contract has yet to be tested to its full capacity, especially for overseas operations. Even so, the contractor is considered by the HASP PT to have increased the delivery quality. It is, however, not clear if delivery quality should be compared to the past, present or enhanced future ability of DE&S.

Effectiveness

In summary, the contractor: delivers the contracted availability (even if this level of service is no longer required); has not increased the speed of delivery (because of the PG, the contractor can hardly be expected to do so for overseas operations); has not reduced the cost of delivery (partly because DE&S has to pay for a level of service they are not using); but has increased the quality of delivery (but the contractor is not tested to the full capacity, especially not for overseas operations).

The CRISP contract outperformed what MoD was capable of at the time, and was able to reduce delivery time and cost, and increase delivery quality. However, it is debatable whether or not the same is equally true for the HASP contract. MoD has had ample time to learn from the contractor, and has been able to enhance its ability in comparison to the level where it was at a decade ago. The CRISP contract was compared against MoD capability in 1998. The HASP contract should have been compared against MoDs enhanced capability in 2008, and its projected further improvement over the next 27 months, but since the HASP contract was a direct continuation of the CRISP contract, this was not the case.

Of the four goals for this acquisition project only two were fulfilled. Consequently, this acquisition project cannot be regarded as being 100% effective. On the scale “*Low – Medium – High*”; the effectiveness of this acquisition project is assessed to be “*Medium*”. The two principal factors that lead to the “*Medium*” effectiveness are the PG, which means that the contractor cannot increase the speed of delivery, and the planning assumptions, which turned out to lead to an overestimation of the requirements. There are, however, alternative (rival, see Section 3.5.4) explanations to the “*Medium*” performance: a potential “*definition problem*”, a potential “*measurement problem*”, and a potential “*comparison problem*”. The potential “*definition problem*” (i.e. *what* to measure) is twofold. First of all, it is not clear if it is the acquisition of equipment, the provision of support, or the combination of the two, which is supposed to be “*faster, cheaper, better*”, when responsibility is outsourced to a contractor. Secondly, the notion of CfA is less than crystal clear. For equipment and support, availability refers to operational availability in theatre. In this case, availability refers to the existence of spares in the contractor’s warehouses. The potential “*measurement problem*” (i.e. *how* to measure) arises as a consequence of the fact that it is not clear when, where and how availability should be measured; and that it is not clear how changes in speed of delivery, cost of delivery and quality of delivery should be measured. The potential “*comparison problem*” (i.e. *with what* to compare) is constituted by the ambiguousness regarding with what to compare the measurements. It is not clear if the measurements should be compared to the past, present or future (enhanced) ability of DE&S.

Efficiency

The availability target is reached in this acquisition project. However, because of changes in the operational requirements, the planning assumptions are not valid at present. Consequently, the contractor does not have to provide spares for MBTs on overseas operations, which means that it is relatively easy for the contractor to meet the availability. Even if the British Army is not using the MBTs as much as anticipated, DE&S has to pay the contractor the contracted management fee, i.e. the contractor's profit. Of the remaining three goals (*"faster, cheaper, better"*), only the goal for increased quality has been reached. This acquisition project does not reach goal fulfilment, and it is more expensive than it (probably) would have been if DE&S had performed the service. The MoD could have made better use of its money than to pay Multipart Defence for a service that is not required. Since this acquisition project does not reach goal fulfilment it is not efficient and thus not an optimum use of money. On the scale *"Low – Medium – High"*, the efficiency of this acquisition project is assessed to be *"Low"*. The most important reasons for the *"Low"* efficiency are the PG and the changed operational requirements. However, the rival explanations, i.e. the potential *"definition problem"*, *"measurement problem"* and *"comparison problem"*, could also constitute parts of the explanation.

While the HASP acquisition project is not efficient, it has enhanced the knowledge regarding internal costs within DE&S. Presumably, the contractor will also have given DE&S the opportunity to enhance other aspects of its effectiveness and efficiency by providing a benchmark with which to compare its abilities.

Performance

The HASP acquisition project is neither effective nor efficient. The effectiveness was assessed to be *"Medium"* for this acquisition project, and the efficiency was assessed to be *"Low"*. The performance was then obtained by using the combination suggested in Table 3.2. The performance of the HASP acquisition project is illustrated in Table 7.21.

Table 7.21: The performance of the HASP acquisition project.

Effectiveness	High	Average Performance	Above average Performance	Good Performance
	Medium	HASP: Below average Performance	Average Performance	Above average Performance
	Low	Poor Performance	Below average Performance	Average Performance
		Low	Medium	High
Efficiency				

The performance of this acquisition project was assessed to be *"Below average"* on the scale *"Poor – Below average – Average – Above average – Good"*.

Business Model strengths and weaknesses

The strengths and weaknesses in the HASP BM are summarised in Table 7.22.

Table 7.22: Summary of strengths and weaknesses in the HASP Business Model.

Building block	Building block component	Major strengths	Major weaknesses
Channels	Purple Gate (PG)	Eliminates fragmentation of the supply chain Reduces theft in the supply chain Reduces problems with operational planning	Delivery times to operations can not be reduced by the contractor Not clear if contractor delivery times should be compared to past, present or future ability of the MoD, if the service had been kept in-house
Value proposition	Contract for Availability (CfA)	<i>Potential strengths are achieved through the contractual implementation of the business model</i>	Two interpretations of availability: one for spares (in contractor's warehouse) and one for equipment and support (system availability in theatre) White van deliveries not appreciated by regiments and consequently frequently stopped at the gate
Key partners	Selection of contractor	Seamless transition from the CRISP to the HASP contract	Because of the short term, interim solution, the previous contract, including the planning assumptions on which it was based, was prolonged
Cost structure	Cost Plus Incentive Fee (CPIF)	The cost is approved (countersigned orders) in advance and the management fee is known	The contractor's profit must be paid regardless of reductions in operational requirements No incentive for the contractor to reduce delivery time No incentive for the contractor to increase delivery quality Not clear if contractor delivery costs should be compared to past, present or future cost of the MoD, if the service had been kept in-house

The “*Below average*” performance of the HASP acquisition project can be blamed on flaws in the BM itself, imperfections in the written contract, and unfortunate circumstances. The configuration of the BM is to blame because of the PG, the CfA, how the contractor was selected, and the CPIF. The “*Channels*” building block includes the PG in the overseas channel for spares, the “*Value Propositions*” building block includes a CfA, the “*Key Partnerships*” building block involves the selection of partner by prolongation of an existing contract, and the “*Cost Structure*” building block utilises CPIF. There is a potential misalignment in the configuration of the building blocks in the HASP BM.

While the PG solves operational problems, it also introduces other problems. In the HASP case, the main problem with the PG is that it means that the contractor will never be able to reduce the time of delivery. Furthermore, it is not clear if delivery times should be compared to the past, present or future ability of DE&S.

In this case, the CfA indicates that there are two different possible interpretations of availability when it comes to a CfA. In some cases, a CfA implies system readiness, i.e. that a prerequisite of availability is that the equipment is available in

theatre, and that it is supported (maintained and repaired) to such a degree that a certain level of availability in theatre is guaranteed. Consequently, a contractor would have to take necessary precautions in order to reach the set availability targets. In the HASP case, availability is considered to be equivalent to the contractor making sure that the spares are on the shelves (in the contractor's warehouse) when they are required. For overseas operations, if the spares are required in Afghanistan and available on shelves in the UK, it is not self-evident how this can be considered to be a CfA. A possible rival explanation is that the HASP BM is a prolongation of the CRISP BM, which was a First Generation Defence Acquisition BM, i.e. CLS (TPL) type BM, not a CfA (PBC) type BM. Furthermore, it is not clear why such a relatively trivial and mundane activity such as acquiring, storing and distributing spares should be outsourced at all, without any transfer of risk, to a contractor, with a guaranteed profit to boot. A possible rival explanation is that the HASP BM is an interim solution, which was expected to be replaced by a permanent sector transformation programme. DE&S ought to be able to reach economies of scale by handling acquisition, storage and distribution of spares to those systems for which system availability is not provided by a contractor. How a contract such as the HASP contract can be considered to be VfM is hard to comprehend, and goes against established theory. However, the HASP contract was intended to be a short-term interim solution while a permanent solution was being prepared, which is presumably the reason why this acquisition project was approved despite any apprehensions concerning VfM. Another aspect of the CfA is that the contractor is required to deliver spares directly to the Regiments. The contractor will try to make the deliveries as efficiently as possible from his point of view. This is not equivalent to convenient deliveries from the point of view of the receiving Regiments. It is not uncommon that deliveries are turned away at the Regiments' gates.

The HASP BM is also to blame for the "*Below average*" performance because of the way in which the contractor was selected. Since it was "*only*" a short-term, interim solution, the Course-of-Action (COA) was to choose "*the easy way out*". In practise, this meant a direct continuation of the previous solution, i.e. that Multipart Defence was selected to continue to do what they had successfully been doing throughout the CRISP contract. Had the contractor been selected in a formal competition, or selected as the prime contractor in order to provide a permanent solution, the performance would, presumably, have been different. Selecting the existing contractor for the new contract probably contributed to the omission to re-evaluate the planning assumptions for the new contract, which is why the BM is to blame. The HASP BM is formally a CfA. Consequently it ought to be a Second Generation Defence Acquisition BM. However, the Second Generation Defence Acquisition BM was probably anticipated to come through the AVST program. The interim HASP contract is a prolongation of the CRISP contract, which was a

First Generation Defence Acquisition BM, i.e. a CLS type BM. This is potentially also a partial explanation for why there is a confusion of the interpretation of the term availability for this acquisition project. Yet another feature of the HASP BM is to blame for the “*Below average*” performance of the acquisition project. The consequence of the CPIF is that the contractor’s management fee, i.e. the profit, must be paid regardless of the factual utilisation of the MBTs. At present, when the MBTs are not on operations, DE&S has to provide the same profit to the contractor as when the UK was participating in two medium scale operations, one small scale operation, and concurrently conducting normal training activities, and was using the MBTs to a larger extent. Consequently, it is impossible for this acquisition project to be efficient, since this is not VfM.

The written contract is at fault for a specific reason. Even though the contract was for a short-term interim solution, DE&S should probably have re-evaluated the initial planning assumptions that were made when the CRISP contract was signed. As it is, these planning assumptions were prolonged. This means that the HASP contract was created based on the assumption that the UK was going to participate in two medium scale operations, one small operation, and have normal training and exercises. It must have been known when the contract was signed that these assumptions were no longer valid. If it was not known, this contract demonstrates that even a short-term prediction can be made quite erroneously.

Finally, the unfortunate circumstances are the changes in operational requirements. At the end of the day, the defence sector is totally in the hands of its owner, i.e. the government. The politicians that are elected to run the government frequently make decisions that drastically alter the military planning assumptions, particularly when they first come into office, which is how the PFI and PPP came about. It is perfectly within the authority of the politicians to make such decisions. However, the combination of frequent and drastic changes makes it nigh on impossible for the defence sector to have BMs and contracts that are fool proof and robust enough to handle all possible rapid and dramatic alterations. Hence, politicians must be made more acutely aware of the potential costs that are associated with their decisions, particularly since these monetary consequences habitually do not make themselves known until the decision makers are no longer in office.

7.4.4 Acquisition Project Risks

In Table 7.23 the HASP acquisition project risks are summarised. The table illustrates the types of risks and uncertainties, and their sources (see Section 4.10.2). In Table 7.24, the HASP BM risks are summarised.

Table 7.23: The HASP acquisition project risks.

			Sources of supply chain risks and uncertainties			
			External	Internal		
			Environ- mental risks	Organisational risks	Network risks	
					Supply risks	Demand risks
Type and consequence of supply chain risks and uncertainties	Operational accidents	Ops	---	Unforeseen time delays and costs for acting as a middleman between OEMs and subcontractors	Contractor buys too many spares Contractor buys spares too soon	---
		T&E	---	Unforeseen time delays and costs for acting as a middleman between OEMs and subcontractors	Contractor buys too many spares Contractor buys spares too soon	---
	Operational catastrophes	Ops	---	---	---	Obsolescence
		T&E	---	---	---	Obsolescence
	Strategic uncertainties	Ops	Reduced operational requirement The SDSR	Contractual risk taking (specificity versus risk)	---	---
		T&E	The SDSR	Contractual risk taking (specificity versus risk)	---	---

In Table 7.23, “Ops” stands for Overseas Operations, and “T&E” stands for Domestic Training and Exercises (see Section 4.8.5).

Operational accidents

The HASP acquisition project concerns consumable spares, including tank tracks, to CR2, the UK MBT. Hence, the risks for operational accidents could have been significant for this acquisition project. For three reasons, the impact on this risk is miniscule for the HASP acquisition project. First of all, the existence of the PG makes the solution with a private contractor more or less equivalent with that of the public provider, since the JSC is the same for both solutions. Once the spares reach the PG, they will have to be transported through the JSC regardless of from where they came, how they got there and who was responsible for getting them there. Hence, in order for this acquisition project to contribute to any increase in operational accidents, the contractor would have to have such a serious stock-out that the spares could not be delivered to the PG in time. Secondly, the HASP PT countersigns all orders for spares. Therefore there is no increase in risk for any operational accidents because of the HASP BM. Since the HASP PT countersigns every order, DE&S is also responsible for the amount of spares in the warehouse. Hence, there is no increase in the risk for operational accidents because of this acquisition project. Finally, even though the CR2 MBT is a platform that could make a difference on any battle field, it has not been deployed during the HASP contract. With only 1.3 per cent of the total number of MBTs deployed, there is

not going to be any measurable risk in the form of operational accidents, whoever is responsible for procurement, storage and distribution of consumable spares.

Even the HASP PT was hard pressed to identify any risks at all. The risks were so few that the project does not even have a risk register. The HASP PT was only able to identify three risks, which can be categorised as two operational accidents and one operational “*catastrophe*”. The operational accidents were that the contractor would buy too many spares and that the contractor would buy spares too soon. These risks were mitigated by having a designated officer within the HASP PT who countersigns each order. Consequently, all orders are pre-approved by DE&S. There is, however, the risk, now more of a factual outcome, which MoD, because of commercial sensitivities, would have to act as a middleman between the OEMs and the prime contractor’s sub-contractors. Because of the resulting time delays and added costs, there is a risk that this acquisition project will find it difficult to reduce the time of delivery and reduce the cost of delivery.

Operational catastrophes

The British Army will sometimes change its requirements. If the army were to disband the CR2s, this would lead to obsolescence, which from the point of view of the HASP acquisition project could be regarded as an operational catastrophe. However, this risk is mitigated to a large extent by having a designated officer countersign all orders for spares that are made by the contractor.

Strategic uncertainties

Even though the reduced requirement for availability on overseas operations is now a fact, it is an example of what was a strategic uncertainty when the acquisition project started, at least when the CRISP acquisition project started. The reduced requirement is an example of how sensitive military planning, management and acquisition is to civilian decision making. Politicians may at any point in time make decisions that change the planning assumptions retroactively. From the point of view of military planning, management and acquisition, such political changes in the planning assumptions are examples of strategic uncertainties. Considering the dramatic changes that the SDR brought about in 1998, in late 2010, the impending SDSR was an example of the type of strategic uncertainties that characterise defence planning, defence management and defence acquisition. The reduced requirement for availability is also an example of contractual risk taking. The question is how specific the written contract should be in comparison to the risk that is being taken by not being specific. Risks that are not identified, assessed or managed cannot be mitigated. Hence, written contracts that are not specific must be categorised as leading to an increase in strategic uncertainties.

Business Model risks

In Table 7.24, the HASP BM risks are summarised.

Table 7.24: The HASP Business Model risks.

Building block	Building block component	Major risks
Cost structure	Cost Plus Incentive Fee (CPIF)	There is a risk (now a certainty) that the contractor's profit will have to be paid even with reductions in operational requirements

There are not many risks related to the HASP BM. Neither the operational catastrophe nor the strategic uncertainties (see Table 7.23) of the HASP acquisition project are connected to the intrinsic HASP BM risks. However, one of the operational accidents can be referred to the BM and is thus included in Table 7.24.

7.5 Analysis of the ADAPT Acquisition Project

7.5.1 Business Model Configuration

The PPBM configuration used by the DE&S PT for the ADAPT (Air Defence Availability Project for Rapier) acquisition project is illustrated in Table 7.25.

Table 7.25: The ADAPT Business Model configuration.

Key Partners PPC: Partnership solution (strategic partnership) Selection of partner: Prolongation of existing contract Prime contractor: MBDA Sub-contractor: Multipart Defence	Key Activities Private sector: Design – Buy – Operate – Manage – Maintain, (DBOMM) Public sector: Finance – Own	Value Propositions Equipment: Existing (i.e. no new acquisition) Support: CfA Included DLoDs: Training, Personnel, Information, Organisation, Infrastructure, and Logistics Other affected DLoDs: Equipment	Customer Relationships Procurer	Customer Segments The Royal Artillery (RA) Regiment (The British Army); The Territorial Army (TA)
	Key Resources Not included in this thesis		Channels Overseas supply (JSC, PG) and support chains Domestic supply and support chains	
Cost Structure Fixed Price Incentive (FPI)			Revenue Streams Not included in this thesis	

The “*Business Model Canvas*”, on which the PPBM is based, is described in Table 4.12; the operationalisation provided by Osterwalder and Pigneur (2010) is described in Table 4.13 and Table 4.14; and the operationalisation used in the PPBM is described in Table 4.23 and duplicated in Table 7.1.

Customer Segments

The “*Customer Segments*” (see Section 4.12.1) in the ADAPT BM consists of the Royal Artillery (RA) and the Territorial Army (TA).

Customer Relationships

In the ADAPT BM, the “*Customer Relationships*” (see Section 4.12.2) between the ADAPT PT and its military customers is the role of “*procurer*”.

Channels

All four different types of “*Channels*” (see Section 4.12.3) are used in the ADAPT BM in order to reach the military customers. Even though the ADAPT BM is a Second Generation Defence Acquisition BM (see Section 5.3.10), it has a “*swivel chair interface*” (see Section 6.5.3), which delays orders for overseas operations and for domestic training and exercises. In the ADAPT BM, sub-contractors are allowed to distribute spares directly to the PG, for overseas operations, or directly to the military units, for domestic training and exercises, without having to pass the prime contractor’s warehouses. In the ADAPT BM, there are no problems with “*White-Van-Man*” (see Section 6.4.3) deliveries. Steps have been taken towards realising aspects of the new way of thinking as portrayed in the Defence Industrial Strategy (DIS, see Section 5.2) 2005. One of these ideas was co-location of contractor and MoD support resources. This idea has been implemented in the ADAPT BM. Consequently, the prime contractor, MBDA, has been allowed to locate its warehouses inside the RA’s premises. Hence, there is no problem with deliveries. The RA collects equipment and spares directly from MBDA warehouse, inside the Regimental area, whenever they need them, exactly as it would from its own warehouse. When this solution was first implemented through the ADAPT acquisition project, it was a novelty in the UK. In addition to the co-location of support resources, the ADAPT BM also encompasses another novelty; the replacement of Army personnel through the introduction of Sponsored Reserves (SRs, see Section 4.8.7). SRs are deployed as far forward as the second line repair facilities (L2, see Section 4.8.2), whereas the Royal Electrical and Mechanical Engineers (REME) are responsible for MRO at the first line repair facilities (L1).

Value Propositions

The “*Value Propositions*” (see Section 4.12.4) for the ADAPT BM is availability of the Rapier Surface-to-Air-Missiles (SAMs). As a Second Generation Defence Acquisition BM (see Section 5.3.10), The ADAPT BM contains a Contract for Availability (CfA, see Section 5.3.7). Like all CfAs, the ADAPT CfA is intended to incentivise industry to develop the products to become more reliable in order to maintain the availability. The ADAPT BM followed directly after its predecessor, TRADERS (The RAPier Direct Exchange of Repairable Spares), which was a First Generation Defence Acquisition BM that contained Contractor Logistics Support (CLS, see Section 5.3.7). The TRADERS contract was ended prematurely, since MoD, after the DIS, thought that it was possible to save even more money.

Based on the new ideas of the DIS in 2005, the ADAPT BM not only covers spares, but also equipment readiness (availability), MRO, co-location of contractor and MoD support activities, fleet management, SRs, and training. The renegotiation of the TRADERS contract coincided with the Royal Air Force (RAF) losing its Rapier system, due to a defence review. As a result of this reduction, 21 of the 57 Fire Units (FUs) were taken out of active service. Hence, repairs became less of an issue, since there were 21 redundant systems that could be used as backup systems. MBDA was selected as the preferred bidder for the contract, and the ADAPT contract was supposed to reduce the cost by no less than 50%. Through the ADAPT contract, MBDA has taken over several of MoDs responsibilities. Already in the TRADERS contract, MBDA had assumed responsibility for procurement of spares, and was acting as a procurement agency. In the ADAPT contract, MBDA has taken over more aspects of the Air Defence System (ADS) capability. Through the ADAPT contract, MBDA has even assumed some of the responsibility for training of the Army's personnel and substituted some of the Army's personnel, through the utilisation of SRs.

The ADAPT BM includes the following DLoDs: Training, Personnel, Information, Organisation, Infrastructure, and Logistics. Equipment is not explicitly included, but since the ADAPT BM deals with support to an already existing piece of equipment, the Equipment DLoD is affected nonetheless, even if it is indirectly. Consequently, the only DLoD that is not affected by the ADAPT acquisition project is Concepts and Doctrine.

Key Activities

In the ADAPT BM, the public and the private sector share the responsibilities for the “*Key Activities*” (see Section 4.12.5) as follows. MoD is responsible for Financing (F) and also retains Ownership (O) of facilities, equipment and spares, as soon as they are bought. The prime contractor (MBDA) is responsible for Designing (D) the service, Managing (M) the system, and Maintaining (M) the equipment. The sub-contractor, i.e. Multipart Defence, is responsible for Buying (B) spares and Operating (O). There is no Transfer (T) of responsibilities. This means that the value configuration for “*Key Activities*” in this BM is Design-Buy-Operate-Manage-Maintain, or DBOMM. The division of responsibilities in the ADAPT BM is illustrated in Table 6.5.

Key Partnerships

The “*Key Partnerships*” (see Section 4.12.7) in the ADAPT BM consists of the prime contractor, i.e. MBDA, and its sub-contractor, i.e. Multipart Defence. The type of Public Private Cooperation (PPC, see Section 4.7.5) is a strategic partnership, which is a form of “*Partnership solution*” (see Figure 4.15). Even if TRADERS was a First Generation Defence Acquisition Contract, it did not follow the usual “*selection of contractor by competition*” (see Section 5.3.10). Instead, as

early as in July 1998, a Partnering Framework Document was signed between MoD and Matra BAe Dynamics (MBD, now MBDA). The TRADERS contract, which was an example of CLS, covered repair of repairable spares, and the procurement, storage and distribution of consumable spares. The ADAPT contract is a continuation of the TRADERS contract. The prime and sub-contractors for the precursor also became the prime and sub-contractors for the successor.

Cost Structure

The “*Cost Structure*” (see Section 4.12.9) building block in the ADAPT BM rests upon a firm price agreement, over the duration of the contract, translated into a fixed monthly price, which is paid quarterly. The contract also contains an incentive, or gain share, mechanism, by which MoD and MBDA can share excess money that is taken out of the contract. There is also a sophisticated penalty mechanism built into the contract. The ADAPT “*Cost Structure*” must be categorised as Fixed-Price, and because of the gain share mechanism, it is a Fixed-Price Incentive (FPI, see Section 4.6.7) “*Cost Structure*”.

Configuration of the most differentiating building blocks

The configuration of the four most differentiating building blocks in the ADAPT BM is presented in Table 7.26.

Table 7.26: The configuration of the four most differentiating building blocks in the ADAPT Business Model.

Key Partnerships					Value Propositions							
Contracting out of Services					Equipment							
Facility Management		Contractor Support to Operations		Outsourcing		Domestic development		---	---	---	---	
-----		-----		-----		Foreign development		---	---	---	---	
-----		-----		-----		Adapted OTS		---	---	---	---	
-----		-----		-----		Standard OTS		---	---	---	---	
Alternative financing solutions					Existing		---	---	ADAPT		---	
Leasing			PFI Solutions			Traditional		CLS	CfA	CfC		
Partnership solution												
Project alliances			Strategic partnerships									
-----			ADAPT			Support						

Key Activities										Cost Structure								
Private sector	ADAPT	Design (D)	Finance (F)	Buy (B)	Own (O)	Operate (O)	Manage (M)	Maintain (M)	Transfer (T)	Contractor's motivation	High			PBC				
		-----	-----	ADAPT	-----	ADAPT	ADAPT	ADAPT	-----		-----			-----				
Public sector	ADAPT	-----	-----	ADAPT	-----	-----	-----	-----	-----		Medium	CPFF		CPIF				
		-----	-----	-----	-----	-----	-----	-----	-----			-----		-----				
Public sector	ADAPT	-----	-----	-----	-----	-----	-----	-----	-----		Low	FFP		FPI				
		-----	-----	-----	-----	-----	-----	-----	-----			-----		ADAPT				
											Low			Medium				
														High				
											Client's assurance							

Table 7.26 illustrates the configuration of the “*Value Propositions*”, the “*Key Partnerships*”, the “*Key Activities*”, and the “*Cost Structure*” building blocks.

7.5.2 Applicability of the PPBM

The Customer Segments building block

To identify the customers as the RA and the TA did not present any difficulties. However, in its present design, the contribution of this building block is limited, and an alternative operationalisation should, perhaps, be investigated.

The Customer Relationships building block

It was no problem to apply this building block and to categorise the relationship between the ADAPT PT and its customers as the role of “*procurer*”. However, the contribution of this building block is also limited. In future development of the PPBM it could be worthwhile to investigate alternative an operationalisation.

The Channels building block

It was not complicated to identify which “*Channels*” that are being used, in this case all four of them, for distribution to the customers. That this building block is of key interest was made obvious by the fact that it revealed how, i.e. through the introduction of the PG in the JSC, fragmentation is avoided. The building block was also useful to demonstrate that there is a price to pay for this development. The channel building block was also instrumental in discovering some of the implications, e.g. co-location (of contractor and military unit) and SRs that the DIS has had on acquisition of equipment and provision of support to equipment.

The Value Propositions building block

The application of the “*Value Propositions*” building block was uncomplicated, and the “*Value Propositions*” was identified as consisting of a CfA for support. It was also straightforward to conclude that most of the DLoDs are included in the ADAPT BM. The “*Value Propositions*” building block demonstrates its usefulness by, in combination with the “*Channels*” building block, indicating that it is far from clear when, where and how availability is being delivered. This building block also illuminates further developments that have followed as consequences of the DIS. By studying the “*Value Propositions*”, it becomes clear that, in Second Generation Defence Acquisition BMs, the DLoDs that are included in the models are no longer restricted to only Equipment and Logistics. In this case, e.g., Training is specified as one of the important components of the CfA. This development gives new dimensions to the concept of availability. Previously, the contractor would have been limited to MRO and keeping consumable spares on the shelves in order to achieve the targeted system availability. In essence, the contractor would make more money if the system broke down more frequently.

Under the ADAPT BM, the contractor is obliged to use additional tools, including the training of military personnel, in order to increase and maintain availability of the Rapier system. A complication with this development is that the effects of any efforts in the area of training is likely to appear at a later date than, e.g., the effects of MRO. This means that a prerequisite of the increased complexity that is exemplified in the ADAPT BM is that the implementation is in a relatively long contract, in order for efforts in the area of training to have an effect on availability.

The Key Activities building block

In the ADAPT BM, it was easy to define the sharing of responsibilities for the “Key Activities” in the BM as Design-Buy-Operate-Manage-Maintain, or DBOMM.

The Key Partnerships building block

It was no problem to identify MBDA and Multipart Defence as the prime and the sub-contractor in the ADAPT BM. That the PPC was a “Partnership solution” was also clear, but whether or not to classify the BM as a project alliance or a strategic partnership was less clear. The complexity of the arrangement and the fact that it was difficult to establish where DE&S and the ADAPT PT stopped and where MBDA begun indicated that ADAPT BM might include a project alliance. However, an alliance implies the equal sharing of risks and rewards. Since there is an asymmetrical distribution of risks and rewards in the ADAPT contract, the ADAPT BM was identified as a strategic partnership.

The Cost Structure building block

In this case the “Cost Structure” was easily identified as a FPI.

7.5.3 Acquisition Project Performance

The performance of the ADAPT acquisition project is summed up in Table 7.27 and the assessment of the performance is illustrated in Table 7.28. Strengths and weaknesses of the ADAPT BM are summarised in Table 7.29. “Ops” stands for Overseas Operations, and “T&E” stands for Domestic Training and Exercises.

Availability

The most important KPI for the ADAPT acquisition project is equipment availability on operations. The contract stipulates that this KPI has to exceed 85%. As of September 2010, ADAPT was achieving 92% availability on the Falkland Islands. Overall, the ADAPT contractor is consistently delivering in excess of 95% system availability. Hence, there is no disputing the fact that the contractor is delivering the contracted availability. However, part of the explanation for this success story is that MBDA has been able to replace ageing FUs with the best of the 21 redundant FUs. MBDA is also in the position to use the redundant FUs as reserves, which make it relatively easy to maintain high system availability, since

any broken down systems can, in theory, be replaced by one of the redundant systems. However, in practise, there may be a significant distance between the operational systems and the surplus systems, which may prevent quick replacements. Nevertheless, it is far from clear that MBDA could have been so successful in delivering the availability without the fortuitous spare FUs. Furthermore, it is not clear that MBDA will be able to maintain the high level of availability if/when they run out of redundant FUs that can replace ageing or broken down FUs on operations.

Table 7.27: The ADAPT acquisition project performance.

		Goals	Strengths	Weaknesses
Effectiveness	Availability target	Ops	The contractor reaches the contracted level of service.	It is unclear whether or not the availability target has been arbitrarily selected. The contractor delivers a higher availability than the contracted level.
		T&E	The contractor reaches the contracted level of service.	It is unclear whether or not the availability target has been arbitrarily selected. The contractor delivers a higher availability than the contracted level.
	Reduced delivery time	Ops	The reserve Fire Units (FUs) mean that the contractor can exchange FUs as they are wearing out.	The contractor can not reduce the delivery time of supplies and spares because of the Purple Gate. It is unclear if delivery time should be compared to the past, present or enhanced future ability of the MoD DE&S.
		T&E	The contractor has reduced the delivery time.	It is unclear if delivery time should be compared to the past, present or enhanced future ability of the MoD DE&S.
	Reduced delivery cost	Ops	---	It is not possible to measure the target until the Out-of-Service-Date (OSD) in 2020.
		T&E	---	It is not possible to measure the target until the Out-of-Service-Date (OSD) in 2020.
	Increased delivery quality	Ops	The contractor has increased the delivery quality.	It is unclear if delivery quality should be compared to the past, present or enhanced future ability of the MoD DE&S.
		T&E	The contractor has increased the delivery quality.	It is unclear if delivery quality should be compared to the past, present or enhanced future ability of the MoD DE&S.
Efficiency	Monetary resources	Ops	Because of the contract, the MoD DE&S now has a much better understanding of its overall costs.	The contractor delivers a higher availability than the contracted level.
		T&E	Because of the contract, the MoD DE&S now has a much better understanding of its overall costs.	The contractor delivers a higher availability than the contracted level.

Delivery time

Because of the PG and the JSC, it is not relevant, *in principle*, to discuss increase of the speed of delivery of equipment and spares for overseas operations. A contractor cannot, *in general*, be expected to be faster than MoD, when the contractor is obliged to use the same supply chain as MoD. However, in this case, because the contractor, by a stroke of pure luck, has access to 21 redundant FUs, it is possible

to reduce the delivery times, since the contractor can replace the ageing FUs with the best of the redundant ones, rather than to have to temporarily take the FUs out of service, thus reducing availability, in order to perform MRO. For domestic deliveries, the contractor is now co-located with the Regiment, which means that the RA can go to the warehouse and get what they need. Hence, delivery time has been reduced under ADAPT, since the contractor was previously obliged to transport spares to the Regiment when they were required.

Delivery cost

The ADAPT acquisition project is supposed to reduce the cost of delivery, for the remaining useful life of the system, i.e. to the OSD, by more than 50%. Whether or not MBDA will be successful in this respect remains to be seen when the system has reached its OSD in 2020. This acquisition project is a textbook example of the current enjoined procedure for acquisition within DE&S. The ADAPT PT used a PSC, in this case a BVB, when it was decided to give MBDA the CfA. Hence, in this case, it ought to be undisputed with what to compare the cost of delivery.

Delivery quality

The quality of delivery is high, and has been increased. All in all, it is too early to judge this element of effectiveness, since there are so many aspects of quality of delivery for this contract. Several of the components of the contract, e.g. training of military personnel and the utilisation of SRs, are in their infancy, and the effect of the efforts in these components will not divulge themselves until in a few years.

Effectiveness

In summary: the contractor delivers (in excess of) the contracted availability; the contractor has reduced the time of delivery; it is too early to determine whether or not the contractor will be able to reduce the cost of delivery by 50%; and the contractor has increased the quality of delivery. Since one of the goals cannot be evaluated yet, it is too early to evaluate the effectiveness component of the performance of the acquisition project. Nevertheless, as demonstrated in this analysis, the project is on the right track towards becoming an effective acquisition project. This acquisition project is assessed to be “*High*” on the scale “*Low – Medium – High*”. It is, however, not clear if delivery time and delivery quality should be compared against the past, present, or enhanced future ability of DE&S. Since the ADAPT contract replaced a previous contract, the comparison should be made against the ability of the TRADERS contract.

Efficiency

Since it is too soon to evaluate the effectiveness of the ADAPT acquisition project, it is also too soon to evaluate the efficiency of the acquisition project. It can, however, already be argued that the contractor is performing too well on the availability goal. How large the additional cost for exceeding 95% overall system

availability, which among other things involves shipping replacement FUs down to the Falkland Islands, rather than stopping at the contracted 85%, is not clear, but it seems well worth finding out if there is more money to be saved by not surpassing the contracted availability. Even though it is too early to evaluate the efficiency of the ADAPT acquisition project, it is probably safe to say that the project is well on its way to becoming an efficient project. If the 50% reduction of remaining LCC is realised, the project is likely to become VfM, and consequently an efficient project. The project is assessed to be “*Medium*” on the scale “*Low – Medium – High*”. By producing a PSC, or a BVB, the acquisition project has led to an enhanced awareness within DE&S regarding the costs of support to the Rapier system. This is a fringe benefit of the project, which is worth mentioning.

Performance

The contract must probably run a few more years before it is relevant to start discussing the performance of the contract. However, while it is too soon to comprehensively assess this acquisition project, it is well on its way to becoming both effective and efficient. At least as effective as it could possibly get, with the existence of the PG, which means that the project can never reduce delivery times for overseas operations. The effectiveness was assessed to be “*High*” for this acquisition project, and the efficiency was assessed to be “*Medium*”. The performance was then obtained by using the combination suggested in Table 3.2. The performance of the ADAPT acquisition project is illustrated in Table 7.28

Table 7.28: The performance of the ADAPT acquisition project.

Effectiveness	High	Average Performance	ADAPT: Above average Performance	Good Performance
	Medium	Below average Performance	Average Performance	Above average Performance
	Low	Poor Performance	Below average Performance	Average Performance
	Low		Medium	High
Efficiency				

The performance of this acquisition project was assessed to be “*Above average*” on the scale “*Poor – Below average – Average – Above average – Good*”.

Business Model strengths and weaknesses

In Table 7.29 the strengths and weaknesses in the ADAPT BM are summarised.

Table 7.29: Summary of strengths and weaknesses in the ADAPT Business Model.

Building block	Building block component	Major strengths	Major weaknesses
Channels	Purple Gate (PG)	Eliminates fragmentation of the supply chain Reduces theft in the supply chain Reduces problems with operational planning	Not clear when, where and how availability is being delivered by the contractor The effect on transfer of risk to the contractor is not clear Delivery times to operations can not be reduced by the contractor Not clear if contractor delivery times should be compared to past, present or future ability of the MoD, if the service had been kept in-house
Channels	Sponsored Reserves (SRs)	Allows contractors in the support chain without fragmentation	Loss of competence within the British Army Difficult to measure effects on availability
Value proposition	Contract for Availability (CfA)	Problems with White van deliveries mitigated through co-location	Difficult to measure effects of contractor responsibility for Training
Cost structure	Fixed Price Incentive (FFI)	The maximum price is known in advance	Not possible to measure the target until the OSD Not clear if contractor delivery costs should be compared to past, present or future cost of the MoD, if the service had been kept in-house

The ADAPT acquisition project is well on its way to becoming both effective and efficient, but it is too soon to assess the performance. However, while it is too early to distribute blame or credit, it is possible to discuss, in general terms, factors that *may* lead to success or failure of the acquisition project in the future, some of which are already influencing the acquisition project. Since this acquisition project is rather complex, involving outsourcing of Training, SRs in the support chain, and co-location of facilities, it is also rather complex to separate the potential success factors from each other. It is, however, probably safe to say that there are potential success factors in the BM, in the written contract and in the environment. Similarly, there are also factors that may lead to failure in the BM, in the written contract and in the environment.

In the configuration of the BM, there are several factors that have both strengths and weaknesses (see Table 7.29) and that may lead to success or failure. The PG in the JSC eliminates fragmentation, reduces theft and reduces problems with operational planning. On the downside, the PG also makes it ambiguous when, where and how availability is delivered by a contractor; has an unclear effect on transfer of risk to a contractor; and renders it nigh on impossible for a contractor to reduce delivery times. The use of SRs makes it possible to use contractors in the support chain without fragmentation. On the other hand, SRs leads to a loss of competence within the British Armed Forces, and it is also difficult to measure which effect they have on availability.

In this CfA, new ideas from the DIS are integrated. One of the advantages of one of these new ideas is that through co-location of contractor and MoD storage facilities, the problems with “*White-Van-Man*” (see Section 6.4.3) deliveries are mitigated. One of the disadvantages of another of these new ideas is that it is difficult to measure the effects that outsourcing of Training to a contractor has on availability. There is also a significant lead time for any improvements that this may lead to. The BM includes a FPI. A benefit with the FPI is that the maximum price is known in advance. A shortcoming with this specific agreement is that it is not possible to finally measure the target until the OSD of the system.

There is no question that the TRADERS contract outperformed what MoD was able to deliver at the time of the signing of the contract. However, TRADERS consisted of the outsourcing of the relatively simple task of procuring, storing and distributing spares. Once MoD has rationalised its processes, has become more effective and efficient, and thus improved its own performance, there is nothing to say that a civilian contractor should always be able to be “*faster, cheaper, better*” than what MoD could be. Quite to the contrary, MoD ought to be able to reach economies of scale by itself for procuring, storing and distributing spares to a degree that should easily be comparable with the civilian contractors. This is already the case for support solutions that have not been outsourced. The ADAPT BM and the ADAPT contract are, however, more than the comparatively mundane outsourcing of procurement, storage and distribution. Through the ADAPT BM, and its implementation in the ADAPT contract, DE&S has reached the next level of cooperation with industry, where industry has taken over the responsibility for more of the elements that in combination produce capability. For this reason it is also more difficult to judge the acquisition project’s performance and to compare it against what MoD could have been able to do by its own accord.

The ADAPT BM is one of the BMs that represent the most complex BMs that DE&S has engaged in to date. It is a Second Generation Defence Acquisition BM to all intents and purposes. Among other things, the BM also involves training of British Army personnel and even replacement of British Army personnel with SRs. The lead time for delivery of the effects of these elements of capability is longer than for many other elements. They are also interconnected with the other elements. As an example it can be noted that if the training works out and intended, and if the SRs are as good as, or even better than, their Army predecessors, the quality of the preventive maintenance should be enhanced, which ought to lead to an increase in availability because of fewer breakdowns, and more easily repaired breakdowns of the system. There will, by necessity, be a running-in period before the effects of training and SRs can be measured.

In the contextual events, there is one development that stands out more than any other, and which has positively influenced the performance of the ADAPT

acquisition project. Normally, defence review reductions do not tend to have positive effects on existing contracts. However, in this case, the reduction of operational Rapier systems involved 21 operational FUs immediately becoming redundant FUs, and subsequently transforming into spare FUs. So far, this fortuitous development has had a profound effect on the contractor's ability to maintain availability on a high level, since it has been possible to replace ageing FUs with the best of the spare FUs.

7.5.4 Acquisition Project Risks

In Table 7.30, ADAPT acquisition project risks are summarised. The table illustrates the types of risks and uncertainties, and their sources (see Section 4.10.2) are presented. In Table 7.31, the ADAPT BM risks are summarised.

Table 7.30: The ADAPT acquisition project risks.

			Sources of supply chain risks and uncertainties			
			External	Internal		
			Environ- mental risks	Organisational risks	Network risks	
					Supply risks	Demand risks
Type and consequence of supply chain risks and uncertainties	Operational accidents	Ops	---	The existence of the Purple Gate	---	---
		T&E	---	---	---	---
	Operational catastrophes	Ops	---	---	---	Obsolescence
		T&E	---	---	---	Obsolescence
	Strategic uncertainties	Ops	Reduced operational requirement The SDSR	Contractual risk taking (specificity versus risk)	The effect of contracting out the Training DLoD The effect of SRs	---
		T&E	The SDSR	Contractual risk taking (specificity versus risk)	The effect of contracting out the Training DLoD The effect of SRs	---

In Table 7.30, “Ops” stands for Overseas Operations, and “T&E” stands for Domestic Training and Exercises (see Section 4.8.5).

Operational accidents

While mitigating some risks, i.e. theft, fragmentation and problems with operational planning, the introduction of the PG concurrently created other risks. There is a risk that the PG changes the meaning of CfAs, or even renders them meaningless, since in practise, the contractor cannot assume responsibility, and risk cannot be transferred to the contractor, as long as he is obliged to utilise the JSC, where MoD is responsible for transportation after the PG. Another consequence of the PG is that the contractor cannot be expected to reduce delivery times for overseas operations.

Operational catastrophes

The Rapier system is an operational system. The Rapier system has been on operations since the war on the Falkland Islands in 1982, and thirty years later, the system is operational there to this day. Being a sophisticated Air Defence System (ADS) the potential consequences if the system was temporarily out of service when it was needed, would potentially be disastrous. However, the ADAPT PT considers the risk of any operational catastrophes to be very low. The one potential operational catastrophe that the ADAPT PT identified was the risk of obsolescence. The British Army will sometimes fundamentally change its requirements. Such changes could lead to obsolescence for the Rapier system. Being an electronic system, the technological development could also lead to obsolescence, since, sooner or later, technology will have developed so far as to make the entire system obsolete. For a contract that is supposed to run to the OSD, the risk of obsolescence was one that MoD had to manage. In this case, the risk of obsolescence was transferred to the contractor.

Strategic uncertainties

The risk for reduced requirements for availability on overseas operations is a strategic uncertainty for any defence acquisition project, including the ADAPT acquisition project. In late 2010 the impending SDSR was an example of the type of strategic uncertainties that characterise defence planning, defence management, and defence acquisition. One document can revolutionise all planning assumptions, making it necessary to revise planning, change existing contracts, and to cancel or postpone future contracts. The specificity of the contract is also a source of strategic uncertainty. Any risks that were not identified, analysed and managed in the contract are all strategic uncertainties that may affect the contract.

In addition to procurement, storage and distribution of spares; and MRO; in the ADAPT contract, MoD has contracted out parts of the training for the Army personnel, and even in practise contracted out some of the Army personnel. While the outsourcing of procurement and support after the introduction of the PG into the JSC no longer contributes to any increase in operational risk, the case may be quite different when other elements of capability are outsourced. It could be argued that there is an increase in strategic uncertainty because DE&S has contracted out training and with the introduction of SRs into the support chain. Since there is no way of knowing for certain that this will work out and, or even better than, the previous solution, when the Army was doing all the MRO with their own personnel, that they had trained themselves, there must be an inherent uncertainty regarding the potential quality of this aspect of the contract.

Business Model risks

Table 7.31 summarises the ADAPT BM risks.

Table 7.31: The ADAPT Business Model risks.

Building block	Building block component	Major risks
Channels	Purple Gate (PG)	There is a risk that Contracts for Availability (CfA) have been rendered meaningless in practise There is a risk that a contractor will not be able to reduce delivery times for overseas operations There is a risk that transfer of ownership and risk have been rendered meaningless in practise
Channels	Sponsored Reserves (SRs)	There is a risk that the demand for SRs will exceed the supply There is a risk that not all SRs will be available when required There is a risk that there will be unforeseen consequences with SRs
Value proposition	Contract for Availability (CfA)	There is a risk that there will be unforeseen consequences with the outsourcing of more elements of capability (DLoDs), e.g. training

Table 7.31 illustrates those of the acquisition project risks as depicted in Table 7.30 that are directly associated with the BM itself, even if they have been expanded and rephrased in order to fit the building block components. System obsolescence and contract specificity are connected to the contract, whereas any reduced operational requirements and the imminent SDSR are examples of environmental factors that are outside of DE&S responsibility and over which DE&S has not direct influence when designing the BM.

7.6 Cross Case Synthesis

In this section, using a similar structure as in the previous sections of this chapter, the results of the analyses in the previous sections are compared and synthesised in order to establish any existing common patterns among the four cases. In the cross-case synthesis, corresponding to the Research Questions (RQs, see Section 1.6), it is the BM strengths, weaknesses and risks, separated from those of the contract and the context, that are compared and synthesised in order to establish common patterns among the BMs; whereas in the within-case analyses, the performance and risks of the overarching acquisition projects (see Section 7.1) were decomposed and analysed in order to more easily identify the common denominators in the BMs in the ensuing synthesis. Consequently, the following subsections are used in this section: Business Model configurations (connected to RQ 1); Applicability of the PPBM (connected to RQ 1); Business Model strengths and weaknesses (connected to RQ 2); and Business Model risks (connected to RQ 3).

7.6.1 Business Model Configurations

In Table 7.32 the configurations of the four BMs included in the reported research are illustrated. As mentioned previously, the “*Revenue Streams*” and “*Key Resources*” building blocks, and internal costs (in the “*Cost Structure*” building block), have not been included in the reported research.

Table 7.32: The Business Model configurations in the four cases.

Business Model Building Block		Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Customer Segments		The British Armed Forces	The Royal Air Force (RAF)	The British Army	The Royal Artillery; The Territorial Army
Customer Relationship		Procurer	Challenger	Procurer	Procurer
Channels	Overseas supply chain	Yes	Not applicable	Yes	Yes
	Overseas support chain	Yes	Not applicable	No	Yes
	Domestic supply chain	Yes	Not applicable	Yes	Yes
	Domestic support chain	Yes	Not applicable	No	Yes
Value Proposition	Equipment	Adapted COTS	Standard MOTS	No new acquisition	No new acquisition
	Support	CfA	CfA (MOTS)	CfA	CfA
	Included DLoDs	Training, Equipment, Personnel, Information and Logistics	Training, Equipment, Personnel, Information and Logistics	Information and Logistics	Training, Personnel, Information, Organisation, Infrastructure, and Logistics
	Other affected DLoDs	None	None	Equipment	Equipment
Key Activities	Private sector responsibility	Finance – Buy – Own – Operate – Manage – Maintain, (FBOOMM)	Finance – Own – Maintain, (FOM)	Finance – Buy – Own – Transfer, (FBOT)	Design – Buy – Operate – Manage – Maintain, (DBOMM)
	Public sector responsibility	Design	Design – Lease – Operate – Manage	Design – (Own)	Finance – Own
Key Partnerships	PPC	Alternative financing solution (PFI)	Alternative financing solution (Leasing)	Contracting out of services (outsourcing)	Partnership solution (strategic partnership)
	Selection of partner	Through competition	Through competition	Prolongation of existing contract	Prolongation of existing contract
	Prime contractor	ALC	Boeing (via FMS)	Multipart Defence	MBDA
	Sub-contractors	Multipart Defence	None	None	Multipart Defence
	Other important actors	Consortium of banks (PFI)	The US DoD, USAF and LSE	OEMs	None
Key Resources (Not included in this thesis)					
Revenue Streams (Not included in this thesis)					
Cost Structure (Only external costs included in this thesis)		Firm Fixed Price (FFP)	Cost Plus Fixed Fee (CPFF)	Cost Plus Incentive Fee (CPIF)	Fixed Price Incentive (FPI)

The “*Business Model Canvas*”, on which the PPBM is based, is described in Table 4.12; the operationalisation provided by Osterwalder and Pigneur (2010) is presented in Table 4.13 and Table 4.14; and the operationalisation used in the PPBM is described in Table 4.23 and duplicated in Table 7.1.

In this section, the contents of the individual building blocks are compared in order to identify any common patterns for the BMs, i.e. the different configurations of building blocks in the four cases.

Customer Segments

In Table 7.33, the “*Customer Segments*” in the four cases are illustrated.

Table 7.33: The Customer Segments in the four cases.

Business Model Building Block	Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Customer Segments	The British Armed Forces	The Royal Air Force (RAF)	The British Army	The Royal Artillery; The Territorial Army

The “*Customer Segments*” (see Section 4.12.1) building block in the different BMs is not differentiating between these BMs in any perceptible way. In the current version of this building block it contains a piece of information that is stating the obvious, i.e. that the Armed Forces; or more specifically a particular Armed Forces Headquarters (HQ); a service within the Armed Forces; a particular branch, Corps or Regiment within one of the services; or a specific military unit; is the end user of the equipment or support. Basically, these “*segments*” are all part of the same customer, the Armed Forces. Thus, the common pattern for this building block is that for a DPA, which acquires equipment and support, but increasingly also other Defence Lines of Development (DLoDs), such as Training, for a military customer, the current content of this building block is not useful for differentiating between different PPBM, differentiating between the performances and risks associated with the PPBM, or explaining how such differences came about. Consequently, in any future development of the PPBM, it could be worthwhile to investigate if an alternative operationalisation of the “*Customer Segments*” could augment the contribution of this building block. Perhaps the spectrum of peace, crises and war could provide a more appropriate ground for the categorisation of the “*Customer Segments*”; either as an additional dimension or as a replacement.

Customer Relationships

Table 7.34 illustrates the “*Customer Relationships*” in the four cases.

Table 7.34: The Customer Relationships in the four cases.

Business Model Building Block	Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Customer Relationship	Procurer	Challenger	Procurer	Procurer

The “*Customer Relationships*” (see Section 4.12.2) building block is categorised as “*procurer*” in the C Vehicle, HASP and ADAPT BMs, and as “*challenger*” in the STSA BM. In the STSA BM, the STSA PT overtly shoulders the responsibility of saying “*No*” to the customer, i.e. to the RAF. Considering the unconditional

adherence to configuration communality with the USAF version of the aircraft, this is not a spectacular attribute of this BM. Besides the potential costs for any UK adaptations of the MOTS aircraft, the MOTS support solution does not allow anything else than unconditional adherence to configuration communality. There is no common pattern for this building block *per se*, but a reflection is that this building block is potentially of great interest to study. If and when a DPA deliberately assumes different roles in its relationships with its customers, depending on the contents of the other building blocks, e.g. “*Value Propositions*”, responsibility for “*Key Activities*” and relationship with “*Key Partnerships*”, it could be interesting to see how the “*Customer Relationships*” influences the BM performance and risks. The three proposed points on a spectrum of possible relationships appears to be a reasonable starting point for the development of this building block. It could probably be worthwhile to further explore the “*Customer Relationships*” building block in any future developments of the PPBM, both in terms of the number of possible values and in terms of what the values represent, in order to investigate if another operationalisation could increase the contribution of this building block. If the operationalisation of the “*Customer Segments*” building block were to be altered in any significant way, the operationalisation of the “*Customer Relationships*” building block would have to be changed accordingly.

Channels

In Table 7.35, the “*Channels*” in three of the four cases are summarised. In the STSA BM, it is not relevant to discuss “*Channels*” for the distribution of equipment and support to equipment. In addition, in the HASP BM, the “*Value Propositions*” only includes the provision of spares. Consequently, the “*Channels*” to the customer only include the overseas and domestic supply chain.

Table 7.35: The Channels in the four cases.

Business Model Building Block		Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Channels	Overseas supply chain	Yes	Not applicable	Yes	Yes
	Overseas support chain	Yes	Not applicable	No	Yes
	Domestic supply chain	Yes	Not applicable	Yes	Yes
	Domestic support chain	Yes	Not applicable	No	Yes

The “*Channels*” (see Section 4.12.3) building block includes four potential ways of distributing equipment and support to equipment to the customers. The overseas supply chains, including the JSC, for the C Vehicle, HASP and ADAPT BMs are depicted in Figure 6.2, Figure 6.6 and Figure 6.8. From the PG to the deployed military unit, the distribution flow follows the description provided in Section 6.2.

The C-Vehicle, HASP and ADAPT supply chains for overseas operations are similar. They are, however, not identical. There are several minor differences and one of the more important of these is that the channel in the C Vehicle BM is for the distribution of equipment, repairable spares and consumable spares; the channel in the HASP BM is for consumable spares; and the channel in the ADAPT BM is for repairable and consumable spares. Another notable difference is that in the C Vehicle BM sub-contractors are not allowed to deliver directly to the PG, whereas the sub-contractors in the HASP and ADAPT BM deliver either to the contractor, or directly to the PG. Furthermore, while the C Vehicle and HASP BMs avoid the delay via the “*swivel chair interface*” (see Section 6.5.3), and a potential source of errors, the ADAPT BM does not allow direct, electronic information to flow from unit level to the contractor. There is an initiative within the ADAPT contract to make this information flow directly. While there are several minor differences between the overseas supply chains for the three BMs, they are predominantly similar, and particularly prominent common denominators between them are the problems brought about by the introduction of the PG.

The domestic supply chains for the C Vehicle, HASP and ADAPT BMs are illustrated in Figure 6.3, Figure 6.4, Figure 6.7 and Figure 6.9. The dissimilarities between the domestic supply chains are basically the same as for the overseas supply chains, i.e. differences regarding what it is that is being distributed (equipment, repairable spares and/or consumable spares); the point of delivery for sub-contractors; and the existence or non-existence of the “*swivel chair interface*”. There is, however, especially one difference that is specific to the domestic supply chains for these BMs. In the ADAPT BM, the prime contractor runs the warehouse inside the customer’s premises, which is a development that is in line with one of the initiatives, i.e. co-location of contractor and MoD support resources, in the DIS. Consequently, there are no problems with the Regiment having to receive “*White-Van-Man*” (see Section 6.4.3) deliveries at any time of day, as there are in the C Vehicle and HASP BMs. The Regiment collects equipment and spares directly from the prime contractor’s warehouse, inside the Regimental area, whenever they need them. When this solution was first implemented in the ADAPT contract, it was a novelty in the UK.

The support chains for overseas operations, and for domestic training and exercises, for the C Vehicle and ADAPT BMs are illustrated in Figure 6.5 and Figure 6.10. In the support chains, the C Vehicle and ADAPT BMs encompass another novelty of the DIS, the replacement of Army personnel through the introduction of SRs. Hence, employees of the prime contractors can, as SRs, be deployed as far forward as the L2 repair facilities. At the L1 repair facilities, the REME are responsible for MRO. That the C Vehicle BM, which is a First Generation Defence Acquisition BM (see Section 5.3.10), contains elements of the DIS, which set the agenda for

Second Generation Defence Acquisition BMs is noteworthy. The reason for this is probably that the contract was delayed so that this influence of new ideas was made possible. The “Channels” building block is of great importance. It is through the “Channels” that equipment and support to equipment is being distributed, and it is in the “Channels” that BM performance and risks will manifest themselves most clearly. It is also in this building block that the logistics interfaces between different actors in the supply and support chains are represented. The common pattern is that the four proposed variants of “Channels” seem to be adequate and exhaustive in order to describe how supply and support must be distributed to military units on overseas operations, or on domestic training or exercises.

The PG has effectively addressed and partially solved risks and problems, i.e. theft, fragmentation and problems with operational planning, at the operational level. These improvements have, however, come at significant costs. The PG has introduced other operational problems in the physical supply chain, structural problems in the design of BMs and conceptual problems in the implementation of business concepts into written contracts. These problems will be further explored in Section 7.6.3. The observation that the PG has brought about positive and negative effects is also a common pattern among the three cases that have supply chains for overseas operations. The negative effects of the introduction of the PG would not have been so effortlessly revealed without these four variants of “Channels” in this building block. Another discernible pattern is that “White-Van-Man” deliveries have been, and still are in some cases, a problem for deliveries to, e.g., Regiments, in the domestic supply chain. It is also clear that the DIS has probably remedied the problem by introducing co-location of contractor and MoD support resources. A pattern emerging after the DIS is also the use of SRs, through which support can be outsourced without fragmentation of the support chain.

Value Propositions

In Table 7.36 the “Value Propositions” in the four cases are presented.

Table 7.36: The Value Proposition in the four cases.

Business Model Building Block		Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Value Proposition	Equipment	Adapted COTS	Standard MOTS	No new acquisition	No new acquisition
	Support	CfA	CfA (MOTS)	CfA	CfA
	Included DLoDs	Training, Equipment, Personnel, Information and Logistics	Training, Equipment, Personnel, Information and Logistics	Information and Logistics	Training, Personnel, Information, Organisation, Infrastructure, and Logistics
	Other affected DLoDs	None	None	Equipment	Equipment

The “*Value Propositions*” (see Section 4.12.4) building block consists of equipment and support to equipment, and the direct (included) and indirect (affected) effects on the remaining DLoDs, i.e. Training, Personnel, Information, Concepts and Doctrine, Organisation, and Infrastructure.

The C Vehicle and the STSA BMs involve the acquisition of new equipment, whereas the HASP and ADAPT BMs include support to already existing systems. The acquired equipment in the C Vehicle BM is adapted COTS (construction equipment and Mechanical Handling Equipment, MHE), and in the STSA BM it is standard MOTS (strategic airlift).

The STSA and the HASP BMs are two examples of BMs for short-term temporary solutions. Consequently, specifications and requirements were relaxed in these BMs in comparison to what would probably have been the case for long-term, permanent solutions. The intended long-term, permanent solutions were delayed (increased delivery time) and unaffordable (increased delivery cost), respectively. The STSA BM, which was intended to be implemented as a seven year interim solution, has now become a permanent solution, which will last several decades, while the underlying BM remains the same. The 27 month interim HASP contract had a built in option for a one year extension, but it is not clear whether or not this option was used, or if any other alternative solution were used. If the option for an extension was used, the contract will have run its course sometime during 2012.

All four BMs include CfAs. Superficially, the four BMs bear a striking resemblance with each other in this respect. This is, however, surprisingly far from the factual situation. In the C Vehicle BM, the CfA is about providing availability of construction equipment and MHE. Consequently, the prime contractor delivers vehicles according to the requirements of the British Armed Forces. In the STSA BM, the CfA is about providing availability of strategic airlift flying hours in accordance with the specifications of the US Air Force (USAF), not the Royal Air Force (RAF). In the HASP BM, the CfA is restricted to the acquisition, storage and distribution of spares, in a quantity that meets the requirements of the British Army. Consequently, in the HASP BM, availability is being delivered in the form of spares on the shelves of the contractor. In the ADAPT BM, the prime contractor has assumed responsibility for more DLoDs than merely Equipment and Logistics, and can use, e.g., Training of British Army personnel as a component in the efforts to enhance system availability, through enhanced skills among the mechanics.

In practise, DE&S has outsourced a significant portion of acquisition, storage and distribution of spares to one contractor, Multipart Defence, which in a sense acts as a procurement agency. In the four cases, Multipart Defence is the prime contractor only in one BM, i.e. in the HASP BM. However, Multipart Defence is the sub-contractor, for acquisition, storage and distribution of spares, to ALC in the C Vehicle BM and to MBDA in the ADAPT BM. Previously, Multipart Defence also

played the role of sub-contractor, for acquisition, storage and distribution of spares, to BAE in the CRISP contract (predecessor to the HASP contract) and to MBDA in the TRADERS contract (precursor to the ADAPT contract). Consequently, Multipart Defence has been responsible for acquisition, storage and distribution of spares in all the UK support solutions mentioned in this thesis.

The STSA and HASP BMs represent the least complexity. The implementation of these short-term, interim BMs is a *“flying truck”* and *“spares on the shelves”*. In these PPBMs it is also clear when, where and how availability is being delivered. In the STSA BM, availability is being delivered in the form of flying hours, whereas in the HASP BM, availability is being delivered on the shelves in the contractor’s warehouse. The relatively long-term C Vehicle and ADAPT BMs, on the other hand, represent more complex BMs, as they are CfAs for availability of systems that are deployed on overseas operations. For these two BMs, the introduction of the PG has complicated matters to a large extent. As the contractors cannot be held responsible for what happens after the PG, it is not clear when, where or how availability should be delivered for overseas operations. The potential answer to these questions could be anything between *“In the contractor’s warehouse, when the contractor receives an order from the Armed Forces”*, via *“When the system is delivered to the PG”*, to *“When the system is delivered in the JOA”*. Availability means different things, or refers to different types of availability, in the four BMs described above. For the more complex variants of availability, i.e. system availability on deployed operations, it is not clear when, where or how availability is delivered.

While the ADAPT BM is not the most recent of the cases, it is the most advanced, and the BM that is most in line with the new ideas in the DIS. One of the implications of this observation is that the ADAPT BM, as a CfA, is explicitly intended to incentivise industry to develop the systems to become more reliable in order to enhance and maintain the availability. In order to make this possible, in the ADAPT BM, the contractor has been given the direct responsibility for additional DLoDs. In the other BMs, the contractors have been given responsibility for Equipment, Support, or a combination of the two. In the ADAPT BM, the contractor has also been given the responsibility for some of the Training of British Army personnel, and even replacement of some of the Personnel in the British Army (by using SRs).

The *“Value Propositions”* building block is central in the PPBM. The proposed dimensions, i.e. equipment and support, are relevant to capture the *“Value Propositions”* that a DPA could have towards its military customer. In addition to the two basic dimensions, the effect on the other DLoDs is also. For more advanced BMs, where responsibility for more DLoDs is outsourced to contractors, it is likely that all DLoDs must be included in this building block in order to appropriately describe the *“Value Propositions”* to the customer. The *“Value*

Propositions” building block, in combination with the “*Channels*” equivalent, has disclosed that CfAs are difficult to utilise in combination with the PG, for the delivery of availability to overseas operations, thus indicating these building blocks’ usefulness. Hence, there is a potential misalignment between the existence of the PG and the ambition of CfAs for overseas operations.

The most prominent common pattern is that all BMs include CfAs. A pattern associated with this observation is that availability has different meanings in different acquisition projects, e.g. operational system availability in the JOA and existence of spares on shelves in civilian warehouses in the Home Logistics Base (HLB, see Section 4.8.6). There is also an emerging pattern that ideas from the DIS, e.g. SRs and co-location, to a certain extent have remedied some of the problems that is prevalent in acquisition projects that predate the DIS.

Key Activities

In Table 7.37, the sharing of the “*Key Activities*” between the public and the private sectors in the four cases is displayed.

Table 7.37: The Key Activities in the four cases.

Business Model Building Block		Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Key Activities	Private sector responsibility	Finance – Buy – Own – Operate – Manage – Maintain, (FBOOMM)	Finance – Own – Maintain, (FOM)	Finance – Buy – Own – Transfer, (FBOT)	Design – Buy – Operate – Manage – Maintain, (DBOMM)
	Public sector responsibility	Design	Design – Lease – Operate – Manage	Design – (Own)	Finance – Own

The division between the private and public sector of responsibilities for the “*Key Activities*” (see Section 4.12.5) in the four cases have been illustrated in Table 6.2, Table 6.3, Table 6.4 and Table 6.5. The sharing of responsibilities for the “*Key Activities*” can be categorised as FBOOMM (Finance–Buy–Own–Operate–Manage–Maintain) in the C Vehicle BM, as FOM (Finance–Own–Maintain) in the original STSA BM, as FBOT (Finance–Buy–Own–Transfer) in the HASP BM and as DBOMM (Design–Buy–Operate–Manage–Maintain) in the ADAPT BM.

In the C Vehicle BM there is a complication with the categorisation of sharing of responsibilities for the “*Key Activities*”. Although this division, *in principle*, is FBOOM, the PG causes difficulties once more. Despite the fact that ownership of the equipment remains with the contractor even after passing the PG, risk taking cannot be assumed by the contractor, since the contractor has no influence over the equipment after the PG. Consequently, the implication of the introduction of the PG is that, whatever the formal contract states, in practise there cannot be any transfer of risk beyond that node in the JSC. Regardless of ownership, risk must be assumed by the public sector, i.e. by MoD.

In the STSA BM, because of the involvement of the US DoD FMS program (see Sections 6.3.2 and 6.3.4), the sharing of responsibilities becomes relatively complex. Formally, the STSA acquisition project *could be* regarded as a Government-to-Government acquisition project, rather than as an example of PPC. If a deal with the US is going to be analysed with the PPBM, the analysis of the sharing of responsibilities will have to be adapted accordingly (see Table 6.3). For this analysis, the acquisition project *is* considered to be a PPC, and is consequently analysed as *if it were* a PPC. When the interim leasing solution turned into a permanent solution through the ultimate acquisition of the C-17s, the FOM division of responsibilities for “*Key Activities*” simultaneously turned into FOMT (see Section 6.3.4). HMT is not likely to ever allow a similar development again, and has imposed severe restrictions on future leasing arrangements in order to prevent a development that is not considered to be VFM.

The proposed contents of the “*Key Activities*” building block in the PPBM is how theorists and practitioners in some areas outside of the defence sector, e.g. in the infrastructure construction industry, successfully categorise different PPPs. In these outside areas, the categorisation results in labels on the different forms of PPPs. Hence, if the notion of using the terminology also in the defence sector was followed through entirely, the PPPs in the four acquisition projects should be labelled as an FBOOMM PPP, an FOM PPP, an FBOT PPP and a DBOMM PPP, respectively. However, PPPs are but one part of the overall PPBM. Consequently, the author has elected *not* to label the four PPBM in accordance with this tradition. In the current version, the PPBM are not designated any prefix or suffix in order to discriminate between them by describing the configuration of building blocks that they represent. Such a development may well be a topic for future research in the area of PPBM for defence acquisition. At present, the central observable pattern is that the suggested terminology is useful also within the defence sector.

Another possible pattern is that, in combination with the “*Channels*” building block, the “*Key Activities*” building block seems to indicate that with the introduction of the PG, regardless of ownership, risk must be assumed by the public sector, i.e. by MoD, in the JSC, thus making risk transfer to the private sector debatable.

Key Partnerships

Table 7.38 illustrates the type of cooperation between the public and the private sector, how the prime contractor was selected and identifies the “*Key Partnerships*” in the four cases.

Table 7.38: The Key Partnerships in the four cases.

Business Model Building Block		Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Key Partnerships	PPC	Alternative financing solution (PFI)	Alternative financing solution (Leasing)	Contracting out of services (outsourcing)	Partnership solution (strategic partnership)
	Selection of partner	Through competition	Through competition	Prolongation of existing contract	Prolongation of existing contract
	Prime contractor	ALC	Boeing (via FMS)	Multipart Defence	MBDA
	Sub-contractors	Multipart Defence	None	None	Multipart Defence
	Other important actors	Consortium of banks (PFI)	The US DoD, USAF and LSE	OEMs	None

The types of PPC in the “*Key Partnerships*” (see Section 4.12.7) building block are in the C Vehicle BM: “*Alternative financing solutions*” (PFI); in the STSA BM: “*Alternative financing solutions*” (Leasing); in the HASP BM: “*Contracting out of services*” (outsourcing); and in the ADAPT BM: “*Partnership solution*” (strategic partnership).

The “*Alternative financing solutions*”, i.e. the PFI, in the C Vehicle BM has turned out to be the primary concern in the C Vehicle PT. The consortium of banks is only interested in getting its ROI and consequently not particularly interested in any renegotiations. Furthermore, HMT has decided that PFIs are not VfM and PFIs are accordingly no longer recommended for defence acquisition.

In the STSA BM, the “*Alternative financing solutions*” is leasing. HMT does not consider leasing to be VfM and has, after the debacle with the STSA acquisition project, imposed severe restrictions for any future leasing arrangements, thus limiting the usability, appeal and power of attraction of this type of PPC. Since PFIs and leasing, the two “*Alternative financing solutions*” in existence, are no longer allowed/recommended/encouraged by HMT, in effect, HMT has all but abolished “*Alternative financing solutions*” in the UK, at least for defence acquisition.

In the C Vehicle and STSA BMs, the formal partners, i.e. the prime contractors, were selected through competitions, whereas in the HASP and ADAPT BMs, the partners were selected by prolongation of existing contracts.

The remaining components of the current version (i.e. operationalisation) of the “*Key Partnerships*” building block primarily provide information that is relatively trivial to produce, i.e. the identities of prime contractors, sub-contractors and other important actors. In the STSA BM, there are, however, two exceptions to this general observation. The STSA BM involves doing business with the US, which means that governments are formally doing business with each other because of the US DoD FMS Program. As a consequence, it is more complicated to identify the

relevant partners and actors in the STSA BM. Furthermore, a part of the financing in the STSA BM was through the LSE, where the necessary money was raised by way of a bond construction, which brings a new type of actor into the equation.

The HASP BM illustrates another type of actor that must sometimes be taken into consideration, the OEMs. Though not a partner *per se*, in this case, the OEMs must give their approval if the prime contractor is going to be allowed to procure spares from new, cheaper suppliers than what has been specified by the OEMs. In addition, because of commercial sensitivities, DE&S has to act as an intermediary between the OEMs and the sub-contractors, even though the acquisition of spares has been outsourced to the prime contractor.

There are three interesting observations with this building block: when acquiring defence equipment and support from the US, the acquisition project and the BM becomes more complex; when acquiring spares from suppliers other than the OEMs, DE&S must play an active role as mediator between the OEMs and the new suppliers; and finally, HMT has effectively more or less terminated “*Alternative financing solutions*”, i.e. leasing and PFIs, as alternative PPCs for defence acquisition in the UK.

The observation regarding dealings with the US defence industry is a common pattern. The existence of the US DoD FMS Program will make all such dealings more complex than other types of defence acquisition projects. The observation regarding dealings with OEMs is also generic, i.e. a common pattern. The issue of commercial sensitivities is likely to make DE&S more involved than was originally intended in acquisition projects that are similar to the HASP acquisition project. The restrictions concerning “*Alternative financing solutions*” is a common pattern, since the decision by HMT is valid for all defence acquisition projects in the UK.

One part of the proposed contents, i.e. the spectrum of potential PPC in this building block is similar to how different BMs for public procurement are categorised in the UK today (see Section 4.5.9). The reason why it is not exactly the same is that it proved to be too difficult to obtain the necessary information in order to classify the different BMs according to the entire spectrum of UK BMs for defence acquisition. Hence, it is reasonable to include the proposed spectrum of potential cooperation in one of the building blocks of the PPBM. It also seems appropriate to include how the partner was selected, and who the partner is and other significant actors, in the same building block.

Cost Structure

In Table 7.39 the “*Cost Structures*” in the four cases is illustrated.

Table 7.39: The Cost Structures in the four cases.

Business Model Building Block	Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Cost Structure (Only external costs included)	Firm Fixed Price (FFP)	Cost Plus Fixed Fee (CPFF)	Cost Plus Incentive Fee (CPIF)	Fixed Price Incentive (FPI)

The four BMs in the reported research all include CfA, which is supposed to incentivise industry to increase system availability and to acquire equipment “*faster, cheaper, better*” and to provide “*faster, cheaper, better*” support solutions. However, the BMs all contain substantial elements of traditional price agreements in their “*Cost Structures*”, which do not necessarily support this ambition of the CfAs, even if some of the BMs also have elements of performance agreements.

The external “*Cost Structure*” (see Section 4.12.9) in the C Vehicle BM is FFP. As demonstrated in Table 4.15, there are advantages, e.g. risk transfer, and disadvantages, e.g. lack of transparency of costs, with Fixed-Price Contracts. A FFP does incentivise the contractor, but without a formalised incentive mechanism, the contractor is primarily incentivised to increase the profit, which is not shared with the buyer in a FFP type contract. A partial explanation for the FFP type “*Cost Structure*” lies in the fact that despite being categorised as a CfA, the C Vehicle BM is a First Generation Defence Acquisition BM. As it is, there is a potential misalignment between the CfA and the FFP.

The external “*Cost Structure*” in the STSA BM is CPFF. There are pros, e.g. transparency of costs, and cons, e.g. the buyer has to take all extra costs, also with Cost-Plus Contracts (see Table 4.16). In a CPFF, the only incentive for the contractor lies in the fixed fee component, through which the contractor may be incentivised to increase the profit. However, the CPFF was probably a necessary prerequisite of the UK participation in the USAF support solution and of the STSA (C-17) contract, rather than the explicit requirement of DE&S. Nonetheless, there is a misalignment between the CfA and the CPFF.

The external “*Cost Structure*” in the HASP BM is CPIF. The CPIF has the same rewards and drawbacks as other Cost-Plus Contracts. There is also an incentive fee mechanism in the CPIF. Consequently, while there is no transfer of risk and DE&S has to take all additional costs, there is a formal mechanism to incentivise the contractor to improve the performance and share the rewards with DE&S.

The external “*Cost Structure*” in the ADAPT BM is FPI. In addition to the advantages and disadvantages of Fixed-Price Contracts, there is also an incentive mechanism in the FPI. Hence, in the ADAPT BM there is risk transfer and incentivisation of the contractor, even if it is a relatively traditional price agreement.

In the four BMs, the increased complexity in “*Value Propositions*”, particularly as manifested in the ADAPT BM, from traditional procurement of equipment to CfA, which includes acquisition of equipment and support, and other DLoDs, does not seem to have resulted in a reciprocal development of the “*Cost Structure*”. It seems likely that CfAs should involve moving towards Performance Based Contracts (PBCs), but the most distinguishable pattern for the four analysed cases is that they have remained in the relatively safe confinement of the more traditional “*Cost Structures*”, i.e. Fixed-Price Contracts and Cost-Plus Contracts, even though the ADAPT BM represents a step towards an increased contractual complexity.

The “*Cost Structure*” building block disclosed an interesting observation in the C Vehicle BM. There is an ambiguity regarding with what the cost of the contractor should be compared. It is not clear if this cost should be compared to the past, present or future cost for DE&S, if the responsibility had been retained within MoD. Hence, there is a potential “*comparison problem*”. The STSA BM involves the acquisition of a new capability, rather than the replacement of an existing one. Consequently there is no baseline with which to compare the cost of this acquisition, which is another aspect of the potential “*comparison problem*”.

The internal costs were not explicitly included in the reported research. Nevertheless, one interesting fact regarding internal costs was revealed in the C Vehicle BM. The internal costs for contract management and monitoring, intervention, and the required preservation of competence, are not negligible. Also the STSA BM has significant internal costs for contract monitoring and competence maintenance, even if these are miniscule in comparison to the costs for acquisition and support of strategic airlift capability. In the HASP BM, there are noteworthy internal costs for having a designated officer countersign all orders for new spares and for having to act as an intermediary between OEMs and the sub-contractors.

For the reported research, the “*Cost Structure*” building block only explicitly includes the external costs. The relevance of this inclusion is demonstrated by the interesting observation regarding the C Vehicle BM “*Cost Structure*”, i.e. FFP even though it is a CfA. This potential mismatch between type of contract (CfA) and “*Cost Structure*” (FFP) would, perhaps, have remained undetected if the “*Cost Structure*” had not been included in the PPBM.

Configuration of the most differentiating building blocks

The configurations of the four most differentiating building blocks in the C Vehicle, STSA, HASP and ADAPT BMs are presented in Table 7.40.

Table 7.40: The configurations of the four most differentiating building blocks in the four Business Models.

Key Partnerships				Value Propositions													
Contracting out of Services				Equipment	Domestic development	---	---	---	---								
Facility Management	Contractor Support to Operations		Outsourcing		Foreign development	---	---	---	---								
	---	---	HASP		Adapted OTS	---	---	C Vehicle	---								
Alternative financing solutions					Standard OTS	---	---	STSA	---								
Leasing		PFI Solutions			Existing	---	---	HASP, ADAPT	---								
STSA		C Vehicle			Traditional		CLS	CfA	CfC								
Partnership solution					Support												
Project alliances		Strategic partnerships															
---		ADAPT															
Key Activities				Cost Structure													
Private sector	ADAPT	C Vehicle, STSA, HASP	C Vehicle, HASP, ADAPT	C Vehicle, STSA, HASP	C Vehicle, ADAPT	C Vehicle, ADAPT	C Vehicle, STSA, ADAPT	(STSA), HASP	PBC								
									Design (D)	Finance (F)	Buy (B)	Own (O)	Operate (O)	Manage (M)	Maintain (M)	Transfer (T)	---
									CPFF		CPIF						
									STSA		HASP						
									FFP		FPI						
Public sector	C Vehicle, STSA, HASP	ADAPT	STSA	(STSA), HASP, ADAPT	STSA	STSA	---	(STSA), HASP	Low	Medium	High						
									Client's assurance								

The “*Channels*” building block is not included in Table 7.40, but it has already been established that there is a potential misalignment between the limitations of the PG in the “*Channels*” building block and the ambitions of the CfA in the “*Value Propositions*” building block. This observation is a common pattern among the C Vehicle, HASP and ADAPT BMs, and presumably also a common pattern for all BMs that includes the JSC.

There are potential misalignments between the configurations of the “*Value Propositions*” building block and the “*Cost Structure*” building block in two of the BMs. All four BMs are CfAs, but the “*Cost Structures*” are all relatively traditional price agreements. No defence acquisition BM has come as far as to include a Performance Based Contract (PBC). Even so, it would have been in line with the CfA to have FPI “*Cost Structures*” for all CfAs, since this would have transferred risk to the contractor and explicitly incentivised the contractor to increase delivery speed, decrease delivery cost and increase delivery quality. Only the ADAPT BM, which is the most advanced and complex of the CfAs in the reported research, include a FPI “*Cost Structure*”. There is a potential misalignment between the ambitions of the CfA and the traditional price agreements.

In the C Vehicle and STSA BMs the “*Key Partnerships*” building block includes an “*Alternative financing solutions*”, PFI and Leasing. Consequently, these BMs represent BM configurations that are no longer allowed, or no longer encouraged, in the UK. The PFI is no longer considered to be VfM, and is consequently not allowed. The leasing arrangement risks turning into a LTB arrangement, which is not VfM. Consequently, leasing arrangements are not encouraged and those arrangements that are allowed are heavily restricted.

7.6.2 Applicability of the PPBM

In this section, the applicability of the individual building blocks is compared in order to identify any common patterns for the BMs, i.e. the different configurations of building blocks in the four cases.

The Customer Segments building block

For a defence acquisition project this building block identifies the military customer, i.e. a specific part of the Armed Forces. There were no difficulties in the application of the “*Customer Segments*” building block for any of the four cases. As mentioned in the previous section, the contribution of this building block is debatable, and it would probably be worthwhile to investigate an alternative operationalisation in future development of the PPBM.

The Customer Relationships building block

It was straightforward to apply the “*Customer Relationships*” building block in the four cases. In its current version, the PPBM consists of a three point spectrum for this building block. It could probably be worthwhile to further explore the customer building block in any future developments of the PPBM, both in terms of the number of possible values and in terms of what the values represent. Any changes in the “*Customer Segments*” building block would probably require corresponding changes in the “*Customer Relationships*” building block.

The Channels building block

In the “*Channels*” building block four different “*Channels*” can be used to reach the military customers. It was uncomplicated to identify which “*Channels*” that were being used in three of the four cases. Since the STSA BM concerns a resource for strategic airlift, which is never transported by other means than its own engines, this building block was not relevant in that case. The distribution of equipment or support is presumably, in all cases but this type of very large transportation resources, of paramount interest in defence acquisition projects, thus making “*Channels*” a central building block. This building block demonstrates its usefulness by revealing how, i.e. through the introduction of the PG and the SRs, MoD avoids fragmentation of the JSC and the support chain. However, this building block also reveals that problems have been created by these inventions. The “*Channels*” building block is also useful for the revelation that deliveries to Regimental areas are not friction free. The “*Channels*” building block was also instrumental in discovering some of the implications, e.g. co-location and SRs, which the DIS has had on acquisition of equipment and provision of support to equipment, and how this has remedied previous problems.

The Value Propositions building block

This building blocks is one of the most essential components of the PPBM since it describes what it is that is being delivered to the customer. The two proposed dimensions cover the equipment and the support solution. In combination with a description of the effected DLoDs this building block captures what it is that is offered to the military customer. The application of the “*Value Propositions*” building block, i.e. the identification of equipment and support solution, did not present any problems in any of the four cases. It was also relatively undemanding to identify the DLoDs that were included in, or affected by, the BM. The “*Value Propositions*” building block proves its worth by, in combination with the “*Channels*” building block, providing insights regarding the negative effects of the PG. It is not clear when, where and how availability is being delivered, since a contractor cannot be held responsible for what happens after the PG, despite retaining ownership of the equipment. This building block also illuminates three practical problems with outsourcing of acquisition of spares and contractor

provision of availability. The first problem has to do with OEMs, which have to approve of any changes in the provision of spares to the equipment that they have manufactured. The second problem has to do with what the performance of the contractor should be compared; past, present or future? The third problem has to do with the question regarding the complexity of the outsourced service; is there a lower limit, below which outsourcing should not be considered?

This building block also illuminates further developments that have followed as consequences of the DIS. By studying the “*Value Propositions*”, it becomes clear that, in Second Generation Defence Acquisition BMs; the DLoDs that are included in the models are no longer restricted to Equipment and Logistics, which gives new dimensions to the concept of availability. Previously, the contractor would have been limited to MRO in order to achieve the targeted system availability. In essence, the contractor would make more money if the system broke down more frequently. Now, a contractor is obliged to use additional tools, including the training of military personnel, in order to increase reliability and maintain availability. A complication associated with this development is that the effects of any efforts in the area of training of personnel is likely to appear at a later date than, e.g., the effects of MRO. This means that a prerequisite of the increased complexity is that the implementation is in the form of a relatively long contract, in order for efforts in the area of training to have an effect on system availability.

The Key Activities building block

This building block describes the division of responsibilities between the public and private sectors and is of principal interest in the PPBM. It was not problematic to apply the “*Key Activities*” building block for three of the cases. However, in the STSA BM, the application was rather more complex. Because of the US DoD FMS program, it turned out to be rather problematic to unravel the involvement of two governments in the acquisition project. However, after some modification, the building block was made applicable also to this acquisition project. If the Key Activities building block had not been applicable for this case, the PPBM would not have been applicable for defence acquisition projects involving the US defence industry. With the modification, this potential limitation was avoided.

The proposed contents of the “*Key Activities*” building block in the PPBM is how theorists and practitioners in some areas outside of the defence sector, e.g. in the infrastructure building industry, categorise different PPPs. The application of this terminology in the four cases was straightforward and suggests that it is applicable also for the defence sector. It also shed light on the potential problems with the PG *vis-à-vis* ownership of equipment, and the associated responsibility for risk taking. The existence of the PG prohibits risk transfer to the contractor, at least to a certain extent, since the contractor cannot be expected to accept the risk, regardless of ownership, without being responsible for the transportation through the JSC.

The Key Partnerships building block

The “*Key Partnerships*” building block entails the form of PPC, the selection of partner and the identity of partners and other significant actors. None of the cases presented any problems when it comes to describing how the selection of partner was done, or the identification of partners and other actors. It was easy to identify the type of PPC in the C Vehicle and STSA BMs as PFI and leasing, which are the two examples of “*Alternative financing solutions*”. It was also uncomplicated to classify the PPC in the HASP BMs as outsourcing, i.e. an example of “*Contracting out of services*”. In the ADAPT BM, it was clear that the PPC was a “*Partnership solution*”, but whether or not to classify the BM as a project alliance or a strategic partnership was less clear. That strategic partnership was selected was due to the asymmetrical distribution of risks and rewards in the ADAPT contract, which disqualifies project alliances. The “*Key Partnerships*” building block has been constructive in order to understand the problem a PFI can entail. This building block shed light on the fact that it is problematic to renegotiate a contract with a consortium of banks that are primarily interested in their ROI. The PFI is, however, no longer a preferred PPC alternative in the UK defence sector. This building block was essential in order to understand the implications of the US DoD FMS Program. The “*Key Partnerships*” building block was also useful in order to understand that DE&S, despite the outsourcing of acquisition of spares, has to be relatively active and sometimes even act as an intermediary in the dialogue between the OEMs and the prime contractors’ sub-contractors.

The Cost Structure building block

In the “*Cost Structure*” building block, one of five possible “*Cost Structures*” describes how the contractor is paid. In the C Vehicle and ADAPT BMs it was relatively straightforward to categorise the BMs as FFP and FPI. However, it was not without complications⁹⁵ to categorise the “*Cost Structure*” in the STSA and HASP BM. After some deliberation, the “*Cost Structure*” was categorised as CPFF in the STSA BM and as CPIF in the HASP BM. The “*Cost Structure*” building block sheds some light on an interesting feature of the C Vehicle BM, namely that there is a potential mismatch between the FFP and the CfA, i.e. a misalignment between the contents of two of the building blocks in the BM. The “*Cost Structure*” building block also reveals the ambiguity regarding with what the external costs for

⁹⁵ The question regarding categorisation of “*Cost Structure*” was not specifically included in the interview guide (see Annex B), which is, probably, at least a partial explanation for the relatively problematic categorisation. This question was not included since, initially, the “*Cost Structure*” building block was not going to be included in the research. However, during the analysis, based on the data that had been collected, it became apparent that it would be a mistake not to include at least the external costs.

the contractor should be compared. It is not clear if these costs should be compared against the past, present or future costs for DE&S if the responsibility had been retained within MoD. Further, it is not clear if comparison should be made against an enhanced capability of DE&S, or not. Even though internal costs were not explicitly included in the reported research, the C Vehicle, STSA and HASP BMs all provide the opportunity to illuminate the observation that internal costs are by no means negligible. The internal transaction costs for management and monitoring of contracts, interventions, administration of payments, renegotiations of contracts and negotiating new contracts are significant and ought consequently to be explicitly included in future research.

Configuration of the most differentiating building blocks

The proposed PPBM is, when it is applied, ultimately a configuration of the contents in nine different building blocks. Seven of these building blocks are included in this thesis and four of these are of particular interest in order to compare and differentiate between different configurations of building blocks. These four building blocks are more complex than some of the others, and they are themselves configurations of different elements. In Table 7.40, the configurations of the “*Value Propositions*”, the “*Key Partnerships*”, the “*Key Activities*”, and the “*Cost Structure*” building blocks in the C Vehicle, STSA, HASP and ADAPT BMs are compared. The proposed PPBM illustrates its appropriateness to describe the design of a defence acquisition project. As demonstrated in Table 7.40, the PPBM seems to be useful as an instrument to compare, test and evaluate different defence acquisition projects. In the next two sections this ability will be further explored as the strengths, weaknesses and risks associated with the four BMs are compared.

7.6.3 Business Model Strengths and Weaknesses

In this section, the strengths and weaknesses of the individual building blocks is compared in order to identify any common patterns regarding strengths and weaknesses for the BMs, i.e. the different configurations of building blocks in the four cases. The purpose is to provide an initial answer to Research Question 2 (RQ 2), which has been formulated as:

- Research Question 2: Which strengths and weaknesses do different Business Models have in the context of defence acquisition?

Those building blocks that do not have any particular strengths or weaknesses, i.e. “*Customer Segments*” and “*Customer Relationships*”, are not included in this section, since they do not contribute to identify any common patterns. In order to present an initial answer to RQ 2 it is necessary to connect observed common patterns regarding strengths and weaknesses with specific BM configurations, i.e. with

specific combinations of the different PPBM building blocks. Consequently, this section ends with an exercise to connect patterns with configurations.

Channels

In Table 7.41, the strengths and weaknesses in the “Channels” building blocks in the four BMs are presented. The “Channels” building block is “Not Applicable” (“N/A”) for the STSA BM. In addition, since the HASP BM concerns an acquisition project for the provision of spares, the strengths and weaknesses for the PG and SRs are “Not Applicable” for the HASP BM.

Table 7.41: Strengths and weaknesses in the Channels building block.

Building block component	Major strengths (+) and weaknesses (-)	Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Purple Gate (PG)	Eliminates fragmentation of the supply chain (+)	Yes	N/A	N/A	Yes
	Reduces theft in the supply chain (+)	Yes	N/A	N/A	Yes
	Reduces problems with operational planning (+)	Yes	N/A	N/A	Yes
	Not clear when, where and how availability is being delivered by the contractor (-)	Yes	N/A	N/A	Yes
	The effect on private ownership and private responsibility for, e.g., risk in the JSC is not clear (-)	Yes	N/A	N/A	No
	The effect on transfer of risk to the contractor is not clear (-)	Yes	N/A	N/A	Yes
	Delivery times to operations can not be reduced by the contractor (-)	Yes	N/A	N/A	Yes
	Not clear if contractor delivery times should be compared to past, present or future ability of the MoD, if the service had been kept in-house (-)	Yes	N/A	N/A	Yes
Sponsored Reserves (SRs)	Allows contractors in the support chain without fragmentation (+)	Yes	N/A	N/A	Yes
	Loss of competence within the British Army (-)	Yes	N/A	N/A	Yes
	Difficult to measure effects on availability (-)	Yes	N/A	N/A	Yes

The PG was introduced into the JSC in order to eliminate fragmentation, reduce theft and reduce problems with operational planning. The major strengths of the PG are that it accomplishes these goals, as illustrated by the C Vehicle and ADAPT BMs. While solving some existing problems, the PG also introduced new problems into the process. For CfAs, which encompass system availability, a consequence of the PG is that it is not clear when, where and how availability should be delivered by the contractor, which is exemplified by the C Vehicle and ADAPT BMs. There is a potential misalignment between the PG in the “Channels” building block and the CfA in the “Value Propositions” building block.

Another problem introduced by the PG is that the effect on private ownership and private responsibility for, e.g., risk in the JSC is unclear. In the C Vehicle BM, the contractor owns the equipment, but is obliged to deliver it to the PG when it is required. How the existence of the PG effects private ownership is not clear. Furthermore, because of the PG, it is not clear how transfer of risk to the contractor is affected. The contractor cannot assume any risk beyond the PG, since the responsibility in the JSC rests with MoD. That this is a problem is illustrated

by the C Vehicle and ADAPT BMs. In addition, since the introduction of the PG, delivery times to operations cannot be reduced by the contractor. This pattern, i.e. that the PG is not compatible with the goal to reduce delivery times, is confirmed by the C Vehicle and ADAPT BMs. As confirmed by the C Vehicle and ADAPT BMs, there is a possible “*comparison problem*” associated with delivery times.

The major strength associated with the introduction of the SRs through the DIS is that the concept with SRs allows competence from industry to participate as combatants in the JOA, thus mitigating the risk of fragmentation of the support chain. This common pattern is confirmed by the C Vehicle and ADAPT BMs, which are the two BMs in the reported research that utilise SRs. There are also negative aspects with the introduction of SRs. First of all, there is an essentially unavoidable loss of competence in the British Armed Forces. Secondly, it is difficult to measure which effect that SRs have on availability. These two weaknesses are confirmed by the C Vehicle and ADAPT BMs.

Value Propositions

The strengths and weaknesses in the “*Value Propositions*” building block in the four BMs are presented in Table 7.42. “*N/A*”, “(?)” and “---” denote “*Not Applicable*”, “*uncertainty*” and “*too soon to evaluate*”.

Table 7.42: Strengths and weaknesses in the Value Proposition building block.

Building block component	Major strengths (+) and weaknesses (-)	Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Military-Off-The-Shelf (MOTS)	Relatively quick delivery of the aircraft (+)	N/A	Yes	N/A	N/A
	Cheaper than development or adaptation of MOTS (+)	N/A	Yes	N/A	N/A
Contract-for-Availability (CfA)	Much cheaper than an in-house support solution would have been (+)	No (?)	Yes	No (?)	---
	Problems with White van deliveries mitigated through co-location (+)	No	N/A	No	Yes
	White van deliveries not appreciated by regiments and consequently frequently stopped at the gate (-)	Yes	N/A	Yes	No
	Not clear when, where and how availability is being delivered by the contractor (-)	Yes	N/A	N/A	Yes
	The concept of Availability is not unequivocal (-)	Yes	Yes	Yes	Yes
	Difficult to measure effects of contractor responsibility for Training (-)	N/A	N/A	N/A	Yes

In the STSA acquisition project, the equipment that was leased (and eventually bought), was the C-17, a MOTS aircraft, which was not adapted in any way. The strengths of this aspect of the STSA BM, i.e. that the acquisition resulted in faster and cheaper delivery of a strategic airlift platform than what would have been possible with either development of a new platform or adaptation of MOTS, must in all likelihood be regarded as a common pattern for the acquisition of MOTS, and for COTS that is not militarily adapted.

The USAF support solution in the STSA acquisition project is cheaper than a MoD support solution would have been. In the C Vehicle and HASP BMs however, it is uncertain whether or not the outsourced solution is cheaper than what an MoD solution would have been. In the ADAPT acquisition project, it is too early to evaluate the cost of the project.

When it comes to “*White-Van-Man*” (see Section 6.4.3) deliveries there are two patterns, working in opposite directions, in operation in UK acquisition projects. In “*Pre-DIS*” BMs, i.e. in First Generation Defence Acquisition BMs, the common pattern, as displayed by the C Vehicle and HASP BMs, is that such deliveries are likely to be turned away at the Regiments’ gates, i.e. a definite weakness of the BM. However, in “*Post-DIS*” BMs, i.e. in Second Generation Defence Acquisition BMs, as exemplified by the ADAPT BM, this problem has been mitigated through the introduction of co-location of contractor and MoD infrastructure, which has cancelled out the weakness and even turned it into BM strength instead.

As already stated in the “*Channels*” building block, and as illustrated by the C Vehicle and ADAPT BMs, a pattern of the combination of the PG and CfAs is that it becomes unclear when, where and how availability is being delivered.

A noticeable common pattern among the four BMs is that there are multiple interpretations of what availability is, and consequently of what CfAs are. In the C Vehicle and ADAPT BMs, availability refers to system availability in the JOA. In the HASP BM availability refers to the existence of spares on the shelves in the contractor’s warehouse. In the STSA BM, availability refers to flying hours. The different interpretations of CfAs means that in the C Vehicle and ADAPT contracts; the customer can expect the system to be operational in the JOA a certain percentage, e.g. 95%, of the time that he needs it in the JOA. In the HASP contract, when the customer requires the spares in the JOA, in 95% of the cases the spares are on the shelves of the contractor’s warehouse. The only guarantee in the C-17 contract, i.e. in the STSA acquisition project, is that the aircraft will be operational, say, 1000 hours per year, which says nothing of the probability of availability at a particular point in time when the aircraft is required to be operational. The common pattern regarding the concept of availability is a potential ambiguity regarding its interpretation, i.e. a “*definition problem*”.

Only one of the BMs in the reported research is a proper Second Generation Defence Acquisition BM. One of the aspects of the development that the DIS brought about is that more DLoDs can now be outsourced to a contractor in order to further incentivise the contractor to assume responsibility for reliability in order to enhance availability. The weakness with this type of CfAs is that it becomes difficult to measure the effects of a contractor assuming responsibility for, e.g., Training. For one thing, the lead time for training to have an effect on availability is relatively long. Furthermore, DLoDs are by necessity all interrelated in order to

contribute to producing capability. Consequently, it can be difficult to separate and measure the effects of individual DLoDs.

Key Activities

In Table 7.43, the strengths and weaknesses in the “*Key Activities*” building blocks in the four BMs are presented. Private responsibility for financing of equipment is only applicable for the C Vehicle and STSA BMs. Consequently, “*N/A*” denotes that this is “*Not Applicable*” for the HASP and ADAPT BMs.

Table 7.43: Strengths and weaknesses in the Key Activities building block.

Building block component	Major strengths (+) and weaknesses (-)	Case A: C Vehicle (PFI)	Case B: STSA (Leasing)	Case C: HASP	Case D: ADAPT
Private responsibility for financing of equipment	Faster acquisition than with traditional financing (+)	Yes	Yes	N/A	N/A
	Reduced flexibility since it involves banks (-)	Yes	Yes	N/A	N/A
	Not Value-for-Money (VfM) – No longer recommended by HMT for defence acquisition in the UK (-)	Yes	Yes	N/A	N/A

The positive common denominator, and an established pattern for “*Alternative financing solutions*”, for the PFI and the leasing arrangements in the C Vehicle and STSA BMs, is that they contributed to make it possible to acquire equipment faster than what would otherwise have been possible. The negative common denominator, an equally firmly established pattern for “*Alternative financing solutions*” (i.e. Leasing and PFIs), e.g. for the PFI and the leasing arrangements in the C Vehicle and STSA BMs, is that they are not considered to be VfM and are no longer recommended by HMT for defence acquisition in the UK. Another weakness in the C Vehicle and STSA BMs is the reduced flexibility because of the involvement of banks. This is presumably a common pattern for “*Alternative financing solutions*” that includes banks as additional partners in the acquisition projects, since they are first and foremost interested in their ROI.

Key Partnerships

The strengths and weaknesses in the “*Key Partnerships*” building block in the four BMs are presented in Table 7.44. The “*Alternative financing solutions*” are only applicable for the C Vehicle and STSA BMs, and the selection of contractor only concerns the HASP BM. Consequently, several entries in the table are “*N/A*”.

Table 7.44: Strengths and weaknesses in the Key Partnerships building block.

Building block component	Major strengths (+) and weaknesses (-)	Case A: C Vehicle (PFI)	Case B: STSA (Leasing)	Case C: HASP	Case D: ADAPT
Alternative Financing Solutions	Faster acquisition than with traditional financing (+)	Yes	Yes	N/A	N/A
	Reduced flexibility since it involves banks (-)	Yes	Yes	N/A	N/A
	Not Value-for-Money (VfM) – No longer recommended by HMT for defence acquisition in the UK (-)	Yes	Yes	N/A	N/A
Selection of partner	Seamless transition between contracts (+)	N/A	N/A	Yes	N/A
	Because of the short term, interim solution, the previous contract, including the planning assumptions on which it was based, was prolonged (-)	N/A	N/A	Yes	N/A

The content of Table 7.43 is identical to the content of the top half of Table 7.44. Accordingly, the common patterns discussed above for the “*Key Activities*” building block in the C Vehicle and STSA BMs are also applicable for the “*Key Partnerships*” building block. In addition, for the HASP BM, the selection of contractor has pros and cons. Because of the prolongation of the contract, there was a seamless transition between contracts. However, because of the prolongation, the planning assumptions were also prolonged, which turned out to be less advantageous.

Cost Structure

In Table 7.45, the strengths and weaknesses in the “*Cost Structure*” building block in the four BMs are presented. In the table, “(?)” denotes uncertainty.

Table 7.45: Strengths and weaknesses in the Cost Structure building block.

Building block component	Major strengths (+) and weaknesses (-)	Case A: C Vehicle (FFP)	Case B: STSA (CPFF)	Case C: HASP (CPIF)	Case D: ADAPT (FPI)
Cost structure	The maximum price is known in advance (+)	Yes	No	No	Yes
	The cost is approved (countersigned orders) in advance and the management fee is known (+)	No	No	Yes	No
	Misalignment between value proposition and cost structure (-)	Yes	Yes	Yes (?)	No (?)
	The contractor’s profit must be paid regardless of reductions in operational requirements (-)	Yes	Yes	Yes	Yes
	Not clear if contractor delivery costs should be compared to past, present or future cost of the MoD, if the service had been kept in-house (-)	Yes	Yes	Yes	Yes
	Not possible to measure the target until the OSD (-)	No	No	No	Yes

A consequence of Fixed-Price “*Cost Structures*” is that the maximum price the buyer will have to pay over the entire contract period is known in advance. This strength is shared by the C Vehicle and ADAPT BMs. In the HASP BM, in which the “*Cost Structure*” is Cost-Plus, another arrangement results in a similar outcome,

but on a monthly basis. Since the contractor's orders are countersigned by DE&S, and since the management fee is known, the invoices from the contractor does not come as a surprise to DE&S.

There is a potential misalignment between the ambitions of the CfA in the "*Value Propositions*" and the selected "*Cost Structures*" in two of the BMs. That the C Vehicle BM has a FFP "*Cost Structure*" may be explained by the fact that it is a First Generation Defence Acquisition BM. The "*Cost Structure*" in the STSA BM, i.e. CPFF, may be explained by the fact that DE&S had to accept what the US DoD had already negotiated with the contractor. The HASP BM has a CPIF "*Cost Structure*" which enables incentivisation. In practise, though, the contractor has to buy from the OEMs and all orders are countersigned by the HASP PT. The ADAPT BM, probably one of the most advanced Second Generation Defence Acquisition BMs to date, has a FPI "*Cost Structure*". Hence, there is both risk transfer and incentivisation in the ADAPT BM. All BMs have traditional price agreements, even if the ADAPT BM has a rather sophisticated price agreement, rather than innovative performance agreements (e.g. PBC).

The "*Cost Structure*" in the ADAPT BM includes a particular weakness. It is not possible to evaluate the total cost of this acquisition project until the OSD of the equipment that it is supporting, i.e. not until the year 2020.

A common pattern among the "*Cost Structures*" in the four BMs is that the contractors' profits must be paid regardless of any reductions in the operational requirements. Another common pattern among the four BMs is that they appear to share a universal "*comparison problem*". It is not clear if the contractors' delivery costs should be compared to the past, present or future cost of MoD, if the respective services had been retained in-house.

When the First Generation Defence Acquisition Contracts were initiated, i.e. from the SDR in 1998 and onwards, defence procurement projects were often running late and over budget, and MoD supply and support chain did not compare very well against private sector specialised global TPL providers such as DHL, TNT and UPS. Hence, there was room for improvement, and it was obvious with what to compare the performance of the new contracts. These contracts did not have to look a long time into the future to identify the potential improvements. The baseline performance was the performance by MoD at that particular point in time. The early contracts performed very well in comparison to MoD, and were able to reduce the cost of delivery, increase the speed of delivery, and increase the quality of the delivery. However, these improvements were in comparison to a relatively "*Poor*" performance on the part of MoD.

It is less clear that the Second Generation Defence Acquisition Contracts, i.e. contracts that have replaced the previous generation after the advent of the DIS,

i.e. in 2005, should as easily outperform MoD for the more trivial functions such as procurement, storage and distribution of spares. First of all, the First Generation Defence Acquisition Contracts have already considerably improved effectiveness and efficiency. Secondly, MoD has been able to study the contractors’ performance and evolve in parallel with this development. Hence, the implicit goals for speed, cost and quality can no longer be compared against a current baseline that is below par, but should be transformed to explicit targets that should be realised at different points in time during the lifetime of the contract. However, there are other aspects of the Second Generation Defence Acquisition Contracts, which make them more difficult to compare to the performance of DE&S. The inclusion of, e.g., Training and Personnel in the Second Generation Defence Acquisition BMs, have increased complexity to a large extent.

Summary of strengths and weaknesses for different configurations

A major weakness for PPBMs that contain the combination of the PG in the “Channels” building block and CfAs in the “Value Propositions” building block (see Table 7.46), at least when availability refers to system availability, is that it is not clear when, where and how availability should be delivered by the contractor. This weakness can be labelled a “*measurement problem*”. There is a potential misalignment between the PG in the “Channels” building block and the CfA in the “Value Propositions” block, since the existence of the PG prohibits the contractor to deliver availability to the JOA, where it is needed. Consequently, the PG makes it impossible to fulfil this aspiration of the CfA. There is yet another aspect of the potential mismatch between the PG and CfAs. Because of the PG, a contractor cannot be expected to reduce delivery times to operations. This common pattern is not compatible with the overall goal to reduce delivery times.

Table 7.46: A schematic illustration of PPBM configurations containing the combination of the PG and CfAs.

Key Partnerships Any content	Key Activities Any content	Value Propositions Contract-for-Availability (CfA)	Customer Relationships Any content	Customer Segments Any content
	Key Resources		Channels Overseas Supply Chain (PG, JSC)	
Cost Structure Any content		Revenue Streams		

Another major weakness introduced by the PG lies in the combination of the PG in the “Channels” building block and private sector ownership of equipment in the “Key Activities” building block (see Table 7.47). There is a potential mismatch in this combination, since it is far from clear how private ownership of equipment should be handled in the JSC. Even if a contractor formally owns the equipment, he cannot assume responsibility for anything that happens to the equipment after

the PG. Furthermore, because of the PG, risk cannot be transferred to a contractor beyond the PG, even if risk transfer is formally a part of the contractual implementation of the BM and the contractor owns the equipment. Since all responsibility must be considered to rest with MoD beyond the PG, the contractor cannot be expected to assume any risk in the JSC or in the JOA. Consequently, in practise, MoD must assume responsibility, and take the risk, for the contractor's equipment until it is returned to the contractor again.

Table 7.47: A schematic illustration of PPBM configurations containing the combination of the PG and private sector ownership.

Key Partnerships Any content	Key Activities Private sector Ownership (O) Key Resources	Value Propositions Any content	Customer Relationships Any content Channels Overseas Supply Chain (PG, JSC)	Customer Segments Any content
Cost Structure Any content		Revenue Streams		

A weakness with the combination of SRs in the “*Channels*” building block and CfAs in the “*Value Propositions*” building block (see Table 7.48) is that it becomes difficult to separate the contribution of the SRs from other contributors of system availability, and to evaluate the performance of the SRs.

Table 7.48: A schematic illustration of PPBM configurations containing the combination of SRs and CfAs.

Key Partnerships Any content	Key Activities Any content Key Resources	Value Propositions Contract-for-Availability (CfA)	Customer Relationships Any content Channels Overseas Support Chain (SRs)	Customer Segments Any content
Cost Structure Any content		Revenue Streams		

A weakness for BMs that contains the combination of private sector financing in the “*Key Activities*” building block and banks in the “*Key Partnerships*” building block (see Table 7.49) is that there is a reduction of flexibility when banks, which are primarily interested in securing the ROI, are involved in the financing. In the UK, PFIs, one form of “*Alternative financing solutions*”, and a particular form of the combination of private sector financing and banks, are no longer recommended by HMT for defence acquisition, since they are not VfM. Leasing, the other form of “*Alternative financing solutions*”, is no longer encouraged by HMT for defence acquisition in the UK, since it is considered to be a risk that leasing arrangements are morphed into LTB arrangements, which are not VfM.

Table 7.49: A schematic illustration of PPBM configurations containing the combination of private sector financing and banks.

Key Partnerships Alternative financing solutions (PFI, Leasing) Banks	Key Activities Private sector Financing (F)	Value Propositions Any content	Customer Relationships Any content	Customer Segments Any content
	Key Resources		Channels Any content	
Cost Structure Any content			Revenue Streams	

CfAs were concocted partly as a remedy in order to incentivise industry to assume an increased responsibility for enhancing availability. Of the traditional “*Cost Structure*” constructs, i.e. traditional price agreements, FPI appears to be the most suitable to address the aspirations of the CfA, since the FPI transfers risk to the contractor and incentivises the contractor to improve the performance. It could be argued that CfAs ought to be accompanied by performance agreements, such as the relatively recently developed American concept of PBC, rather than with any of the price agreements that have traditionally been used in defence acquisition, in order to fully realise the aspirations of the CfA concept. Consequently, there is a possible misalignment between BMs that contain CfA in their “*Value Propositions*” building blocks and FFP, CPFF or CPIF in their “*Cost Structure*” building blocks (see Table 7.50). CPFFs in particular seem to be incompatible with CfAs, but FFPs and CPIFs do not seem to be much better at entirely realising the aspirations of the CfA. In order to fulfil the ideas of the CfA, DE&S ought, perhaps, to actively strive to adopt and implement the US PBC construct in the “*Cost Structure*” building block, or at least further develop the traditional price agreements.

Table 7.50: A schematic illustration of PPBM configurations containing the combination of CfAs and FFPs, CPFFs or CPIFs.

Key Partnerships Any content	Key Activities Any content	Value Propositions Contract-for-Availability (CfA)	Customer Relationships Any content	Customer Segments Any content
	Key Resources		Channels Any content	
Cost Structure FFP, CPFF or CPIF			Revenue Streams	

In addition to the potential internal misalignments presented in this section, there are also potential external misalignments. Because of the potential misalignment between the PG and the CfA it can be argued that there is a potential misalignment between the BM and the overall strategy to incentivise industry to increase reliability and availability. Because of the potential misalignment between the PG and risk transfer, it can also be argued that there is a potential misalignment between the BM and the overall strategy to transfer risk to the private sector through different PPC solutions.

7.6.4 Business Model Risks

In this section, the risks of the individual building blocks is compared in order to identify any common patterns regarding risks for the BMs, i.e. the different configurations of building blocks in the four cases. Analogous to the previous subsection, the purpose is to provide an initial answer to Research Question 3 (RQ 3), which has been formulated as:

- Research Question 3: Which risks are associated with different Business Models in the context of defence acquisition?

Those building blocks that do not have any particular strengths or weaknesses, i.e. “*Customer Segments*”, “*Customer Relationships*”, “*Key Activities*”, “*Key Partnerships*”, and “*Cost Structure*”, are not included in this section, since they do not contribute to identify any common patterns. In order to present an initial answer to RQ 3 it is necessary to connect observed common patterns regarding risks with specific BM configurations, i.e. with specific combinations of the different PPBM building blocks. Hence, this section ends with an exercise to patterns with configurations.

Channels

In Table 7.51, the risks in the “*Channels*” building blocks in the four BMs are presented. The “*Channels*” building block is “*Not Applicable*” (“*N/A*”) for the STSA BM. The HASP BM concerns an acquisition project for the provision of spares. Consequently, risks associated with the PG and SRs are “*Not Applicable*” for the HASP BM.

Table 7.51: Risks in the Channels building block.

Building block component	Major risks	Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Purple Gate (PG)	CfA rendered meaningless	Yes	N/A	N/A	Yes
Sponsored Reserves (SRs)	Demand will exceed the supply	Yes	N/A	N/A	Yes
	Not available when required	Yes	N/A	N/A	Yes
	Unforeseen consequences	Yes	N/A	N/A	Yes

As exemplified by the C Vehicle and ADAPT BMs, there is a risk that the introduction of the PG has rendered CfA meaningless, at least for overseas operations and at least to some extent. When the contractor is not allowed to deliver availability when, where and how it is needed by the end customer, it is dubious if it is a CfA at all.

When it comes to SRs, which are included in the C Vehicle and ADAPT BMs, they constitute an exclusive, expensive and limited resource. Hence, there is a risk that demand will exceed supply. Since the SRs are only a few individuals in each contract, there is also a risk that they will not be available when they are required.

Since the SRs are so few, legitimate reasons for failure to report for duty, like decease, and less legitimate reasons, like the reluctance to fulfil ones contractual obligations, will have an immediate and significant effect on the availability of the SRs. Finally, since the SRs are a new phenomenon, it is likely that there is a risk that all consequences of this concept have not been anticipated, and that there will be unexpected consequences because of the SRs.

Value Propositions

The risks in the “*Value Propositions*” building block in the four BMs are presented in Table 7.52. “*N/A*” denotes “*Not Applicable*”.

Table 7.52: Risks in the Value Proposition building block.

Building block component	Major risks	Case A: C Vehicle	Case B: STSA	Case C: HASP	Case D: ADAPT
Off-The-Shelf (OTS)	Increased requirements necessitates adaptation	Yes	Yes	N/A	N/A
Contract-for-Availability (CfA)	Errors in codification of spares	Yes	N/A	Yes	Yes
	JSC flooded with deliveries of multiple orders of spares	Yes	N/A	Yes	Yes
	Retaining some risk renders risk transfer impossible	Yes	N/A	N/A	Yes
	Contractors ability to support fleet reduced	Yes	Yes	N/A	Yes
	Reduced availability	Yes	Yes	N/A	Yes
	Payment for unnecessary upgrades	N/A	Yes	N/A	N/A
	Increased cost for support solution	No	Yes	N/A	No
	Unforeseen consequences with outsourcing of other DLoDs than equipment and support	N/A	N/A	N/A	Yes

A common risk shared by all BMs that involve OTS equipment, be it COTS such as the C Vehicle BM, or MOTS such as the STSA BM, is that the presumably relaxed requirements, which made it possible to procure OTS equipment in the first place, may change at any time, and make it necessary to adapt the OTS equipment to better fit the new requirements. Any such adaptations are likely to increase the Total Cost of Ownership (TCO) of that piece of equipment.

In BMs that include the outsourcing of codification of spares, such as the C Vehicle BM, there is the risk that errors will be made by the contractor. The consequence of errors in the codification of spares is that the spares are “*lost in cyberspace*”. If the codes on the spares do not match the codes in the IS, they “*do not exist*”, and are consequently not delivered to their end-users. A risk that is closely related to the risk of codification errors is the risk that the JSC will become flooded with spares because of unnecessary, multiple orders for spares that are never delivered, because they have been coded erroneously.

Risk transfer is a significant part of PPC and consequently also of the novel forms of doing business, manifested in new types of BMs, between DE&S and the

defence industry, e.g. CfA. However, when MoD retains some risk, such as in the case with the PG, there is a risk that the entire concept of risk transfer is rendered impossible, meaningless or loses some of its intended purpose. The contractor either assumes the risk, or not. If/when MoD retains part of that risk; a considerable portion of the whole point of involving industry becomes debatable.

A common risk for all BMs that involve the outsourcing of support to equipment is that, for whatever reason, the contractor's ability to support the fleet is reduced. This could be the consequence if the contractor has expanded too fast, beyond his ability to deliver, or if there is suddenly a full scale war that simultaneously increases the requirements from all the contractor's customers. From the point of view of a military unit out on operations, it does not matter why the support is not functioning. The consequences if it does not function may be severe. If the contractor is subsequently heavily financially penalised for not fulfilling his commitment does not matter from the point of view of a military operation.

Second Generation Defence Acquisition BMs, such as the ADAPT BM, may involve the contracting out of more DLoDs than equipment and support. There are risks associated with this development. It is unlikely that all consequences, positive or negative, have been foreseen and managed in advance. Because of the interdependencies and interrelatedness of the DLoDs, these consequences are likely to manifest themselves over time, as more contracts are signed, and as more contractors commence delivering, e.g. Training, to the Armed Forces.

Summary of risks for different configurations

Table 7.53 illustrates PPBMs which contain the PG in the “Channels” building block and a CfA in the “Value Propositions” building block.

Table 7.53: A schematic illustration of PPBM configurations containing a combination of the PG and a CfA.

Key Partnerships Any content	Key Activities Any content Key Resources	Value Propositions Contracting-for-Availability (CfA)	Customer Relationships Any content Channels Overseas Supply Chain (PG, JSC)	Customer Segments Any content
Cost Structure Any content			Revenue Streams	

There is a risk that the PG will render the CfA meaningless for overseas operations, i.e. that there is a misalignment between the PG in the “Channels” building block and the CfA in the “Value Propositions” building block. This is simultaneously a risk that there is a misalignment between the BM and the overall strategy.

8 Implications for Theory

“The problem at this juncture for an author of a book, rather than a magazine article, is that so many people in MoD and industry are doing so much work that things can change relatively quickly (but often don’t) making the choice of a publication date fraught with difficulty. Get it wrong and one or more of the author’s arguments can appear out of date. The key is to keep abreast of what is happening. No easy task”.

Kincaid (2008, p v)

8.1 Introduction

The research purpose: to “*study, analyse, and evaluate BMs regarding how they can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept*”, was used to formulate three Research Questions (RQs):

- Research Question 1: How can a generic Business Model for a non-profit, governmental, Defence Procurement Agency be described?
- Research Question 2: Which strengths and weaknesses do different Business Models have in the context of defence acquisition?
- Research Question 3: Which risks are associated with different Business Models in the context of defence acquisition?

In this chapter, the theoretically oriented results produced in the endeavour to produce an answer to RQ 1 are presented in Sections 8.2 and 8.3. The practically oriented results concerning RQ 1, and the answers to RQ 2 and RQ 3, and their implications for defence acquisition practise, are presented in Chapter 9. This chapter also includes discussions regarding the implications for Business Model (BM) theory, Public Private Participation (see Section 4.3) theory, and for future research. In Section 4.13 a dozen propositions were formulated. In Sections 8.4, 8.5 and 8.6, these propositions will be used to structure the implications for BM theory, Public Private Participation theory and other areas of theory. Future research is addressed in Section 8.7.

8.2 A Generic Public Private Business Model

In Table 8.1 the generic Public Private Business Model (PPBM) for defence acquisition that is proposed in this thesis is presented.

Table 8.1: A generic Public Private Business Model for defence acquisition.

Key Partnerships Spectrum of degree of Public buyer (decider) – Private supplier (provider) Cooperation (PPC): Contracting out of services (Facility Management, Contractor support to operations (CSO), Outsourcing), Alternative financing solutions (Leasing, PFI solutions), Partnership solutions (Project Alliances, Strategic Partnerships (PPPs)) Process for selection of partner Identity of partner Network of suppliers	Key Activities Public buyer (decider) or private supplier (provider) responsibility, as well as Transfers (T) of responsibility, for activities such as: Design (D), Finance (F), Buy (B) / Rent (R) / Lease (L), Construct (C) / Build (B), Develop (D), Own (O), Operate (O), Manage (M), and Maintain (M) for products (equipment) and services (support). Key Resources The most important assets required to make a business model work. NOT included in this thesis	Value Propositions Two dimensions: Equipment: Existing – Standard (OTS) – Adaptation – Foreign Development – Domestic Development Support: Traditional – Contractor Logistics Support (CLS) – Contract-for-Availability (CfA) – Contract-for-Capability (CfC) CfAs and CfCs will also influence most of the other Defence-Lines-of-Development (DLoDs): Training (T), Equipment (E), Personnel (P), Information (I), Concepts and Doctrine (D), Organisation (O), Infrastructure (I), Logistics (L)	Customer Relationships Spectrum of degree of compliance with – opposition to the user requirements: Colleague, Procurer, Challenger Channels Two dimensions: Type (Supply – Support); Destination (Overseas – Domestic): Overseas supply chain (operations) Overseas support chain (operations) Domestic supply chain (training and exercises) Domestic support chain (training and exercises)	Customer Segments Section or department within the Armed Forces Permanent Joint Headquarters (PJHQ) or the Front Line Command (FLC) Or Service within the Armed Forces Or Branch, Corps, Regiment, or Military unit within the services
Cost Structure Only different forms of the external costs (i.e. FFP, FPI, CPIF, CPFF, PBC) have been explicitly included. Internal costs are NOT included in this thesis		Revenue Streams “The cash a company generates from each customer segment”. NOT included in this thesis		

The proposed PPBM for defence acquisition is based on the “*Business Model Canvas*” (see Table 4.12), which consists of nine building blocks (Osterwalder and Pigneur, 2010, pp. 16-17). The nine building blocks have been operationalised (see Table 4.13 and Table 4.14) by Osterwalder and Pigneur (2010), and this operationalisation has been further developed in the PPBM. The proposed PPBM has kept the original structure, including the names of the building blocks. However, the operationalisation of the PPBM building blocks build on key constructs (see Section 4.11) from Business Model theory, defence acquisition theory and practise, Public Private Participation theory, and military logistics theory and practise. In this section, the proposed contents, i.e. operationalisation, of the PPBM building blocks are presented. The results regarding the applicability and appropriateness of the PPBM are presented in Section 8.3.

8.2.1 Customer Segments

Defence acquisition is about a Defence Procurement Agency (DPA) acquiring a product or providing a service for its customer, a nation's Armed Forces. Several categories of potential customers within the Armed Forces can be envisaged, but the author has deemed three categories to be sufficient. Hence, building on the analyses of interviews conducted at FMV and at DE&S, three categories of "*Customer Segments*" are proposed: a section or department within the Armed Forces Permanent Joint Headquarters (PJHQ) or within the Front Line Command (FLC); a service within the Armed Forces; or a branch, Corps, Regiment or military unit within the services. The DPA can serve all three different categories simultaneously, within the auspices of one acquisition project.

8.2.2 Customer Relationships

Building on the analyses of interviews conducted at FMV and at DE&S, it is proposed that for the relationships between a DPA and its military customer it would be appropriate to use the three archetypes: colleague (comrades in arms); procurer (professional); and challenger (Devil's advocate). In the first archetypal relationship, the DPA representative acts as a colleague that genuinely sympathises with the requirements of the military customer, and also shares the interest in new technology to the degree that there is a tacit agreement that "*nice-to-have*" overrules "*need-to-have*". Hence, the DPA representative will happily engage in discussions regarding how to best satisfy the customers' requirements by developing new systems, or even researching new technologies. In the second relationship, the DPA representative acts professionally as a procurer towards the military customer, and proceeds to acquire the system as specified, preferably OTS. In the third relationship, the challenger, the DPA representative questions the requirements as presented by the customer. Hence, if there is an alternative solution, even if it is less suitable to the requirement put forward by the customer, the DPA representative will push questions such as if it is necessary to meet the exact specifications of the customer, or if an, e.g., "*80% solution at 50% of the price*" would suffice. Well aware that the relationship between availability and cost is probably more exponential than linear when availability approaches 100%, the DPA representative will also relentlessly challenge ostensibly arbitrary statements such as a requirement for 80% availability. The DPA can assume one of these relationships for each customer in every defence acquisition project.

8.2.3 Channels

Building on the analyses of interviews conducted at FMV and at DE&S, it is proposed that the "*Channels*" building block can be made up of three dimensions

(see Section 4.8.5): type of function (i.e. what is distributed?); type of activity (i.e. why is it distributed?); and type of distance (i.e. where is it distributed, and therefore; how is it distributed?). There are two types of functions (supply and support); two types of activities (operations and training/exercises); and two types of distances (far enough to require strategic lift and near enough not to require strategic lift). The type of value can be either supply (products, i.e. equipment or spare parts) or support (i.e. services in the form of Maintenance, Repairs and Overhauls, MRO). In practise, the two dimensions type of activity and type of distance can currently be simplified and combined to produce one dimension (see Table 4.19), type of destination, which can take two values: overseas operations; and domestic training and exercises. The two new dimensions create a two-by-two matrix (see Table 4.20) with four elements, i.e. “*Channels*”: overseas supply chain (operations); overseas support chain (operations); domestic supply chain (training and exercises); and domestic support chain (training and exercises). The DPA can use all four “*Channels*” for each customer in every defence acquisition project.

8.2.4 Value Propositions

Building on the analyses of interviews conducted at FMV and at DE&S, the “*Value Propositions*” building block consists of two dimensions: equipment and support. Equipment can take the values: no new equipment; standard Off-The-Shelf (OTS); adapted OTS; foreign development; and domestic development. Support can take the values: traditional (procurement and support), spares inclusive (procurement and Contractor Logistics Support, CLS), availability (Contracting for Availability, CfA), or capability (Contracting for Capability, CfC), see Figure 5.4. The combination of these two dimensions results in 20, mutually exclusive, permutations of equipment and support “*Value Propositions*” (see Table 5.1) that the DPA can use for a defence acquisition project. The value that is being created by a DPA for the Armed Forces is a contribution to a military capability. Hence, building on the analyses of interviews conducted at DE&S, this building block contains a third, additional dimension, which contains eight Defence Lines of Development (DLoDs, see Section 5.3.6) that can be used to describe how military capability is generated (The UK MoD, 2011d). These DLoDs are explicitly included, implicitly affected or not affected at all: Training (T), Equipment (E), Personnel (P), Information (I), Concepts and Doctrine (D), Organisation (O), Infrastructure (I) and Logistics (L). Presumably, CfCs will include all DLoDs, whereas CfAs will include most of them and CLS may only include Equipment and Logistics. The DPAs “*Value Proposition*” can be any combination of the DLoDs.

8.2.5 Key Activities

To fill this building block, constructs from Public Private Partnerships (PPPs) theory (Grimsey and Lewis, 2004, p 129) have been used to categorise the public-private buyer-supplier partnership regarding which actor, in the public or the private (contractor, sub-contractor, TPL providers, or banks) sector, that, in the endeavour to create value for the end-customer (i.e. the Armed Forces), assumes responsibility for different activities (see Table 4.18). Hence, for the PPBM, “*Key Activities*” is proposed to consist of public buyer (decider) or private supplier (provider) responsibility, and Transfers (T) of responsibility, for “*Key Activities*” such as: Design (D), Finance (F), Buy (B)/Rent (R)/Lease (L), Construct (C)/Build (B), Develop (D), Own (O), Operate (O), Manage (M), and Maintain (M) for products (equipment) and services (support to the equipment). In principle, the DPA is free to give the private sector the responsibility for any bundle of activities.

8.2.6 Key Resources

Building on the analyses of interviews conducted at FMV and at DE&S, the “*Key Resources*” building block consists of three dimensions: personnel with different sets of knowledge, skills and experience; organisation; and corporate culture. Competencies in project management, different areas of technology, system integration, acquisition, logistics, etc., will be required and play an important role in order for the DPA to satisfy the requirements of its military customer. This building block has not been included in the reported research (see Section 1.5).

8.2.7 Key Partnerships

Building on the analyses of interviews conducted at FMV and at DE&S, the “*Key Partnerships*” building block consists of four components: spectrum of Public Private Cooperation (PPC) (The Swedish Armed Forces, 2006b, p 4): “*Contracting out of services*” (Facility Management, Contractor Support to Operations, Outsourcing), “*Alternative financing solutions*” (Leasing, PFI solutions), “*Partnership solutions*” (Project Alliances, Strategic Partnerships (PPPs)); process for selection of partner (competition, alternative form of selection); identity of partner (prime contractor), and network of suppliers (individual sub-contractors that supply products and services). In principle, the DPA can use any form of PPC for any defence acquisition project.

8.2.8 Revenue Streams

This building block could be relevant also in the focal context, at least if the relationship between a DPA and its military customer was strictly business, but the

author decided against including “*Revenue Streams*” in this research project (see Section 1.5). The “*Revenue Streams*” building block in the PPBM consists of the payments from the customers.

8.2.9 Cost Structure

The “*Cost Structure*” building block consists of all operation costs, i.e.: external costs, i.e. what the DPA pays partners and suppliers for delivering the products and services; and internal costs, e.g. the costs that the DPA has for its personnel, facilities, etc. External costs consist of one of the five most frequently used “*Cost Structures*” in defence acquisition (Sols *et al*, 2007): Firm Fixed-Price (FFP); Fixed-Price Incentive (FPI); Cost-Plus Incentive Fee (CPIF); Cost-Plus Fixed Fee (CPFF); and Performance Based Contract (PBC). For the PPBM used in this thesis only the external costs have been explicitly included (see Section 1.5). In principle, the DPA can use any “*Cost Structure*” for any defence acquisition project.

8.3 Testing the Public Private Business Model

The generic Public Private Business Model (PPBM) for defence acquisition that is proposed in this thesis consists of nine building blocks. In the reported research, the PPBM has been used to describe and analyse four UK defence acquisition projects. There has been no indication that the nine building blocks are not exhaustive, and consequently nothing to suggest that additional building blocks should be required in order to describe and analyse defence acquisition projects. Furthermore, there has been no suggestion that the labels of the building blocks should not be appropriate also for a Defence Procurement Agency (DPA) in the public sector. Consequently, the PPBM, i.e. the Business Model Canvas and its building blocks (Osterwalder and Pigneur, 2010, pp. 16-17), with the adaptations proposed in Section 8.2, is both applicable and appropriate in the defence acquisition context. As illustrated in this section, some of the contents will probably have to be further developed in future research.

8.3.1 Customer Segments

There were no difficulties in the application of the “*Customer Segments*” building block for any of the four cases in this research project. For a defence acquisition project this building block merely identifies the military customer and nothing more. Consequently, the contribution of the current version of this building block is debatable. In any future development of the PPBM, it could be worthwhile to investigate if an alternative operationalisation of the “*Customer Segments*” could augment the contribution of this building block. Perhaps the spectrum of peace,

crises and war could provide a more appropriate ground for the categorisation of the “*Customer Segments*”.

8.3.2 Customer Relationships

It was straightforward to apply the “*Customer Relationships*” building block in the four cases in this research project. It would probably be worthwhile to further explore the customer building block in any future developments of the PPBM, both in terms of the number of possible values on the spectrum and in terms of what the values represent, in order to capture any potential subtleties in the “*Customer Relationships*” that the current three values on the spectrum neglects to identify. If the operationalisation of the “*Customer Segments*” building block were to be altered in any significant way, the operationalisation of the “*Customer Relationships*” building block would have to be changed accordingly.

8.3.3 Channels

It was uncomplicated to identify which “*Channels*” that were being used in three of the four cases in this research project. One of the cases includes a very large transportation resource and, consequently, the discussion regarding “*Channels*” is irrelevant in that case. There is nothing to suggest that further development is required regarding the physical flow of products (equipment and spares) and services (support). However, in future research, it could be worthwhile to investigate the expansion to also include the information flow.

8.3.4 Value Propositions

The application of the “*Value Propositions*” building block did not present any problems in any of the four cases in this research project. Furthermore, there was nothing to suggest that any modification of this building block should be required in any future research. This building block seems to quite sufficiently capture the offering from a DPA to its military customer. If anything, the building block could be made somewhat more generic, or at least less country-specific, by the substitution of TEPIDOIL for DOTMLPF or DOTMLPFI, i.e. the US or NATO equivalent. However, this author would argue against such a substitution on the grounds that the UK DLoDs, incidentally another country-specific acronym, in addition to providing an outstanding mnemonic (TEPID OIL), explicitly includes logistics, where the strengths, weaknesses and risks that are associated with a BM most clearly manifest themselves, whereas the alternatives do not.

8.3.5 Key Activities

It was not problematic to apply the “*Key Activities*” building block for three of the cases. The remaining case represented a more challenging application. Because of the US Department of Defense (DoD) Foreign Military Sales (FMS) Program (see Section 6.3.2), it turned out to be rather problematical to unravel the involvement of two governments in the acquisition project. However, after some modification, the building block was made applicable also to this acquisition project. If the “*Key Activities*” building block had not been applicable for this case, the PPBM would not have been applicable for defence acquisition projects involving the US defence industry. With the modification, this potential limitation was avoided. The proposed terminology for division of responsibility is taken from the general PPP theory. Nothing in the application of this terminology in the military domain implies that the terminology should not be applicable also for the defence sector.

8.3.6 Key Resources

The “*Key Resources*” building block was not included in the reported research, since it was decided that issues concerning personnel, organisation and corporate culture was on the periphery of the scope of the research. The author sees no immediate difficulties with the inclusion of this building block in any future research. However, the dimensions should be expanded to include also other “*Key Resources*”, such as Information Systems, in order to “*describe the most important assets required to make a BM work*”.

8.3.7 Key Partnerships

In an earlier incarnation of the PPBM, the “*Key Partnerships*” building block incorporated a relatively elaborate spectrum of PPC taken from PPP theory (Grimsey and Lewis, 2004, p 129), which provided the model with a finer mesh than the current version. However, it proved too complicated to adequately categorise the British acquisition projects, which are not classified in accordance with PPP theory, in this comparatively detailed spectrum. Consequently, the fine-meshed PPP spectrum was replaced by the less detailed, but military adapted, PPC spectrum. The PPC spectrum proved more straightforward to apply than the PPP spectrum. The Swedish military PPC spectrum (The Swedish Armed Forces, 2006a, p 3) that was used instead of the generic civilian PPP spectrum proved more suitable to the context. In future research it would probably be well worth the effort to return to the question of the content of this building block in order to thoroughly investigate whether or not the PPC spectrum is more generally applicable for defence acquisition than the PPP spectrum. The application of the other three components of this building block did not present any problems at all.

8.3.8 Revenue Streams

In the UK, the Armed Forces and the military agencies, including DE&S, are integral parts of MoD. Consequently, this building block was not included in the reported research, since it was decided against trying to explore the “*Revenue Streams*” within the UK MoD. The author sees no immediate difficulties with the inclusion of this building block in any future research.

8.3.9 Cost Structure

In the UK, the Armed Forces and the military agencies, including DE&S, are integral parts of MoD. Consequently, *internal* costs were not explicitly included in the “*Cost Structure*” building block in the reported research, since it was decided against trying to explore the internal costs within the UK MoD. The author sees no difficulties with the inclusion of internal costs in any future research. External costs were included at the outset of the research, but not with the explicit use of contract theory terminology as described above. Consequently, at the time of the interviews, the question regarding costs were more general in nature, and no questions referred explicitly to FFP, FPI, CPIF, CPFF or PBC. In the analysis it became clear that it would be useful to differentiate between the different acquisition projects by using the appropriate terminology from contract theory. Therefore the content of this building block was revised accordingly. Since the terminology was not included from the outset, it was not without complications to categorise the BMs in this respect. However, the author is convinced that this has more to do with the omission to include the correct terminology from the outset than with the appropriateness of the terminology in this context. In any future research *both* external *and* internal costs should be included in the “*Cost Structure*” building block. However, further research is necessary in order to determine what to include in these costs and how to model them. In the current version, FFP, FPI, CPIF, CPFF and PBC were included in the external costs. There are, however, other possible types of “*Cost Structures*” that could be included, for example target cost structures. Even though PBC is already included in the PPBM, any future research should further explore this American concept and its general implications for defence acquisition. Furthermore, the contribution of Sols *et al* (2007) turned out to be controversial. Consequently, further research is required in order to relate emerging performance based agreements to traditional price based agreements.

8.4 Implications for Business Model Theory

The primary theoretical contribution of the reported research is in the area of Business Model (BM) theory. As far as is known to this author, BM theory

developed in the private sector has never been applied for research in the public sector in order to investigate its applicability for defence acquisition. Based on Osterwalder (2004, p 14), less the part of a company's logic of earning money, the author has defined the following working definition of a BM for a non-profit, governmental organisation:

"A Business Model for a non-profit, governmental organisation is a conceptual tool that contains a set of elements and their relationships. It is a description of the value the organisation offers to one or several segments of customers and the architecture of the organisation and its network of partners for creating and delivering this value and relationship capital".

In Section 4.13.1, seven propositions regarding BM theory were formulated. In this section, these propositions will be addressed based on the results of the within-case analyses and the cross-case synthesis in the previous chapter. The first three propositions were concerned with the construction and testing of a PPBM and they were formulated thus:

- Proposition 1: BM theory from the private sector is applicable in the public sector.
- Proposition 2: The nine BM building blocks can be adapted and filled with content to fit the defence acquisition context.
- Proposition 3: The nine PPBM building blocks are appropriate to exhaustively describe defence acquisition projects.

Based on the "*Business Model Canvas*" (Osterwalder and Pigneur, 2010), a PPBM (see Table 8.1), which can be regarded as an evaluation model (Pateli and Giaglis, 2003), for defence acquisition has been created. The nine BM building blocks (Osterwalder and Pigneur, 2010) were adopted, adapted and filled with content from theory and practise; predominantly from defence acquisition theory (Sols *et al*, 2007), Public Private Participation theory and practise (bundling: Grimsey and Lewis, 2004, p 129; Public Private Cooperation, PPC: The Swedish Armed Forces, 2006b, p 4), and defence acquisition practise (Defence Lines of Development, DLoDs: The UK MoD, 2011d), and the results of analyses of interviews conducted at FMV and DE&S; in order to fit the defence acquisition context. The model allows numerous permutations through different configurations of the suggested contents of these building blocks, in order to exhaustively describe defence acquisition projects. The PPBM was then used to describe and evaluate the BMs of four British defence acquisition projects. If/when the PPBM is applied it should initially be used to design the BM to be used in the particular acquisition project, then the BM would be used as an aid to plan, conduct and evaluate the acquisition project. In the reported research, the PPBM has been used in

retrospect, in order to describe what the associated BM might have looked like, if it had existed, based on the evidence of an existing acquisition project.

The proposed PPBM and the test of the PPBM, the results of which have been described in Sections 8.2 and 8.3, are the major contributions to BM theory from the research. The research has demonstrated that BM theory (Osterwalder and Pigneur, 2010, p 44) from the private sector is applicable also in the public sector (Proposition 1). This contribution can be regarded as constituting the first step in the direction of a new research strand in BM theory; namely BMs for non-profit, governmental organisations. The research has shown that the nine building blocks (Osterwalder and Pigneur, 2010, pp. 16-17) can be adapted and filled with content to fit the defence acquisition context (Proposition 2). This contribution is directed towards the defence sector, which has until now not been addressed in BM research. The research has also demonstrated that the PPBM exhaustively describes defence acquisition projects (Proposition 3). This contribution has been validated at a seminar for Swedish Subject Matter Experts (SMEs).

The next two propositions are associated with the strengths and weaknesses, or performance (i.e. effectiveness and efficiency) of defence acquisition projects. These two propositions were formulated as:

- Proposition 4: The nine PPBM building blocks are appropriate to evaluate the performance of defence acquisition projects.
- Proposition 5: There is a correlation between the configuration of the nine PPBM building blocks and defence acquisition projects' performance.

The within-case analyses and cross-case synthesis have demonstrated that the PPBM building blocks are a useful description based on which the performance of defence acquisition projects can be evaluated (Proposition 4). Furthermore, the research has demonstrated that there is a correlation between certain PPBM configurations and the performance of the corresponding defence acquisition project (Proposition 5). The results that substantiate this assertion are presented in Section 9.2. These results include the observation that a particular form of Public Private Cooperation (PPC, see Section 4.7.5), i.e. "*Alternative financing solutions*" (see Section 4.7.7), does not lead to Value-for-Money (VfM, see Sections 4.7.2 and 4.9.9) for defence acquisition projects where ownership is transferred to the public sector. In such projects, alternative solutions would have acquired the equipment less expensively than what "*Alternative financing solutions*" can do.

The last two propositions dealing with BM theory are concerned with the risks that are associated with defence acquisition projects:

- Proposition 6: The nine BM building blocks are appropriate to evaluate the risks associated with defence acquisition projects.

- Proposition 7: There is a correlation between the configuration of the nine PPBM building blocks and defence acquisition projects' risks.

The within-case analyses and cross-case synthesis presented in Chapter 7 have illustrated that the PPBM building blocks are useful also for evaluating the risks associated with defence acquisition projects (Proposition 6). More specifically, the research has demonstrated that there is a correlation between the configuration of the nine PPBM building blocks and defence acquisition projects risks (Proposition 7). The research results that corroborate this statement are presented in Section 9.2. A risk of particular interest to the context is the risk that the Purple Gate (PG), in itself an attempt to mitigate other risks, may inadvertently have contributed to making the entire concept of Contracting-for-Availability (CfA) meaningless. Based on the results of the reported research there is a risk that the PG will render the CfA meaningless for overseas operations, i.e. that there is a misalignment between the PG in the "*Channels*" building block and the CfA in the "*Value Propositions*" building block.

8.5 Implications for Public Private Participation Theory

The secondary theoretical contribution of the reported research is in the area of Public Private Participation (see Section 4.3) theory. Public Private Participation (Cooperation, Partnership) theory has its application both in the public and the private sector. However, the full range of possibilities associated with PPP theory has not previously been used for research in the defence sector. When PPP theory is used in the UK defence context, acquisition projects are referred to as PPPs, PFIs, or PPP/PFI type projects (Parker and Hartley, 2003). As far as is known to the author, the concept of bundling (Grimsey and Lewis, 2004, p 129) has never been used in the defence sector. Furthermore, in PPP theory, there is consensus (Grimsey and Lewis, 2004, p 135) regarding the necessity to have competition and risk transfer in order to achieve Value-for-Money (VfM). However, in defence acquisition practice, there seems to be ambivalence in this respect. In Section 4.13.2, three propositions regarding potential contribution to Public Private Partnership theory were formulated. In this section, these propositions will be addressed based on the results of the within-case analyses and the cross-case synthesis in the previous chapter. The propositions were formulated as:

- Proposition 8: The spectrum of public/private Business Models can be utilised in order to categorise different defence acquisition projects.
- Proposition 9: The notion of bundling can be utilised in order to differentiate between different defence acquisition projects, by describing

how the public and private sectors assumes responsibility for certain activities.

- Proposition 10: Competition and risk transfer are necessary prerequisites for VfM also in the defence acquisition context.

There is a problem with categorisation of PPP/PPC acquisition projects, particularly in the defence sector. In the UK, current practise is to categorise defence acquisition projects as PPPs (PFIs) or not, there is no finer disintegration of the concept. In the reported research, a generic PPBM for defence acquisition is created. In the “*Key Partnerships*” building block, a first step towards utilising the spectrum (see Section 4.7.4) of public/private Business Models (as proposed by Grimsey and Lewis, 2004, p 54) in order to categorise different defence acquisition projects (Proposition 8). In an earlier version of the PPBM, the entire spectrum of public/private BMs was included in this building block. However, there was not sufficient data available in the analysis in order to categorise the four cases with this degree of disintegration. Instead, the concept of Public Private Cooperation (PPC, The Swedish Armed Forces, 2006b, p 4) was used instead. PPC (see Section 4.7.5) turned out to be more suited to retroactively categorise British defence acquisition projects. However, in future research efforts, this author would argue that the full spectrum of public/private BMs should be investigated again.

In the “*Key Activities*” building block, the activities used for bundling are utilised in order to distinguish between different defence acquisition projects, by describing how the public and private sectors assumes responsibility for certain activities (Proposition 9). As shown in the previous chapter, this construct from PPP theory is useful to distinguish between defence acquisition projects by describing how the public and private sectors assumes responsibility for different activities. Such a categorisation ought to be useful in future research in order to compare the performance of different BMs and acquisition projects.

The reported research has discovered that in the UK, defence acquisition practise is apparently conducted in opposition to PPP theory (Proposition 10). According to PPP theory, the two predominant prerequisites of VfM are competition and risk transfer (Grimsey and Lewis, 2004, p 135). In the UK, the Defence Industrial Strategy (DIS, The UK MoD, 2005c) is working against competition by allowing other ways of selecting a prime contractor. Furthermore, the introduction of the Purple Gate (PG, see Section 4.8.7) is working against risk transfer, since it is difficult to combine risk transfer to the private sector with public sector responsibility in the Joint Supply Chain (JSC) beyond the PG, i.e. through the Coupling Bridge (CB, see Section 4.8.7). Hence, it seems that in the UK, VfM is not always realised through competition and risk transfer, i.e. not in accordance with prevalent PPP theory. This issue is an apparent paradox that is of the utmost interest to address in future research.

8.6 Implications for other Areas of Theory

In the reported research, the frame of reference is predominantly based on theoretical constructs from Business Model (BM) theory, defence acquisition theory, Public Private Partnership theory and military logistics theory. As described in Sections 8.4 and 8.5, the main theoretical contributions of the research are to BM theory and Public Private Partnership theory. Future research in the area of PPBMs can make further contributions in these areas, and in the area of defence acquisition theory and military logistics theory. However, as previously indicated for Performance Based Contracts (PBC, see Section 4.6.7) and demonstrated for Procuring Complex Performance (PCP, see Section 4.16), there are emerging areas of theory of potential importance to the PPBM. Any future research in the area of PPBMs should further investigate how these emerging areas of theory could contribute to the PPBM frame of reference, and how PPBM research could contribute to theory building also in these areas. In Section 4.13.3, two propositions for future research were formulated:

- Proposition 11: Research regarding how BMs can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept, can be conducted within the emerging area of Performance Based Contracting.
- Proposition 12: Research regarding how BMs can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept, can be conducted within the emerging area of Procuring Complex Performance.

These propositions will not be addressed in this thesis. However, and as illustrated in the comparison in Section 4.16, there is a significant degree of overlap between the area of PCP and the proposed PPBM. Research in these areas can enrich, stimulate and cross-fertilise each other.

8.7 Research Questions for Future Research

In the reported research, three Research Questions (RQs) have been addressed (see Section 8.1). RQ 1 has been answered by the proposed generic Public Private Business Model for defence acquisition (see Table 8.1). A first step has also been taken towards establishing which inherent strengths and weaknesses (RQ 2) and risks (RQ 3) that are associated with different configurations of PPBM building blocks. However, since the reported research has exclusively dealt with theoretical configurations of the PPBM, rather than with established configurations with established labels, there are issues with the PPBM that ought to be addressed in

future research before the PPBM can become really useful in defence acquisition practise. In current UK defence acquisition practise, different forms of Public Private Participation are used as labels to differentiate between different forms of BMs for defence acquisition. Since such labels are powerful and useful in practise, the following RQs should be addressed in future research:

- How can the generic PPBM be used in order to establish, define and label different classes (i.e. groupings of similar configurations) of PPBMs for defence acquisition?
- How can the PPBM be used in order to establish, define and label different individual BMs for defence acquisition?

In addition to those issues that are directly related to the focused RQs, the reported research has also exposed a number of secondary issues that would be interesting to address in future research. Competition and risk transfer are considered to be the most important determinants of VfM (Grimsey and Lewis, 2004, p 135). According to the OECD (2008, p 20), *“the distinguishing feature that determines whether a project is defined as traditional public procurement or as a Public Private Partnership (PPP) should be whether or not a sufficient amount of risk has been transferred”*. However, as demonstrated by Proposition 10 (see Section 8.5), in the UK, the DIS is working against competition and the PG is working against risk transfer, which leads to the following RQ:

- How can Value-for-Money (VfM) be ensured without competition and risk transfer?
- How should traditional procurement be distinguished from emerging forms of Public Private Participation?
- How, since there is no risk transfer, can Cost-Plus Contracting arrangements be used for Public Private Participation?

Defence procurement has two general objectives, which are not always compatible and consequently may necessitate policy trade-offs (Markowski *et al*, 2010b, p 3): the supply dependability objective (which means to assess and/or form dependable supply chains to secure reliable and sustainable deliveries of goods, services and know-how to form and maintain defence capabilities in the required state of operational readiness); and the Value-for-Money (VfM) objective (which means to buy what is needed cost effectively (which should not be taken to mean *“at least cost”*) and in accordance with Defence’s quality and schedule requirements). Political demands for higher performance (*“Doing more with less”*), i.e. increased effectiveness (*“faster, cheaper, better”*) and efficiency (*“Value-for-Money”*), works against the dependability objective, which leads to the following RQ:

- How should a DPA combine the dependability objective with the VfM objective?

There is no definitional clarity regarding what, i.e. different forms of Public Private Participation, fills the space between traditional government provision and full privatisation (OECD, 2008, p 16; Grimsey and Lewis, 2004, p 54). However, for the decision regarding entering into a PPP, a Public Sector Comparator (PSC) has been suggested (Grimsey and Lewis, 2005). Consequently, the following RQ can be formulated:

- How can different forms of Public Private Participation on the spectrum from government provision to privatisation be defined and differentiated from each other?
- How can a PSC be used by a DPA when deciding between traditional procurement and emerging forms of Public Private Participation?

Cost-saving was initially the primary reason behind outsourcing initiatives among governments worldwide. Later, the primary reason for outsourcing changed to improved speed or quality of services (Dickens Johnson, 2008). Flexibility (as described by Slack *et al*, 2010, p 40) could be the next dimension of interest to governments. As early as three decades ago, Kraljic (1983) discussed what make-or-buy policies that would “*give the best balance between cost and flexibility*”. In the UK, flexibility is not even implicitly addressed in the political rhetoric, whereas in Sweden, it is explicitly addressed in military strategy (see Section 4.9.2). Hence, the following RQs can be articulated:

- How can the driving forces behind governmental outsourcing initiatives be described?
- How can defence acquisition satisfy the customers’ requirements for quality, speed, dependability and flexibility; and the politicians’ demands for reduced cost?

For standard quality Off-The-Shelf (OTS) products, price agreements are often sufficient. However, when buying services, performance agreements have become increasingly popular (van Weele, 2002, p 162). According to Sols *et al* (2007), the contractor’s “*motivation to perform*” is “*High*” for Performance Based Contracts (PBC), “*Medium*” for Cost-Plus Contracts and “*Low*” for Fixed-Price Contracts; whereas the client’s “*assurance relative to achievement of effectiveness goals*” is “*High*” for PBC, “*Medium*” for Cost-Plus and Fixed-Price Contracts *with* incentive mechanisms (i.e. CPIF and FPI) and “*Low*” for Cost-Plus and Fixed-Price Contracts *without* incentive mechanisms (i.e. CPFF and FFP). This is not in line with “*the common view*”, i.e. that Fixed-Price Contracts transfer risks to the supplier, whereas in a Cost-Plus Contract the buyer assumes the risk and the

supplier is not incentivised to reduce costs or improve performance (Glas *et al*, 2011). This leads to the following RQ:

- How should PBC be described, i.e. which dimensions could be used, in order to make a comparison with traditional Cost-Plus and Fixed-Price Contracts possible?
- How do the emerging performance agreements such as PBC relate to traditional price agreements such as Cost-Plus and Fixed-Price Contracts?

Performance Based Contracting (PBC), such as the UK MoD Contracting-for-Availability (CfA), is becoming increasingly popular. The CfA is intended to incentivise industry to make systems more reliable and thus increase system availability. However, performance agreements can only be beneficial “*if the operations strategies are properly and effectively implemented*” and academic literature provides little guidance regarding how this should be done (Datta and Roy, 2011). Consequently, the following RQs can be formulated:

- How should operations strategies for PBC be formulated?
- How should operations strategies for PBC be implemented?
- How can PBC be utilised in order to fulfil the ambitions of CfAs?

In Operations Management there have been many suggestions for how “*Competitive Priorities*” (Ward *et al*, 1998), or “*Performance Objectives*” Slack *et al* (2010, p 40), should be described, and how they should be used in order to satisfy customers. Four or five dimensions are usually used to describe this aspect of Operations Management. However, based on the reported research it is clear that in the UK defence sector, only three dimensions are utilised; speed (faster), cost (cheaper) and quality (better), whereas dependability and flexibility (see Section 4.9.2) are not used explicitly. Furthermore, for the three dimensions that are used, there have been problems with definition; measurement and comparison (see Section 4.9.3). In addition, there are “*major problems that seriously limit an objective and accurate assessment of purchasing performance*” (see Section 4.9; van Weele, 2002, p 258). Hence, in the focal context, the following RQ emerges:

- How should performance objectives be defined for a DPA in order to be useful to satisfy its customers (the Armed Forces) and owners (the politicians)?

Howard and Caldwell (2011, pp. 6-9) make a case for why traditional procurement methods cannot buy complex performance. There is a need for new theory in the area of procurement of complex products and integrated services and Howard and Caldwell (2011, p 16) propose that the emerging area of Procuring Complex Performance (PCP) might be the answer. Spring and Mason (2011, p

105) suggest that BMs may offer a way to grasp the complexity of PCP. This leads to the following RQ:

- How can traditional procurement methods handle the complexity of procurement of complex products and integrated services, i.e. complex performance?
- How can the concept of BMs be used in conjunction with the concept of PCP in order to handle the complexity of procurement of complex products and integrated services?

According to van Weele (2002, pp. 140-150), the different segments in Kraljic's portfolio correspond to different possible strategies and partnership should be selected for strategic products. However, not all relationships between buyer and supplier should "*be moved into a more partnership style*" (Cooper *et al*, 1997), which leads to the following RQ:

- How should a DPA decide with which contractors to partner?
- How should a DPA decide between different forms of price agreements and performance agreements?

In the reported research, PPC has been included in the PPBM. However, the research has revealed that in the UK, "*Alternative financing solutions*" (leasing and PFI solutions) are no longer allowed, or not recommended. Furthermore, the research has demonstrated that it is difficult to differentiate between different forms of Public Private Participation in the area of defence acquisition. Consequently, in the area of defence acquisition, there is a need for a new mechanism for differentiating between different forms of Public Private Participation, which leads to the following RQ:

- How should different forms of Public Private Participation be differentiated between in the area of defence acquisition?

9 Implications for Practise

“I know that in an age of austerity, we cannot spend more. But neither should we spend less. So the answer is to spend better. And to get better Value-for-Money. To help nations to preserve capabilities and to deliver new ones. This means we must prioritise, we must specialise, and we must seek multinational solutions. Taken together, this is what I call Smart Defence”.

Fogh Rasmussen (NATO, 2011b)

9.1 Introduction

The research purpose: to *“study, analyse, and evaluate BMs regarding how they can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept”*, was used to formulate three Research Questions (RQs):

- Research Question 1: How can a generic Business Model for a non-profit, governmental, Defence Procurement Agency be described?
- Research Question 2: Which strengths and weaknesses do different Business Models have in the context of defence acquisition?
- Research Question 3: Which risks are associated with different Business Models in the context of defence acquisition?

In this chapter, the practically oriented generic results produced in the quest for answers to RQ 1, RQ 2 and RQ 3 are presented in Section 9.2. The theoretically oriented results have been presented in Chapter 8. In Section 9.3, the transferability of the presented results is discussed. In Section 9.4, the implications for Swedish defence acquisition is discussed. In Section 8.7, RQs were proposed from a theoretical perspective. In Section 9.5 potential research areas and research issues are proposed from a practical perspective.

During this research project, a number of issues have arisen regarding the differences between the British and the Swedish defence sectors. Some of these issues are addressed in this chapter, whereas other issues do not fit into the structure. In an attempt not to let all of them sink into undeserved oblivion, an assortment of some of the rest of the author’s ideas, issues, questions and speculations are collected and presented in Section 9.6.

9.2 Results of the Multiple Case Study in the UK

The proposed generic Public Private Business Model (PPBM) for defence acquisition is a theoretical construct, which is intended to also be of practical use for defence acquisition professionals. In this section, following the structure provided by the RQs, the results that have implications for practise are presented. The results are consequently divided into general results, strengths, weaknesses and risks. Only those building blocks and building block configurations for which there are research results to present are included. A major implication for practise is that the research has demonstrated that the concept of Business Models (BM) is applicable in the public sector. Based on the reported research, it is the opinion of the author that the overall structure of the proposed PPBM would be suitable to design BMs for defence acquisition, and to use them as the underlying structure for planning, executing and evaluating defence acquisition projects. Having such a structure as the foundation of acquisition projects could facilitate the ensuing evaluation of an individual acquisition project, but would also enable a comparison between different projects in order to identify and eradicate negative patterns and to identify and reinforce positive patterns.

9.2.1 General Results

The reported research has demonstrated that in the “*Customer Relationships*” building block, there is a potential for differentiating the relationship between the DPA and the customer depending on the situation. For the mundane acquisition of more trivial commodities such as nuts and bolts, the professional role of the “*procurer*” is likely to be sufficient. However, for new development of a sophisticated platform, which integrates several advanced systems, or the acquisition of expensive Off-The-Shelf (OTS) equipment, the role should, perhaps, be that of the “*Challenger*”.

A trend in defence acquisition and military logistics the last couple of years has been outsourcing, which has involved a shift of responsibility from the public to the private sector. In the defence sector Contractor Support to Operations (CSO) is one form of defence outsourcing. The UK MoD was an early adopter of CSO in the forms of Contractors on Deployed Operations (CONDOs) and Contractor Logistics Support (CLS). There were positive and negative consequences of CONDOs and CLS. For overseas operations, one of the more negative consequences of CLS was the fragmentation of the supply and support chains into supply and support networks, with multiple actors, with different roles and responsibilities at various nodes in the network. Based on Lessons Learned (LL) from the Balkan Wars, the UK MoD introduced the Purple Gate (PG), which is a Consolidation Point (CP), into its supply chain, in order to avoid theft,

fragmentation and problems with operational planning. Because of the PG, which prohibits suppliers in the Joint Supply Chain (JSC), these problems have either been eliminated or mitigated, and there is no fragmentation of the overseas supply chain. From the PG, through the Coupling Bridge (CB) and into the Joint Operations Area (JOA), the UK MoD transports supplies (i.e. equipment and spares) through the JSC with the transportation resources it has at its disposal.

Another novelty was introduced in the Defence Industrial Strategy (DIS) in order to address fragmentation of the support chain through CONDOs. It involves the replacement of Army personnel through the introduction of Sponsored Reserves (SRs). Consequently, the UK can now avoid fragmentation of the support chain, since Contractors on Deployed Operations (CONDOs) are no longer necessary in order to utilise contractor knowledge and skills for Maintenance, Repairs and Overhauls (MRO) as far forward as the second line repair facilities (L2). However, in the UK, a prerequisite of the introduction of SRs was a change of legislation.

For domestic training and exercises, another negative consequence of CLS and Third Party Logistics (TPL) was that delivery schedules that were convenient to the contractor and its sub-contractors were not always suitable to the receiving Regiments, which meant that “*White-Van-Man*” (see Section 6.4.3) deliveries were frequently turned away. The research shows that the problems with “*White-Van-Man*” deliveries at any time of day have now begun to be addressed. The novelty of co-location of contractor and MoD support resources, which was one of the initiatives in the DIS, has now remedied this problem for some contracts. However, for older contracts, TPL deliveries are occasionally being turned away.

Performance Based Contracts (PBCs) are attracting increasing attention in the defence sector. The research has illustrated that in UK defence acquisition, it is becoming common to Contract for Availability (CfA), which is a form of PBC, in which performance is articulated in terms of availability, and there are even aspirations to Contract for Capability (CfC) in the near future. Hence, the trend is towards increased complexity in the “*Value Propositions*” building block. However, the results of the research suggest that there are several potential problems associated with CfAs in practise, even misalignments between the theoretical ambitions behind CfAs at the strategic level, and the practical implementation of these ideas into defence acquisition contracts at the operational level.

The research has raised the question if there is a lower limit of complexity below which outsourcing should not be considered. The research has not provided any answers in this respect, but one of the cases concerns the rather trivial outsourcing of acquisition, storage and distribution of spares, where availability is measured as the existence of spares on the contractor’s shelves when they are required in theatre. In addition to being a rather trivial service, in which MoD could be better suited to reach economies of scale, there are substantial internal transaction costs and there is

no transfer of risk associated with this particular defence acquisition project. In Public Private Partnership (PPP) theory, the transfer of risk is one of the two most important determinants of VfM, the other one being competition. Consequently, it is far from clear why trivial services such as this should be outsourced, particularly if they do not include risk transfer to the private sector, since it will be difficult for MoD to ensure VfM for such projects.

The results of the research demonstrate that if short-term temporary solutions turn into long-term permanent solutions, there is a potential problem. For short-term temporary solutions, specifications and requirements tend to be relaxed. The research suggests that if these temporary solutions become permanent, the relaxed specifications and requirements are likely to turn permanent as well.

In the “*Key Activities*” building block the division of responsibilities between the private and public sector is described. The proposed contents of the “*Key Activities*” building block in the PPBM is how theorists and practitioners in some areas outside of the defence sector, e.g. in the infrastructure construction industry, successfully categorise different Public Private Partnerships (PPPs). The suggested terminology shows promise of being useful also in the defence sector. By using the same terminology as other sectors, the performance of defence acquisition projects could be compared to similar projects in other areas, which could be beneficial from the point of view of society as a whole. First and foremost, however, the performance of different defence acquisition projects could more easily be compared to each other if the suggested terminology, and the PPBM, were to be used in order to differentiate between defence acquisition projects.

Furthermore, any “*Alternative financing solutions*”, i.e. Private Finance Initiatives (PFI) or leasing, which involves MoD assuming ownership, are more expensive than traditional acquisition at the outset of the acquisition project. Consequently, “*Alternative financing solutions*” that involve transfer of ownership to MoD at the end of the project are not VfM and should thus be avoided. The research has revealed that in the UK, PFIs and leasing are no longer encouraged by HMT, at least not for defence acquisition projects where ownership is transferred to the public sector. The PFI is no longer considered to be VfM, and is consequently not encouraged for defence acquisition. Leasing arrangements risk turning into Lease-to-Buy (LTB) arrangements, which is not VfM. Consequently, leasing arrangements are not encouraged and those arrangements that are allowed are heavily restricted. In practise, HMT has all but abolished “*Alternative financing solutions*” in the UK, at least for defence acquisition.

The results of the research imply that Original Equipment Manufacturers (OEMs) are sometimes problematic in defence acquisition projects. If the OEM owns the right to approve spares from new suppliers, MoD will have to accommodate how the OEM wants to go about exercising this right. A potential consequence is that

MoD will have to act as an intermediary, even if the acquisition of spares has been outsourced to a prime contractor.

As one of the consequences of the DIS, prime contractors are no longer always selected through competition in the UK. In addition to defence policy and security policy, there are, presumably, elements of industry policy, labour market policy and regional policy at play in this development: *“even in competitive environments there are a number of wider factors besides cost and operational effectiveness, affordability and long-term Value-for-Money that will influence supplier and procurement selection. These include security of supply and the retention of key technologies and industrial capabilities, the implications for export potential, our wider policy framework and industrial participation”* (UK MoD, 2005c, p 48). This development does, however, go against PPP theory, since competition is one of the two most important determinants of VfM (the other one being risk transfer).

The research demonstrates that in practise, it is difficult to differentiate between different forms of Public Private Participation. This may indicate that in practise, there is not enough difference between these different forms of interaction between the public and the private sector in order to distinguish between them, or that they have not been defined exhaustively enough in Public Private Participation theory.

9.2.2 Business Model Strengths

The PG was introduced as a response to LL from the operations on the Balkans in the 1990s. The common strengths for PPBMs that contain the PG and the CB in the *“Channels”* building block are that fragmentation of the overseas JSC has been eliminated, theft in the overseas supply chain has been reduced and problems with operational planning have been reduced.

The major strength with the introduction of SRs, an element of the DIS, in the *“Channels”* building block is that this allows competence from industry to participate as combatants in the JOA, without any risk of fragmentation of the support chain for overseas operations.

As a consequence of the DIS, CfAs can contain co-location of private and public sector infrastructure in the *“Value Propositions”* building block. One advantage with the co-location of contractor and MoD storage and distribution resources is that the problem with *“White-Van-Man”* deliveries associated with CfAs before the DIS has been eliminated. With co-location, there is no longer the risk of TPL deliveries being turned away at the Regiments’ gates.

PPBMs that include COTS or MOTS equipment in the *“Value Propositions”* building block likely to deliver equipment and/or support faster and cheaper than BMs that includes adapted OTS equipment or the development of equipment.

PPBMs containing private sector financing in the “*Key Activities*” building block, particularly for financing concerning investments in expensive equipment, facilities or infrastructure, are likely to enable earlier investments than what would have been possible with public sector financing.

PPBMs that contain Firm Fixed-Price (FFP) or Fixed-Price Incentive (FPI) in the “*Cost Structure*” building block share an obvious strength, namely that a substantial component of the maximum price that the buyer will have to pay over the entire contract period is known to the buyer in advance.

9.2.3 Business Model Weaknesses

A weakness with BMs that contain the concept of CfA is the ambiguity of the term availability itself. Availability can be interpreted in several ways, or refer to different types of availability and stand for three different things in the UK; operational availability, available flying hours *per annum* and availability of spares on the contractor’s shelves. For equipment and support, availability refers to system readiness in theatre, i.e. operational availability of the system in the JOA. For very large strategic airlift resources availability refers to the number of flying hours per time unit, which does not say anything about the availability as a probability at a certain point in time. For spares, availability can refer to the existence of spares on the contractor’s shelves when the spares are required, regardless of the fact that there will be a substantial delay before the spares reach, e.g., the theatre. Hence, there is a potential “*definition problem*” regarding what the “A” in CfA is. It is problematic that the interpretation of the most central term in CfAs is so elusive and full of nuances. If availability cannot have one, general interpretation, any CfA must explicitly specify how availability is defined in that particular case. The research results indicate that this is not always the case in the UK. More generally, the research suggests that performance must be explicitly specified for any PBC in order to avoid any unnecessary problems with interpretations.

The UK is moving towards an increased complexity in defence acquisition projects. In line with a novelty of the DIS, not only Equipment and Logistics are being outsourced, but responsibility for other DLoDs can also be outsourced. Hence, a CfA can comprise several DLoDs. With more and more components of capability thus being outsourced, it becomes increasingly difficult to measure the performance of the delivery; especially if availability is not explicitly defined to start with. Hence, there may be a potential “*measurement problem*” in addition to the potential “*definition problem*”. Previously, in a CLS, the contractor would have been limited to MRO in order to achieve the targeted system availability. Under a CfA, a contractor is intended to be incentivised to use additional tools, including the training of military personnel, in order to increase and maintain availability. A complication associated with this development is that the effects of any efforts in

the area of training of personnel is likely to appear at a later date than, e.g., the effects of MRO. This means that a prerequisite of the increased complexity is that the implementation is in the form of a relatively long contract, in order for efforts in the area of training to have an effect on system availability. Even so, there is a potential “*measurement problem*” regarding when, where and how contributions to capability of individual DLoDs should be measured.

A weakness for PPBMs that contain the PG in the “*Channels*” building block and CfAs in the “*Value Propositions*” building block, at least when system availability is included in the CfA, is that it is not clear when, where and how availability should be delivered for overseas operations by the contractor. This weakness constitutes another dimension to the potential “*measurement problem*”. The existence of the PG and the CB in the JSC prohibits the contractor to deliver availability to the JOA, where it is needed. Consequently, the PG and the CB makes it impossible to fulfil this aspiration of the CfA. Furthermore, because of the PG and the CB, a contractor cannot be expected to reduce delivery times to operations. This restriction is not compatible with the overall goal to reduce delivery times. In essence, problems in the military supply chain at the tactical and operational levels appears to have been solved at the expense of the implementation of ideas from the strategic level regarding effective and efficient defence acquisition. In summary, for overseas operations there is a potential misalignment between the limitations of the PG and the CB in the “*Channels*” building block and the ambitions of the CfA in the “*Value Propositions*” building block.

Another weakness introduced by the PG lies in the combination of the PG in the “*Channels*” building block and private sector ownership of equipment in the “*Key Activities*” building block. Because of the PG and the CB in the JSC, the sharing of responsibilities between the public and the private sector has been seriously affected. In cases where the private sector owns a piece of equipment, despite the fact that ownership remains with the private sector even after passing the PG, risk taking cannot be assumed by the contractor, since the contractor has no influence over the equipment after that node in the chain. Consequently, the implication of the introduction of the PG and the CB into the JSC is that, whatever the formal contract states, in practise there cannot be any transfer of risk beyond the PG. Regardless of ownership, in practise, MoD must assume responsibility, and take the risk, for the contractor’s equipment until it is returned to the contractor again. Since all responsibility must be considered to rest with MoD in the JSC and also in the JOA, the contractor cannot be expected to assume any risk in the JSC or in the JOA. In PPP theory, the transfer of risk is one of the two most important determinants of VfM. Consequently, a DPA ought to take this limitation imposed by the PG rather seriously, if VfM is going to be pursued in defence acquisition projects involving support to deployed forces. There is a potential misalignment in

this combination of the PG and the CB in the “*Channels*” building block and private sector ownership of equipment in the “*Key Activities*” building block, since it is far from clear how private ownership of equipment should be handled in the JSC. It is also a potential misalignment with the overall expectation that PPPs will involve a great deal of risk transfer to the private sector.

A weakness for BMs that contain the combination of private sector financing in the “*Key Activities*” building block and banks in the “*Key Partnerships*” building block is that there is a reduction of flexibility when banks, which are primarily interested in securing the ROI, not the actual purpose of the acquisition project they are supporting or any long-time relationship with MoD, are involved in the financing. In the UK, PFIs, one form of “*Alternative financing solutions*” are no longer recommended by HMT for defence acquisition, since they are not VfM. Leasing, the other form of “*Alternative financing solutions*”, is no longer encouraged by HMT for defence acquisition in the UK, since it is considered to be a risk that leasing arrangements are morphed into LTB arrangements, which are not VfM.

The increased complexity in “*Value Propositions*”, from traditional procurement of equipment to CfA, which includes acquisition of equipment and support, and other DLoDs, has not resulted in a reciprocal development of the “*Cost Structure*”. It seems likely that the ascension up the defence acquisition staircase must involve moving towards PBC, but DE&S has so far remained in the relatively safe confinement of the more traditional “*Cost Structures*”, i.e. Fixed-Price Contracts and Cost-Plus Contracts, even if they do not incentivise the contractors as much as would have been desirable. In the US, steps have been taken towards PBCs to match the requirements for delivery of performance such as operational availability. Practise in the rest of the world must move in a similar direction in order to provide the necessary incentives for CfAs. The research results suggest that, at present, there is a potential misalignment between the ambitions of CfAs (performance) in the “*Value Propositions*” and the “*Cost Structures*” that are selected in practise, i.e. traditional price agreements. It would have been more in line with the CfA to have FPI “*Cost Structures*” for all CfAs, since this would have transferred risk to the contractor and potentially explicitly incentivised the contractor to increase delivery speed, decrease delivery cost and increase delivery quality.

One result of particular interest regarding the “*Cost Structures*” is that in all the studied cases, regardless of the selected “*Cost Structure*”, the contractors’ profits must be paid regardless of any reductions in the operational requirements.

The research results indicate that in the UK, there would, in some contracts, seem to be an ambiguity regarding with what the costs of the contractor should be compared. It is not always clear if these costs should be compared to the past, present or future cost of DE&S, if the responsibility had been retained within MoD. This is equally true for the other dimensions of the rhetorical “*faster*,

cheaper, better". If it is enough for the contractor to be just faster, cheaper and better than what MoD was at the time of the negotiations with the contractor, or could be at another point in time, or if the contractor should reach a specified target, appears to be an unresolved issue in some contracts. Consequently, there appears to be a potential "*comparison problem*" in some contracts.

9.2.4 Business Model Risks

For SRs, there is a risk that demand will exceed supply. Since the SRs are only a few individuals in each contract, there is also a risk that they will not be available when they are required. Furthermore, since the SRs are a new phenomenon, there is a risk that all consequences of this concept have not been anticipated, and that there will be unexpected consequences because of the SRs.

For BMs that involve the acquisition of OTS equipment, there is a risk that the presumably relaxed requirements, which made it possible to procure OTS equipment in the first place, may change at any time, and make it necessary to adapt the OTS equipment to better fit the new requirements. Any such adaptations are likely to increase the Total Cost of Ownership (TCO).

In BMs that include the outsourcing of codification of spares, there is a risk that errors will be made by the contractor. The consequence of errors in the codification of spares is that the spares are "*lost in cyberspace*". If the codes on the spares do not match the codes in the Information Systems (IS), they "*do not exist*", and are consequently not delivered. A risk that is closely related to the risk of codification errors is the risk that the JSC will become flooded with spares because of unnecessary, multiple orders for spares that are never delivered, because they have been coded erroneously.

Risk transfer is a significant part of PPC and consequently also of the novel forms of doing business, manifested in new types of BMs, between DE&S and the defence industry, e.g. CfA. However, when MoD retains some risk, like in the case with the PG, there is a risk that the entire concept of risk transfer is rendered impossible, meaningless or loses some of its intended purpose. The contractor either assumes the risk, or not. If/when MoD retains part of that risk; a considerable portion of the whole point of involving industry becomes debatable.

A common risk for BMs that involve the outsourcing of support to equipment is the risk that, for whatever reason, the contractor's ability to support the fleet is reduced. This could be the consequence if the contractor has expanded too fast, beyond his ability to deliver, or if there is suddenly a full scale war that simultaneously increases the requirements from all the contractor's customers. From the point of view of a military unit out on operations, it does not matter why the support is not functioning. The consequences may be severe. If the contractor

is subsequently heavily financially penalised for not fulfilling his commitment does not matter from the point of view of a military operation.

CfAs are now likely to involve the contracting out of more DLoDs than equipment and support. There are risks associated with this development. It is unlikely that all consequences have been anticipated and managed in advance. Because of the interdependencies and interrelatedness of the DLoDs, these consequences are likely to manifest themselves over time, as more contracts are signed, and as more contractors commence delivering, e.g. Training, to the Armed Forces.

9.3 Transferability – What is Specific to the UK?

The research results presented in the previous sections are based on a multiple case study that was performed in the UK. Most of the research results are generic, while some are specific for the UK. The generic results are immediately applicable also for defence acquisition in Sweden and elsewhere. It is, however, equally clear that the country-specific results are not immediately transferable to domestic circumstances in Sweden or in other countries, at least not without some form of transformation in order to make them transferable. Hence, it is necessary to briefly discuss what might entail research results to be country-specific and subsequently to identify those results that must be considered to be country-specific.

In general, there are many factors, such as legal regulations, rules for taxation, different possibilities for financing, the size of the market, the degree of competition, etc., that differentiate nations from each other. Consequently, LL in one country cannot uncritically be transferred from that country to another country, without an investigation regarding to what extent and under which restrictions that is possible. To penetrate the general factors is well beyond the scope of this thesis. However, for the research results in this thesis, there are also specific factors to take into consideration when transferability of results is discussed, and some of these factors will be briefly touched upon in this section. Before the Swedish Armed Forces, FMV and/or any other organisation utilises any of the results presented in this thesis, it will be prudent, even essential, to thoroughly investigate all general and specific factors and their impact on the transferability of the results.

In this section, some of the issues; political, organisational and legal issues, and linguistic issues; that characterise UK defence acquisition and which may lead to country-specific research results, or the delusion of country-specific research results, are described. The selection of issues is restricted to a sample of those issues that have been unearthed during the reported research project. Although some of the research results may be considered to be country-specific, a majority of the

underlying problems are likely to be generic in character and consequently, even for any country-specific results, there may be many important lessons to be learned for other nations, even if these lessons may have to be adjusted to some extent.

9.3.1 Political Issues

VfM for the taxpayer is a central concept in the British government, and an important part of the political rhetoric since the days of NPM. It is, however, not a static concept. Quite to the contrary, it is dynamic and susceptible to new manifestations of the current political will. The definitions and applications of VfM have consequently varied over the past decades. VfM is seen from a national perspective, rather than from a defence sector perspective. Hence, in order to ensure VfM under the DIS, MoD is not obliged to acquire the most competitive and cost-effective system that is to be found on the international defence market, but should, when core competencies are concerned, select a system that is on offer from the UK-based defence industry, in order to maintain certain competencies within the national borders. This move away from competition is contrary to what PPP theory has to say about creating VfM, i.e. acquisition in a competitive environment and transfer of risk to the private sector.

British defence acquisition has undergone a tremendous transformation the past decade. The author goes as far as describing the development as resulting in a new paradigm for defence acquisition. There are two distinct features of the shift in paradigm, and they deal with the questions of “*What is acquired?*” and “*How is it acquired?*” The first of these questions deals with the transition towards Through Life Capability Management (TLCM), i.e. the ascension in the defence acquisition staircase. The second question is more concerned with how acquisition is being conducted in practice. The UK has gone from an approach that strictly tended towards the use of competition to select suppliers, to a more flexible approach, which also allows suppliers to be selected by other means than competition. Hence, in the new paradigm, the UK MoD has altered both *what* it acquires and *how* it acquires it. The MoD no longer acquires only equipment, and MoD no longer uses only competition to select suppliers.

In the UK, the defence acquisition process is an integral part of the capability development process. The acquisition of equipment and provision of support are two components of several DLoDs that are needed in order to create and maintain capability. Hence, in the UK, there is a holistic view on capability, which means that equipment and support cannot be considered in isolation from the other components of capability. Trade-offs are not only identified between procurement and support, but between all DLoDs.

VfM in the UK defence sector has undergone several severe steps of development since the Strategic Defence Review (SDR) in 1998. Prior to 1998, acquisition of equipment and provision of support were considered separately. Consequently, VfM was considered only for the acquisition of equipment. Starting in 1998, there was a shift towards Whole Life Costs (WLCs) and VfM was instead considered through trade-offs across acquisition of equipment *and* provision of support. With the introduction of TLM, VfM is being considered through trade-offs across acquisition of equipment, provision of support *and* other DLoDs.

Political issues could definitely lead to research results becoming country-specific. However, as far as this author can tell, none of the research results presented in Section 9.2 are country-specific for political reasons. However, it would probably be wise to thoroughly scrutinise those research results that include aspects of VfM prior to any actions based on those results. This reservation is due both to the importance of VfM in PPP theory, and the dynamic nature of VfM in the UK.

9.3.2 Organisational Issues

In the UK, the Armed Forces, all agencies, etc., are all part of MoD, which consequently is relatively large in terms of the total number of employees. All changes and development over the last couple of decades, including the organisational changes, must be seen in this light. Regarding defence acquisition, despite the fact that all organisational units were always part of MoD in the first place, there have been significant changes over the past decades. First the Procurement Executive was created in 1971. Then, the DPA and the DLO were created in 1999. Most recently, DE&S was created in 2007. The last reorganisation has concentrated the responsibility for acquisition of equipment and provision of support to one agency within MoD. These organisational changes were deemed necessary, initiated, and subsequently implemented, despite the fact that all changes were within the overall organisation of the UK MoD.

While organisational issues could lead to country-specific research results, it is the opinion of the author that none of the particular research results presented in Section 9.2 are country-specific, at least not for organisational reasons.

9.3.3 Legal Issues

In all likelihood, there are several aspects of the research results that are associated with general and specific British legislation, one way or the other. However, as far as is known to the author, changes in legislation have only been a prerequisite of the introduction of the SRs. Consequently, the research results that are associated with the SRs may be country-specific because of the particular British law that regulates their existence.

9.3.4 Linguistic Issues

Compared to most other countries, the UK has a significant head start in the reformation of defence acquisition and military logistics. A prerogative in that situation is the privilege of selecting terminology for innovations. In the reported research, the terms PG, CLS, CfA and CfC stand out as specific UK terminology. The question is if they represent country-specific new names for domestic inventions, or if they are different names for widespread, well-known phenomena.

It has been suggested that CfAs and CfCs are a UK form of PBCs. If not synonyms, it is probably safe to say that they are so closely related so that any research results pertaining to CfAs should not be considered to be country-specific. Similarly, CLS can be regarded as a military version of TPL. At first glance, the PG appears to be nothing more than a UK military name for a traditional logistics Consolidation Point (CP). However, the PG and the Coupling Bridge (CB) are integral parts of the JSC. The whole point of the JSC concept, including the PG and the CB, is to keep private sector contractors out of the military supply chain in order to avoid, e.g., fragmentation, i.e. multiple actors, with varying roles and responsibilities at different nodes in the military supply chain. Even if it is realised that the PG is not *“only”* a CP, but a part of a larger concept, where civilian contractors, including TPL providers, are not allowed, there is no reason to regard the research results regarding the PG (or the CB, or the JSC) as country-specific.

9.4 Implications for Swedish Defence Acquisition

In this section, the implications that some of the more prominent research results that were presented in Section 9.2 might have for Swedish defence acquisition are discussed. As demonstrated in Section 9.3, most of these results are immediately applicable also for Swedish circumstances. Only one aspect of the results, i.e. the SRs, was established to be country-specific. In addition, caution is probably advisable for the results that relate to VfM and the CfAs. However, these results can have implications for Swedish defence acquisition all the same. Even if the solutions are country-specific, the underlying problems may be quite generic. Consequently, it is probably of great interest to study the problems behind the solutions, and compare the underlying problems with any similar problems that the Swedish defence might be experiencing, even if the British solutions are not implemented in Sweden.

That the complexity of defence acquisition has been increased over the last couple of years is hardly surprising to FMV and the Swedish Armed Forces. However, as demonstrated by the UK experience, it is possible to go astray. Since FMV and the Swedish Armed Forces is undergoing a dramatic reorganisation regarding their

mutual sharing of responsibilities in the areas of defence acquisition and military logistics, they have a golden opportunity to benefit from the research results presented in this thesis. Consequently, contrary to many of the previous chapters and sections, the structure provided by the RQs, constructs, propositions and the proposed PPBM is *not* followed in this section. Instead, a thematic approach has been selected, in order to convey the implications as easily accessible as possible.

9.4.1 The Generic Public Private Business Model

In the reported research, the PPBM building blocks have been instrumental in discovering misalignments between building blocks in different PPBM configurations. It is clear that the PPBM provides a holistic view, through which strengths, weaknesses and risks can be identified. In addition, the PPBM provides a framework through which interconnectedness between building blocks, which might lead to misalignments, can be studied, in order to predict which consequences changes in one building block may have in another building block. The PPBM is also useful for studying the connection between formulated strategy and implemented strategy, i.e. the alignment between strategy, BMs and contractual agreements.

9.4.2 Public Private Participation

In the area of Public Private Participation (see Section 4.3), including PPC, PPPs, PFIs, contracting out, outsourcing, etc., the confusion regarding definitions of concepts and differences between concepts is monumental. Nevertheless, the presented research results have several implications for Sweden.

The Swedish Armed Forces and FMV use the construct of PPC as an umbrella term to distinguish between three different categories of Public Private Participation, “*Contracting out of services*”, “*Alternative financing solutions*” and “*Partnership solutions*”. The PPC has also been used in the PPBM. It is therefore interesting to note that the research results demonstrate that in the UK, PFI solutions and leasing arrangements, i.e. “*Alternative financing solutions*”, are no longer encouraged for defence acquisition by HMT, not when ownership is transferred to the public sector. The reason is that PFIs and LTB arrangements are not considered to be VfM, since it would be cheaper to buy the equipment at the outset of the acquisition project, rather than to have the public sector borrow money from the private sector. In Sweden, no such restrictions have yet been imposed, or even suggested. It ought to be high on the agenda for the Swedish Armed Forces and FMV to further investigate why HMT no longer endorse “*Alternative financing solutions*” and which, if any, implications this should have for Sweden. To this author it seems reasonable to assume that if “*Alternative financing*

solutions” are not considered to be VfM in the UK, the same should be applicable also for Swedish circumstances. Consequently, perhaps the Swedish position *vis-à-vis* “*Alternative financing solutions*” ought to be re-evaluated and reconsidered.

The research demonstrates that in practise, it is difficult to differentiate between different forms of Public Private Participation. This may indicate that in practise, there is not enough difference between these different forms of interaction between the public and the private sector in order to distinguish between them, or that they have not been defined exhaustively enough in Public Private Participation theory. Consequently, the Swedish Armed Forces and FMV ought to further develop the definitions and revise the PPC strategy in order to make the different forms of Public Private Participation unambiguous.

Risk transfer is essential in PPP theory. However, the research results demonstrate that risk transfer is not always a part of outsourcing and CfAs in the UK. Furthermore, the research results demonstrate that the UK MoD will sometimes retain parts of the risk, making it debatable whether or not risk is transferred at all, even if that is stated in the contract and the contractor is paid to take over some risk. In addition, it can be argued that the Armed Forces can never transfer operational risk anyway. Regardless of which, based on the British experience, the Swedish Armed Forces ought to thoroughly investigate the issues of risk transfer in the context of military supply and support chains, in order to determine whether or not risk is to be transferred at all, and if so, how and how much. Furthermore, FMV ought to thoroughly investigate the issues of risk transfer in defence acquisition in order to determine if risk transfer should always be a part of Public Private Participation in Sweden.

In the UK, in some contracts, there appears to be an ambiguity with what the costs of the contractor should be compared. It is not always clear if these costs should be compared to the past, present or future cost for DE&S, if the responsibility had been retained within the UK MoD. This is equally true for the other aspects of the rhetorical “*faster, cheaper, better*”. If it is enough for the contractor to be just faster, cheaper and better than what the UK MoD was at the time of the negotiations with the contractor, or could be at another point in time, or if the contractor should reach a specified target, appears to be an unresolved issue in some contracts. Consequently, there appears to be a potential “*comparison problem*” in some contracts. Also in this regard the Swedish defence sector has an opportunity to learn from the problems experienced in the UK. In order to avoid the “*comparison problem*”, for each individual contract with a contractor, the Swedish Armed Forces and FMV ought to define KPIs; define when, where and how these KPIs should be measured; and define with what these measurements should be compared. By thoroughly investigating these issues, making the necessary definitions and

establishing the essential routines, Sweden is likely to be able to avoid some of the treacherous pitfalls that the UK, at least in some contracts, has stumbled into.

In the UK, prime contractors are no longer always selected through competition. This is one of the consequences of the DIS, which, as one of its objectives, seeks to protect domestic defence industry. According to PPP theory, competition is one of the two most important determinants of VfM (the other one being risk transfer). Consequently, the research results have revealed that the UK development is working against PPP theory. If Sweden were to take steps similar to the British development, this should be done with awareness of the fact that this goes against theory. Even if there is nothing to suggest that Sweden will be taking such steps in the near future, the Swedish Armed Forces and FMV ought to take precautions, and thoroughly investigate why the UK has seen fit to diverge from what is recommended in common PPP theory.

9.4.3 Performance Based Contracts

PBCs are attracting more and more attention in the defence sector. The research has illustrated that in UK defence acquisition, it is becoming common with CfAs, which is a form of PBC. Even though Sweden does not share the exact terminology with the UK, Sweden is nonetheless developing along the same lines as the UK in this respect, i.e. the ascension of the steps of the defence acquisition staircase, even though this concept does not formally exist in Sweden, and is on the verge of entering into more CfAs than the single contract that has been signed so far. Consequently, Sweden would be well advised to examine the British experience.

The research results have revealed that the UK has a potential “*definition problem*” when it comes to how the “A”, for availability, in CfA should be interpreted. Availability can stand for three different things in the UK; operational availability, available flying hours *per annum* and availability of spares on the contractor’s shelves. It is problematic that the interpretation of the most central term in CfAs is so elusive and full of nuances. If availability cannot have one, general interpretation, the Swedish Armed Forces and FMV must explicitly specify how availability, or other forms of performance, is defined for each particular CfA, or PBC, in order to avoid any unnecessary problems with interpretations. Furthermore, the Swedish Armed Forces and FMV must define when, where and how availability (performance) should be delivered.

There is also another aspect of this “*definition problem*”. There may be a line to be drawn somewhere regarding the degree of complexity that should be outsourced. Judging by the research results, there appears to be a lower limit of complexity, below which outsourcing should not occur, at least not if VfM is to be ensured. The Swedish Armed Forces and FMV do not have to establish if such a limit

should exist in Sweden and, if so, how that limit should be defined. Such a limit would be a natural consequence if the Swedish Armed Forces and FMV were to employ a formal Public Sector Comparator (PSC) for each potential contract, and if The Swedish Armed Forces and FMV were able to establish adequate base lines for the costs of performing services in-house, relevant approximations of the internal transaction costs for monitoring contracts, and correct estimates of what a private sector solution would cost, so that the PSC could be fuelled with appropriate input for the comparison between a public sector solution and a private sector alternative.

The UK has come much further than Sweden in the degree of complexity of defence acquisition projects. One aspect of the increased complexity is that the UK has gone from the traditional acquisition of equipment, by way of the simultaneous acquisition of equipment *and* provision of support, to CfA, which potentially involves several DLoDs, e.g. training. Sweden is just about to adjust to the simultaneous acquisition of equipment *and* provision of support, where trade-offs has to be sought between equipment and support. Sweden would be well advised to take advantage of the UK experience of this step in the evolution of defence acquisition. More importantly, Sweden should prepare for the next step in the development process, i.e. the simultaneous acquisition of several DLoDs, i.e. components of capability, by investigating how this has been done in the UK, and which implications this may have for Swedish defence acquisition. This step will involve the seeking of trade-offs between different DLoDs. This step is probably complex enough as it is, but the Swedish organisation, tradition and separation of responsibilities when it comes to defence acquisition will probably make this step even more complex than what it has been in the UK, where, e.g., a potential performance “*measurement problem*” is associated with this increased complexity. With the Swedish organisation, tradition and separation of responsibilities, it seems likely that FMV in the relatively near future will be given the responsibility to acquire more DLoDs than “*merely*” equipment and logistics. How the Armed Forces HQ is going to direct and guide this “*capability acquisition*” is far from clear to this author. The potential performance “*measurement problem*” consists of the problem to measure the contribution of different DLoDs to capability. The research results have demonstrated that in the UK, with the introduction of more and more DLoDs in the contracts, e.g. Personnel and Training, it will become increasingly difficult to evaluate performance, particularly to separate and measure contributions to performance by efforts in different DLoDs, because of, e.g., varying lead times for when the effect can be observed and the interrelatedness and interdependency among the different DLoDs. As Swedish defence acquisition projects reach similar degrees of complexity, similar problems are likely to occur. In addition, in Sweden, the Swedish Armed Forces and FMV are separate authorities, with different roles and responsibilities. In the future, FMV is likely to include

more and more DLoDs in the contracts. However, FMV will only have direct influence over equipment, support to equipment and some additional aspects of logistics, whereas the Swedish Armed Forces will retain responsibility for the remaining DLoDs, i.e. Training, Personnel, Infrastructure, Concepts and Doctrine, Organisation and Information, which is why the Swedish Armed Forces and FMV ought to, jointly, start preparing *now* for these future complex defence acquisition projects, instead of waiting until they occur.

Sweden is following suit, and copying the British development up the stairs of the defence acquisition staircase. In doing so, Sweden has a golden opportunity to rectify one of the omissions in the British development. The increased complexity in “*Value Propositions*”, from traditional procurement of equipment to CfA, which includes acquisition of equipment and support, and other DLoDs, has not resulted in a reciprocal development of the “*Cost Structure*” in the UK. It seems likely that the ascension up the defence acquisition staircase must involve moving towards PBC. Consequently, Sweden has the opportunity to take a shortcut in the development by not remaining in the relatively safe confinement of the more traditional “*Cost Structures*”, i.e. Fixed-Price Contracts and Cost-Plus Contracts, but go for PBC instead. The Swedish Armed Forces and FMV ought to thoroughly analyse which traditional price agreements that best support the intentions of the increased complexity that a CfA suggests, i.e. to identify which forms of traditional contracts that are most likely to incentivise the contractor in accordance with the intentions of the Swedish Armed Forces and FMV.

9.4.4 A Supply Chain without Fragmentation

Through the introduction of the PG, i.e. the British CP, the CB and the creation of the JSC, the UK has eradicated the problem with theft, the problem with fragmentation and the problem with operational planning. The problem of fragmentation of the supply chain is something that the Swedish Armed Forces and FMV have also identified as a particularly troublesome undesirable effect of accepting private sector contractors in the field. If Sweden is ever to introduce a CP similar to the PG and a JSC resembling the UK JSC, Sweden would be well advised to thoroughly investigate the British experience. These results include the observation that while the PG has provided solutions to the problems it was supposed to deal with; it has simultaneously introduced new problems, which have yet to be addressed in the UK.

The research results have demonstrated that because of the PG in the JSC, private ownership of equipment and risk transfer have been seriously affected in the UK. In cases where the private sector owns a piece of equipment, risk taking cannot be assumed by the contractor, since the contractor has no influence over the equipment beyond the CP, i.e. the PG. More generally, in practise there cannot be

any transfer of risk beyond the PG. If the Swedish Armed Forces and FMV were to contemplate a solution similar to the JSC, it would be prudent to investigate the negative consequences that this has brought about in the UK. The Swedish Armed Forces and FMV must be well aware that a JSC will negatively affect private sector ownership if the private sector is obliged to use a strictly military supply chain. The private sector cannot be expected to maintain responsibility for risk taking in a strictly military supply chain. Furthermore, there cannot be any risk transfer beyond a construct such as the PG. In this case, the research results do not provide any guidance regarding how to deal with these problems. However, the research results have indicated that the solutions tested in the UK have come with negative consequences. The Swedish Armed Forces and FMV should be aware that according to PPP theory, risk transfer is important in order to achieve VfM. Hence, a construct that limits risk transfer is also likely to put restrictions on to what extent it will be possible to achieve VfM, which is one of the major driving forces to involve contractors in the first place. There is a potential misalignment in the combination of the JSC and private sector ownership of equipment, since it is far from clear how private ownership of equipment should be handled in the JSC. It is also a potential misalignment between the JSC and the overall expectation that PPPs will involve a great deal of risk transfer to the private sector.

9.4.5 A Support Chain without Fragmentation

Through the introduction of the SRs, the UK has eradicated the problem with fragmentation of the support chain. The problem of fragmentation of the support chain is something that the Swedish Armed Forces and FMV have also identified as an effect of accepting private sector contractors in the field. If Sweden is ever to introduce a concept such as the SRs, the Swedish Armed Forces and FMV should investigate the British initiative. However, for this particular initiative, the research results are country-specific, since a prerequisite of the SRs was a change in UK legislation. Consequently, if Sweden should desire to take advantage of the UK experience regarding SRs, it would be necessary to also analyse the associated legislation, in order to establish whether or not similar actions would have to be taken also in Sweden in order to realise a concept such as SRs.

9.5 Practical Implications for Future Research

In the preparations that were made in the early phases of the reported licentiate research project, an interview study was conducted within FMV in order to, e.g., increase research relevance. The interview study resulted in the identification of several problem areas, in which it would be relevant, from the point of view of practise, to conduct research. The reported research has focused on one of these

areas, BM issues. Hence, the following areas are recommended for future research: Sourcing issues; Business Model issues; Internal issues; Moral and ethical issues; Supply chain issues; and Support chain issues. In Section 2.6, several relevant Research Questions (RQs) have been identified for each of these areas.

9.6 Outstanding Issues

During the reported research project, a number of ideas, issues, questions and speculations have arisen regarding, e.g., certain aspects of the differences between the British and the Swedish defence sectors in general, and differences between British and Swedish defence acquisition in particular. Some of these aspects have been directly addressed in the thesis, while others have no obvious place to be presented. With an enduring conviction that it would be an unwarranted waste not to include them at all, a select fraction of the rest of the author's ideas, issues, questions and speculations are collected and presented in this section.

The illusive concept of Value-for-Money

The implications for Sweden of the development of the concept of VfM in the UK are numerous. Should Sweden use the concept of VfM at all? If so, how should it be defined? Should Sweden use VfM in the context of the price of equipment, the Life Cycle Cost (LCC) of equipment and support, or VfM for capability, across all DLoDs, from the cradle to the grave? Should Sweden use VfM in the defence sector, or should VfM be viewed in the context of the entire society's economy? Should VfM be viewed in the context of defence policy, security policy, regional policy, industry policy, or another area of policy? These questions are not questions that are owned by the Armed Forces, FMV, or even by the Swedish MoD. They are, however, questions that need to be answered by the Swedish government prior to the Armed Forces and FMV be engaged in defence acquisition based on the concept of VfM. It is probably necessary for the Swedish Parliament to pass a few more bills in order to direct the development of defence acquisition in Sweden.

A shift in defence acquisition paradigm

In this thesis it is argued that UK defence acquisition has undergone a shift in paradigm in which the UK MoD has altered both *what* it acquires and *how* it acquires it. The MoD no longer acquires only equipment and support, and MoD no longer uses only competition to select suppliers of equipment and support. In this development, MoD has moved from traditional procurement and support, where procurement of equipment and provision of support were approached separately, through Whole Life Cost (WLC), where the approach was to analyse trade-offs across procurement and support, to TLCM, where the approach is to analyse trade-offs across procurement, support and other DLoDs. To emphasise

the transformation, the UK MoD has changed the name from “*Defence Procurement*” to “*Defence Acquisition*”. With the Budget Bill for 2012, the Swedish government opens the door for taking preliminary steps towards a WLC approach to defence acquisition. The next step for the Swedish MoD must be to address the question whether or not Sweden will limit itself to a WLC approach to defence acquisition, take steps towards a TLM approach to defence acquisition, or if Sweden should invent a new step, which is unique due to the perception that the Swedish circumstances are exceptional. With the Budget Bill for 2012, the Swedish government is also announcing its intention of taking steps towards allowing equipment acquisition (i.e. FMV) to assimilate rear defence logistics (i.e. parts of FMLOG and the Swedish Armed Forces), not merging acquisition of equipment (FMV) with provision of support (FMLOG), like the UK has done, in order to create a new organisation. It must be thoroughly analysed which implications this deviation from the British development has for the potential Swedish utilisation of British concepts such as WLC, TLM, PG, JSC, CfA and CfC.

A shift from alternative financing solutions towards partnership solutions

The Swedish Armed Forces Strategy for PPC divides PPCs into three different categories: “*Contracting out of services*” (Facility Management, Contracting Out, and Outsourcing); “*Alternative financing solutions*” (Leasing and PFIs); and “*Partnership solutions*” (Strategic Partnerships and Alliances). The UK is now moving away from “*Alternative financing solutions*” such as leasing and PFIs, and moving more and more into strategic partnerships with the defence industry. It is reasonable to assume that the British development could have implications also for the Swedish Armed Forces PPC Strategy. Hence, it is recommended that the Swedish Armed Forces and FM closely follow the development in the UK, and analyse why the UK is moving away from “*Alternative financing solutions*”, analyse why the UK is moving more into “*Partnership solutions*”, and analyse what, if any, implications this has for Sweden.

The British defence acquisition staircase

In the UK, DE&S distinguishes between different types of contracts with the use of the defence acquisition staircase, which means that a contract is traditional, CLS, CfA, or CfC. It is recommended that Sweden defines a mechanism for categorising different types of contracts, which means that the Armed Forces and FMV must decide if Sweden should adapt and adopt the UK MoD defence acquisition staircase and the contents of the staircase, i.e. CLS, CfA and CfA, or if Sweden should invent another way of describing the envisioned development.

10 Conclusions and Contributions

“There is a tendency to associate analysis with credibility – particularly if the magic word “computer” is mentioned. The real threat lies not so much in deliberate deceit as it does in subconscious desires to substantiate one’s previously committed position”.

Quade (1964)

10.1 Introduction

The research purpose: to *“study, analyse, and evaluate BMs regarding how they can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept”*, was used to formulate three Research Questions (RQs):

- Research Question 1: How can a generic Business Model for a non-profit, governmental, Defence Procurement Agency be described?
- Research Question 2: Which strengths and weaknesses do different Business Models have in the context of defence acquisition?
- Research Question 3: Which risks are associated with different Business Models in the context of defence acquisition?

In this chapter, the RQs are used in Section 10.2 to structure the summary of the conclusions of the research. In Sections 10.3 and 10.4, the contributions to theory and practise are summarised.

10.2 Conclusions

10.2.1 A Generic Public Private Business Model

The reported research has demonstrated that a generic Public Private Business Model (PPBM) can be created (see Section 8.2) and successfully used (see Sections 8.3 and 9.2) in the area of defence acquisition. More specifically, the research has demonstrated that a PPBM for a non-profit, governmental, Defence Procurement Agency (DPA) can be described by using the *“Business Model Canvas”* (Osterwalder and Pigneur, 2010) construct and its nine building blocks as a point of departure and adapting the contents of the building blocks to the context. The research has demonstrated that by describing the building blocks with constructs from defence acquisition theory (Sols *et al*, 2007), Public Private Participation (see Section 4.3)

theory (Grimsey and Lewis, 2004, p 129), military logistics theory, defence acquisition practise (The UK MoD, 2011d) and Public Private Participation practice (The Swedish Armed Forces, 2006b, p 4), a generic PPBM for defence acquisition can be created (see Table 8.1). The research has demonstrated that the PPBM can be used in practise, to describe and evaluate the underlying BMs of past and present defence acquisition projects (see Section 8.3), even though they were not designed based on a BM construct. The conclusion is that the PPBM would be well suited also for designing the BMs of future defence acquisition projects. To conclude, in the reported research, a significant initial step towards answering RQ 1 has been taken. However, the PPBM would have to be further tested and subsequently also further refined, in several iterations, before it can be stated that RQ 1 has been given its ultimate answer.

10.2.2 Business Model Strengths and Weaknesses

In the reported research, a first step towards answering RQ 2 has been taken. The research results are presented in detail in Sections 9.2.2 and 9.2.3. In the reported research, a PPBM is a specific configuration of the contents in the different building blocks. The PPBM has demonstrated that it can be a powerful instrument in order to identify BM strengths and weaknesses, especially regarding the interconnectedness of the different building blocks.

The PPBM has demonstrated its usefulness for identifying how the implementation of a solution to problems in one building block can lead to new problems in other building blocks. Of particular interest in this respect is the implementation of the Joint Supply Chain (JSC) concept in order to remedy problems with theft, fragmentation (i.e. multiple actors, with varying roles and responsibilities at different nodes in the military supply chain) and operational planning at the operational level. The JSC includes a logistics Consolidation Point (CP), called the Purple Gate (PG) and a Coupling Bridge (CB); and contractors are not allowed into the JSC, i.e. not beyond the PG. The PPBM was instrumental in the discovery that the JSC concept, which was implemented in order to remedy three problems at the operational level in the military supply chain, while successfully addressing these problems, simultaneously created problems at the strategic level in other areas concerning, e.g., private sector ownership and risk transfer to the private sector (see Section 9.2.3).

The above is an example of a potential misalignment in that particular PPBM, i.e. that specific configuration of building blocks. Based on the multiple-case study, the PPBM has unveiled no less than three potential misalignments (see Section 9.2.3). In addition to the potential misalignment between the JSC and private sector ownership and risk transfer to the private sector, the research has also discovered potential misalignments between Performance Based Contracts (PBCs), such as

Contracts for Availability (CfAs), and traditional price agreements, i.e. Fixed-Price Contracts and Cost-Plus Contracts; and between the JSC and CfAs. The common denominator for these prospective mismatches between PPBM building blocks is that the implementation of an innovation in one building block, intending to, e.g., solve problems at the operational level (e.g. the JSC) or implement ideas from the strategic level (e.g. CfAs), has created unforeseen problems in other building blocks, at other levels. Hence, the PPBM has demonstrated its usefulness for discovering misalignments in defence acquisition projects *after* the fact. More importantly, the PPBM has also indicated its potential usefulness for investigating consequences, positive and negative, in other building blocks *before* implementing innovations in defence acquisition projects, thus potentially allowing reinforcement of positive consequences, and elimination of negative consequences.

10.2.3 Business Model Risks

A first step towards answering RQ 3 has also been taken in the reported research. The PPBM demonstrated its usefulness as a vehicle to identify risks that are to be associated with particular PPBMs, i.e. specific configurations of the contents in the different building blocks. In the previous section, the potential misalignment between the JSC and CfAs was referred to. In addition to the potential misalignment, there is also a risk associated with PPBMs that include the combination of the JSC and a CfA. The research suggests that there is a risk that the JSC will render the CfA meaningless for overseas operations, since one of the consequences of the JSC is that it will not be possible for a contractor to deliver availability to overseas operations. Hence, similarly to what has been described in the previous section, the PPBM has demonstrated its ability to serve as a tool for identifying risks *after* the fact, and indicated its potential usefulness for identifying risks *before* the implementation of new BMs.

10.3 Contributions to Theory

The contributions to theory have been described in Sections 8.2, 8.3, 8.4, 8.5 and 8.6. In this section, the contributions to BM and Public Private Participation theory are summarised.

10.3.1 Contributions to Business Model Theory

The primary theoretical contribution of the reported research is in the area of Business Model (BM) theory. As far as is known to the author, the reported research is the first time that BM theory, i.e. the “*Business Model Canvas*” (Osterwalder and Pigneur, 2010) has been used in the public sector in order to

describe how business is being conducted in the defence sector. The reported research has demonstrated that BM theory from the private sector is applicable also in defence acquisition. Consequently, the reported research has demonstrated that BM theory can expand into this area of non-profit governmental organisations. Based on Osterwalder (2004, p 14), less the part of a company's logic of earning money, the author has defined the following working definition of a BM for a non-profit, governmental organisation:

"A Business Model for a non-profit, governmental organisation is a conceptual tool that contains a set of elements and their relationships. It is a description of the value the organisation offers to one or several segments of customers and the architecture of the organisation and its network of partners for creating and delivering this value and relationship capital".

In the reported research, a generic Public Private Business Model (PPBM) for defence acquisition has been created and tested to describe and evaluate past and present defence acquisition projects. The PPBM contributes to BM theory building by providing a framework that can be used for research in the area of defence acquisition. The research has demonstrated that the *"Business Model Canvas"* can be used to create a PPBM. The research has also shown that the building blocks (Osterwalder and Pigneur, 2010, pp. 16-17) can be adapted and used to exhaustively describe all pertinent aspects of defence acquisition projects. An accurate description is made possible by the numerous permutations that the building blocks enable through different configurations of the contents in the building blocks. BM theory building in the area of defence acquisition has been commenced by the contribution of generic strengths, weaknesses and risks associated with certain BM configurations. These results include the observation that a particular form of Public Private Cooperation (PPC), i.e. *"Alternative financing solutions"*, does not lead to Value-for-Money (VfM) for defence acquisition projects where ownership is transferred to the public sector.

10.3.2 Contributions to Public Private Participation Theory

The secondary theoretical contribution of the reported research is in the area of Public Private Participation (see Section 4.3) theory. In the reported research, the spectrum of Public Private Cooperation (PPC) was successfully used to differentiate between defence acquisition projects. PPC is an umbrella term which encompasses *"Contracting out of services"*, *"Alternative financing solutions"* and *"Partnership solutions"* services, supplies or facilities. In the research, the activities used for bundling were also utilised in order to distinguish between different defence acquisition projects, by describing how the public and private sectors assumes responsibility for certain activities. As far as is known to the author, this was the first time that this terminology was applied in the defence sector. As shown

in this thesis, this construct from Public Private Partnership (PPP) theory is useful to distinguish between defence acquisition projects by describing how the public and private sectors assume responsibility for different activities. The research has unveiled that British defence acquisition practise is working against PPP theory in that competition and risk transfer, which are supposedly necessary in order to enable VfM, would no longer seem to be the focus in the UK, since the DIS allows selection of contractors by other means than competition, and since the PG makes risk transfer in the overseas supply chain dubious at best.

10.4 Contributions to Practise

The implications for defence acquisition practise in general have been presented in Section 9.2 and the implications for Swedish defence acquisition practise have been presented in Section 9.4. In this section, these results are summarised.

10.4.1 Contributions to Defence Acquisition Practise in General

The major contribution to defence acquisition practise in general is that the research has demonstrated that the concept of BMs is applicable in the public sector and that it is applicable for defence acquisition. One aspect of the proposed PPBM is the concept of bundling, which is how theorists and practitioners in some areas outside of the defence sector, e.g. in the infrastructure construction industry, successfully categorise different PPPs. By using the same terminology as other sectors, the performance of defence acquisition projects could be compared to similar projects in other areas, which could be beneficial from the point of view of society as a whole. First and foremost, however, the performance of different defence acquisition projects could more easily be compared to each other if the suggested terminology, and the PPBM, were to be used in order to differentiate between defence acquisition projects.

The UK was an early adopter of Contractor Support to Operations (CSO), in the forms of Contractors on Deployed Operations (CONDOs) and Contractor Logistics Support (CLS). For overseas operations, one of the more negative consequences of CSO was the fragmentation of the supply and support chains. In order to address problems with theft, fragmentation of the supply chain and operational planning, the UK MoD introduced the Purple Gate (PG), which is a Consolidation Point (CP), and created the Joint Supply Chain (JSC), which eliminated or mitigated these problems. In order to address the fragmentation of the support chain, the Defence Industrial Strategy (DIS) introduced Sponsored Reserves (SRs), which eliminated the problems created by the CONDOs. CLS, i.e. Third Party Logistics (TPL), also had negative consequences for domestic training

and exercises, and “*White-Van-Man*” (see Section 6.4.3) deliveries were frequently turned away. In order to address this problem, the DIS introduced the novelty of co-location of contractor and MoD support resources, which eliminated this negative aspect of CLS. After CLS, the UK has ventured higher up on the acquisition staircase, and started implementing Contracts-for-Availability (CfA), a form of Performance Based Contracts (PBC), which are supposed to incentivise industry to enhance system reliability and availability. With the use of the PPBM, the research has demonstrated that several of these solutions to emerging problems have created new problems elsewhere. Another important contribution to defence acquisition practise in general is that the research has identified several potential misalignments, between PPBM building blocks, and between PPBM implementations, i.e. building block configurations, and overall strategies.

Among other new developments, the DIS relaxed the requirement for competition in defence acquisition, and opened up for other forms of selection of prime contractors. According to PPP theory, competition and risk transfer are the two most important prerequisites of Value-for-Money (VfM). Hence, there is a misalignment between current UK defence acquisition practise and PPP theory. CfAs are supposed to incentivise industry to enhance system availability. However, they are not accompanied by contracts based on performance agreements, i.e. PBC. Instead, they are still based on traditional pricing agreements. Consequently, there is a potential misalignment between the ambitions behind CfAs at the strategic level, and the practical implementation of these ideas into defence acquisition contracts at the operational level.

The existence of the PG in the JSC prohibits the contractor to deliver availability to the Joint Operations Area (JOA). Consequently, the PG makes it impossible to fulfil this aspiration of the CfA. Furthermore, because of the PG, a contractor cannot be expected to reduce delivery times to operations. This restriction is not compatible with the overall goal to reduce delivery times. In essence, problems in the military supply chain at the tactical and operational levels appears to have been solved at the expense of the implementation of ideas from the strategic level regarding effective and efficient defence acquisition. Hence, for overseas operations there is a potential misalignment between the limitations of the PG and the ambitions of the CfA. The PG in the JSC leads to another potential misalignment. In cases where the private sector owns a piece of equipment, despite the fact that ownership remains with the private sector even after passing the PG, risk taking cannot be assumed by the contractor, since the contractor has no influence over the equipment after that node in the chain. Consequently, the implication of the introduction of the PG into the JSC is that, whatever the formal contract states, in practise there cannot be any transfer of risk beyond the PG. In PPP theory, the transfer of risk is one of the two most important determinants of VfM. There is a

potential misalignment in the combination of the PG and private sector ownership of equipment, since it is far from clear how private ownership of equipment should be handled in the JSC. It is also a potential misalignment with the overall expectation that PPPs will involve a great deal of risk transfer to the private sector.

The research has revealed three potential generic problems in the area of defence acquisition: a potential “*definition problem*” regarding what it is that should be measured; a potential “*measurement problem*” regarding how to measure; and a potential “*comparison problem*” regarding with what to compare measurements. The potential “*definition problem*” (i.e. *what* to measure) is twofold. It is not clear if it is the acquisition of equipment, the provision of support, or the combination of the two, which is supposed to be “*faster, cheaper, better*”, when responsibility is outsourced to a contractor. In addition, the notion of CfA is not crystal clear. For equipment and support, availability refers to system readiness in theatre, i.e. operational availability. For very large strategic airlift resources availability refers to the number of flying hours per time unit, e.g. month or year, which does not say anything about the availability calculated as a probability at a certain point in time. For spares, availability can refer to the existence of spares on the contractor’s shelves when the spares are required, regardless of the fact that there will be a substantial delay before the spares reach, e.g., the theatre. The research suggests that performance must be explicitly specified for any PBC in order to avoid any unnecessary problems with interpretations.

The potential “*measurement problem*” (i.e. *how* to measure) arises as a consequence of the fact that it is not clear when, where and how availability should be measured; and that it is not clear how changes in speed of delivery, cost of delivery and quality of delivery should be measured. Because of the PG and the JSC, it is not clear when, where and how system readiness (operational availability) should be delivered for overseas operations by the contractor. The existence of the PG in the JSC prohibits the contractor to deliver availability to the JOA. Furthermore, there is an increased complexity in defence acquisition, where more and more elements of capability are being outsourced, which means that a CfA can comprise several DLoDs. Consequently, it becomes increasingly difficult to measure the performance of the delivery. The potential “*comparison problem*” (i.e. *with what* to compare) is constituted by the ambiguousness regarding with what to compare the measurements. It is not clear if the measurements of availability, speed, cost and quality should be compared to the past, present or future (enhanced) ability of DE&S. If it is enough for the contractor to be just faster, cheaper and better than what MoD was at the time of the negotiations with the contractor, or could be at another point in time, or if the contractor should reach a specified target, appears to be an unresolved issue in some contracts. Consequently, there appears to be a potential “*comparison problem*” in some contracts.

10.4.2 Contributions to Swedish Defence Acquisition Practise

In addition to the above, the major contribution to Swedish defence acquisition practise is the opportunity to learn from the UK experience. Sweden has the opportunity to learn from the lessons identified in the UK, and to avoid repeating the same mistakes. The research has also provided an opportunity to test part of the Swedish PPC strategy in practise. The research has revealed several potential misalignments between PPBM building blocks and between PPBM configurations and overall strategy. Furthermore, the research has identified a potential “*definition problem*” regarding what it is that should be measured; a potential “*measurement problem*” regarding how to measure; and a potential “*comparison problem*” regarding with what to compare measurements. Because of the research results, Sweden now has the opportunity to avoid implementing BMs with internal and/or external misalignments, and to avoid the potential problems with definitions, measurement and comparison. The Swedish Armed Forces and FMV must explicitly specify how availability, or other forms of performance, is defined for each particular CfA, or PBC, in order to avoid any unnecessary problems with interpretations. Furthermore, the Swedish Armed Forces and FMV must define when, where and how availability (performance) should be delivered, measured, and with what the measurements should be compared.

The Swedish Armed Forces and FMV use the construct of PPC as an umbrella term to distinguish between three different categories of Public Private Participation, “*Contracting out of services*”, “*Alternative financing solutions*” and “*Partnership solutions*”. From a Swedish perspective, one of the more interesting revelations of the research is the observation that the UK is moving away from “*Alternative financing solutions*”, since they are not considered to be VfM, and towards “*Partnership solutions*”, which, together with CfAs, are supposed to incentivise industry to enhance system reliability and availability. The reasons for this development, and the potential implications for Swedish defence acquisition, must be further researched. In addition to the question regarding the status of private finance in defence acquisition, the research has revealed that it may be necessary to re-evaluate the Swedish PPC strategy regarding its definitions of, e.g., “*Partnership solutions*”, since it proved difficult to distinguish between project alliances and strategic partnerships in practise.

It can be argued that the Armed Forces can never transfer operational risk. Regardless of which, based on the British experience, the Swedish Armed Forces ought to thoroughly investigate the issues of risk transfer in the context of military supply and support chains, in order to determine whether or not risk is to be transferred at all, and if so, how much. Furthermore, FMV ought to thoroughly investigate the issues of risk transfer in defence acquisition in order to determine if risk transfer should always be a part of Public Private Participation in Sweden.

The UK has come much further than Sweden in the degree of complexity of defence acquisition projects. The UK has gone from the traditional acquisition of equipment, by way of the simultaneous acquisition of equipment *and* provision of support, to CfA, which potentially involves several DLoDs. Sweden is just about to adjust to the simultaneous acquisition of equipment *and* provision of support. Sweden would be well advised to take advantage of the UK experience of this step in the evolution of defence acquisition. Sweden should also prepare for the next step in the development process, i.e. the simultaneous acquisition of several DLoDs, by further investigating how this has been done in the UK, and which implications this may have for Swedish defence acquisition. This step is probably complex enough as it is, but the Swedish organisation, tradition and separation of responsibilities when it comes to defence acquisition will probably make this step even more complex than what it has been in the UK. It seems likely that FMV in the relatively near future will be given the responsibility to acquire more DLoDs than “*merely*” equipment and logistics. How the Armed Forces HQ is going to direct and guide this “*capability acquisition*” is far from clear to this author. In Sweden, the Swedish Armed Forces and FMV are separate authorities, with different roles and responsibilities. In the future, FMV is likely to include more and more DLoDs in the contracts. However, FMV will only have direct influence over equipment, support to equipment and some additional aspects of logistics, whereas the Swedish Armed Forces will retain responsibility for the remaining DLoDs, i.e. Training, Personnel, Infrastructure, Concepts and Doctrine, Organisation and Information, which is why the Swedish Armed Forces and FMV ought to, jointly, start preparing *now* for these future complex defence acquisition projects, instead of waiting until they occur.

When it comes to CfAs, Sweden has the opportunity to take a shortcut in the development by not remaining in the relatively safe confinement of the more traditional price agreements, i.e. Fixed-Price Contracts and Cost-Plus Contracts, but go for performance agreements, i.e. PBC, instead. The Swedish Armed Forces and FMV ought to thoroughly analyse which traditional price agreements that best support the intentions of the increased complexity that a CfA suggests, i.e. to identify which forms of traditional contracts that are most likely to incentivise the contractor in accordance with the intentions of the Swedish Armed Forces and FMV. Finally, the research results have revealed that the UK development is working against PPP theory, since prime contractors are not always selected through competition. If Sweden were to take steps similar to the British development, this should be done with awareness of the fact that this goes against theory. Even if there is nothing to suggest that Sweden will be taking such steps in the near future, the Swedish Armed Forces and FMV ought to take precautions, and thoroughly investigate why the UK has seen fit to diverge from what is recommended in common PPP theory.

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Glossary of Acronyms

3PL:	Third Party Logistics
4PL:	Fourth Party Logistics
A400M:	Airbus A400M
AAP:	(NATO) Allied Administrative Publication
AAR:	Air-to-Air Refuelling
ACC:	Air Component Command
ACT:	(NATO) Allied Command Transformation
ADAPT:	Air Defence Availability Project for Rapier (Case D)
ADS:	Air Defence System
AJP:	(NATO) Allied Joint Publication
ALC:	Amey Lex Consortium
ALOC:	Air Line of Communication
AN-124:	Antonov An-124 Ruslan
AOF:	(UK MoD) Acquisition Operating Framework
AOR:	Area Of Responsibility
APOD:	Air Port Of Debarkation
APOE:	Air Port Of Embarkation
ATARES:	Air Transport, Air Refuelling and other Exchanges of Services
AVLB:	Armoured Vehicle Launcher Bridge
AVRE:	Armoured Vehicle Royal Engineers
AVSI:	Armoured Vehicle Support Initiative
AVST:	Armoured Vehicle Support Transformation
BAC:	British Aircraft Corporation
BAe:	British Aerospace
BAE:	BAE (no longer an acronym)
BBC:	Behaviour-Based Contracts
BC:	Business Case
BG:	(EU) Battle Group
BM:	Business Model
BMI:	Business Model Innovation
BMO:	Business Model Ontology

BOI:	Board of Inquiry
BPM:	Business Process Model
BSC:	Balanced ScoreCard
BU:	Business Unit
BV:	Best Value
BVB:	Best Value Benchmark
C-130:	Lockheed C-130 Hercules
C-130J:	Lockheed Martin C-130J Super Hercules
C-130K:	Lockheed C-130K Hercules
C-17:	Boeing (formerly McDonnell Douglas) C-17 Globemaster III
C2:	Command and Control
CA:	Comprehensive Approach
CADMID:	Concept, Assessment, Demonstration, Manufacture, In-Service, Disposal
CADMIT:	Concept, Assessment, Demonstration, Migration, In-Service, Termination
CB:	Coupling Bridge
CBA:	Cost-Benefit Analysis
CBP:	Commercial Best Practise
CC:	(Land, Maritime or Air) Component Command
CD&E:	Concept Development and Experimentation
CfA:	Contracting for Availability (the third step in the UK transformation acquisition staircase)
CfC:	Contracting for Capability (the fourth step in the UK transformation acquisition staircase)
CfDA:	Centre for Defence Acquisition (at Cranfield University in the UK)
CIMIC:	Civil-Military Cooperation
CIS:	Commonwealth of Independent States
CJTF:	(NATO) Combined Joint Task Force
CLS:	(US DoD) Combat Logistics Support
CLS:	(UK MoD) Contractor Logistics Support
CMP:	Capability Management Plan
COA:	Course-Of-Action
COEIA:	Combined Operational Effectiveness and Investment Appraisal
CON LOG:	Contract for logistics support
CONDO:	(UK MoD) Contractors On Deployed Operations
CONLOG:	(UK MoD) Contractor Logistic (contract)

COO:	Cost of Ownership
COTS:	Commercial-Off-The-Shelf
CP:	Consolidation Point
CPFF:	Cost-Plus Fixed Fee
CPIF:	Cost-Plus Incentive Fee
CPS:	Complex Product-Service
CR2:	ChallengeR 2 (The UK MBT)
CRARRV:	ChallengeR Armoured Repair and Recovery Vehicle
CRISP:	ChallengeR 2 Innovative Spares Provision
CRM:	Customer Relationship Management
CRO:	(NATO) Crisis Response Operation
CSO:	Contractor Support to Operations
CSS:	Combat Service Support
CV:	Combat Vehicle
C Vehicle:	Construction Vehicle (Case A)
DACP:	(UK MoD) Defence Acquisition Change Programme
DAU:	(US DoD) Defense Acquisition University
DBA:	Dominant Battle-space Awareness
DCDC:	(UK MoD) Development, Concepts and Doctrine Centre
DCP:	(UK) Defence Change Portfolio
DE&S:	(UK MoD) Defence and Equipment Support
Def Stan:	(UK MoD) Defence Standard
DERA:	(UK MoD) Defence Evaluation and Research Agency
DIB:	Defence Industrial Base
DIME:	Diplomatic, Information, Military, Economic
DIP:	(UK MoD) Defence Industrial Policy
DIS:	(UK MoD) Defence Industrial Strategy
DLA:	Defence Logistics Authority (a suggested merger of the Swedish DLO (FMLOG) and the Swedish DPA (FMV) (cf. FLM))
DLO:	Defence Logistics Organisation
DLOC:	(UK MoD) Defence Logistics Operations Centre
DLod:	(UK MoD) Defence Line of Development
DLSC:	(UK MoD) Defence Logistics Support Chain
DLTP:	(UK MoD) Defence Logistics Transformation Programme
DMAIC:	Define, Measure, Analyse, Improve, Control (Six Sigma)

DMI:	Define, Measure, Improve (Velocity Management)
DoD:	(US) Department of Defense
DOTMLPF:	Doctrine, Organisation, Training, Materiel, Leadership, Personnel, Facilities (the US equivalent of the UK DLoDs)
DOTMLPFI:	Doctrine, Organisation, Training, Materiel, Leadership, Personnel, Facilities, Interoperability (the NATO equivalent of the UK DLoDs)
DPA:	Defence Procurement Agency
DRA:	Defence Research Agency
DSCA:	(US DoD) Defense Security Cooperation Agency
DSCOM:	(UK MoD) Defence Supply Chain Operations and Movements
DSDA:	(UK MoD) Defence Storage and Distribution Agency
DSR:	(UK MoD) Directorate of Supplier Relations
Dstl:	(UK MoD) Defence Science and Technology Laboratory
DT:	(UK MoD) Delivery Team
DTMA:	(UK MoD) Defence Transport and Movements Agency
DTS:	(UK MoD) Defence Technology Strategy
DTT:	(UK MoD) Driver Training Tank
EAC:	European Airlift Centre
EAC:	(UK MoD) Enabling Acquisition Change
EADS:	European Aeronautic Defence and Space Company
EATC:	European Air Transport Command
EATF:	European Air Transport Fleet
EBAO:	Effect Based Approach to Operations
EBO:	Effect Based Operations
ECC:	(UK MoD) Equipment Capability Customer
EDA:	European Defence Agency
EDI:	Electronic Data Interchange
EU:	European Union
EUFOR:	European Union Force
FDSCI:	Future Defence Supply Chain Initiative
FE:	Force Element (component of capability)
FFP:	Firm Fixed-Price
FFU:	The Swedish Defence Administration Inquiry (an SOU)
FHQ:	(EU) Force Headquarters
FHS:	The Swedish National Defence College (NDC)

FLA:	Future Large Aircraft
FLC:	(UK MoD) Front Line Command
FLM:	The Swedish Defence Logistics Authority (Försvarslogistikmyndigheten) (a proposed new authority, intended to be created by the merger of the Swedish DPA and DLO. Cf. the UK MoD DE&S)
FLSA:	Forward Logistics Support Area
FMLOG:	The Swedish DLO (Försvarsmaktens Logistik)
FMS:	(US DoD) Foreign Military Sales
FMV:	The Swedish Defence Materiel Administration (Försvarets Materielverk), the Swedish DPA
FOC:	(UK MoD) Full Operational Capability
FOI:	The Swedish Defence Research Agency (DRA) (Totalförsvarets Forskningsinstitut)
FPI:	Fixed-Price Incentive
FPL:	Fourth Party Logistics
FQD:	Forecast Quarterly Demand
FSA:	(UK MoD) Rapier Field Standard A
FSB:	(UK MoD) Rapier Field Standard B
FSC:	(UK MoD) Rapier Field Standard C
FSC:	(UK MoD) Forward Supply Chain
FSU:	The Swedish Defence Structure Inquiry (an SOU)
FU:	(UK MoD) Fire Unit
GE:	General Electric
GWOT:	Global War On Terrorism
H5N1:	Avian influenza
HASP:	Heavy Armour Spares Provisioning (Case C, replaced CRISP)
HAW:	Heavy Airlift Wing
HLB:	Home Logistics Base
HM:	(UK) Her Majesty, alternatively Her Majesty's
HMNB:	(UK MoD) Her Majesty's Naval Base
HMT:	(UK) Her Majesty's Treasury
HNS:	Host Nation Support
HQ:	Headquarters
HR:	Human Resources
HST:	Hard Systems Thinking

IAB:	Investment Approvals Board
ICT:	Information and Communication Technology
IE:	Industrial Engineering
IFOR:	Implementation Force, NATO-led multinational PK force in Bosnia and Herzegovina
IG:	(UK MoD) Initial Gate
IGBC:	(UK MoD) Initial Gate Business Case
IHIP:	Intangibility, Heterogeneity, Inseparability and Perishability
ILS:	Integrated Logistics Support
IOC:	(UK MoD) Initial Operating Capability
IPL:	Initial Provisioning List
IPT:	Integrated Project Team
IR:	Infrared
IS:	Information System
ISAF:	International Security Assistance Force
ISD:	(UK MoD) In-Service Date
ISO:	International Standardisation Organisation
IT:	Information Technology
ITN:	Invitation to Negotiate
ITO:	Input-Transformation-Output
ITT:	Invitation to Tender
ITV:	In Transit Visibility
JDCC:	(UK MoD) Joint Doctrine & Concepts Centre
JDP:	(UK MoD) Joint Doctrine Publication
JFC:	Joint Forces Command
JIC:	Just-In-Case
JIT:	Just-In-Time
JOA:	Joint Operations Area
JRA:	Joint Rear Area
JRASB:	Joint Rear Area Support Base
JSC:	(UK MoD) Joint Supply Chain
JSCS:	(UK MoD) Joint Support Chain Services
JSP:	(UK MoD) Joint Service Publication
JT :	(UK MoD) Joint Team
JV:	Joint Venture

JWP:	(UK MoD) Joint Warfare Publication
KFOR:	Kosovo Force, NATO-led international force in Kosovo
KPI:	Key Performance Indicator
KSR:	(UK MoD) Key System Requirement
KUR:	(UK MoD) Key User Requirement
L1:	First Line repair
L2:	Second Line repair
L3:	Third Line repair
L4:	Fourth Line repair
LL:	Lessons Learned
LCC:	Land Component Command
LCC:	Life-Cycle-Cost
LOC:	Line Of Communication
LOGCOM:	Logistics Command
LOGCON:	Logistics Control
LOI:	Letter Of Intent
LOU:	The Swedish Law Regarding Public Procurement (Lagen om Offentlig Upphandling)
LSD:	Logistic Support Date
LSE:	London Stock Exchange
LTB:	Lease-to-Buy
MAS:	(NATO) Military Agency for Standardisation
MBD:	Matra BAe Dynamics (now MBDA)
MBDA:	No longer an acronym
MBT:	Main Battle Tank
MCC:	Maritime Component Command
MCCE:	Movement Coordination Centre, Europe
ME:	Middle East
MES:	Marconi Electronic Systems
MG:	(UK MoD) Main Gate
MGBC:	(UK MoD) Main Gate Business Case
MHE:	Mechanical Handling Equipment
MIC:	Military-Industrial Complex
MNE:	Multinational Experimentation
MoD:	(UK) Ministry of Defence

MODAF:	(UK) MoD Architectural Framework
MoE:	Measure of Effectiveness
MOOTW:	Military Operations Other Than War
MoP:	Measure of Performance
MOR:	Military Operational Research
MOTS:	Military-Off-The-Shelf
MoU:	Memorandum of Understanding
MOVCON:	Movement control
MPM:	(UK HMT) Managing Public Money
MR:	Maritime Reconnaissance
MRO:	Maintenance, Repairs and Overhauls
MSc:	Master of Science
MTBF:	Mean Time Between Failure
MTTR:	Mean Time To Repair
NAMA:	NATO Airlift Management Agency
NAMO:	NATO Airlift Management Organisation
NAMSA:	NATO Maintenance and Supply Agency
NAO:	(UK) National Audit Office
NATO:	North Atlantic Treaty Organisation
NBD:	Network Based Defence
NBG:	(EU) Nordic Battle Group
NCW:	Network Centric Warfare
NDC:	National Defence College
NDO:	National Defence Organisation
NEC:	Network Enabled Capabilities
NMCC:	National Movement Coordination Centre
NORDAC:	Nordic Armaments Cooperation
NORDCAPS:	Nordic Coordinated Arrangement for Military Peace Support
NORDEFCO:	Nordic Defence Cooperation
NORDSUP:	Nordic Supportive Defence Structures
NPGO:	Non-Profit and Government Organisations
NPM:	New Public Management
NSA:	NATO Standardisation Organisation
NSAC:	NATO Strategic Airlift Capability

NSE:	National Support Element
NSG:	National Support Group
NT:	Network Theory
NWE:	Northwest Europe
OBC:	Outcome-Based Contracts
OCCAR:	Organisation Conjointe de Coopération en matière d'Armement
ODS I:	(US) Operation Desert Shield
ODS II:	(US) Operation Desert Storm
OECD:	Organisation for Economic Co-operation and Development
OEF:	(US) Operation Enduring Freedom
OEM:	Original Equipment Manufacturer
OHQ:	(EU) Operational Headquarters
OIF:	(US) Operation Iraqi Freedom
OLCM:	(NATO) Operations Logistics Chain Management
OM:	Operations Management
ONUC:	(UN) Opération des Nations Unies au Congo
OODA:	Observe, Orient, Decide, Act (the Boyd cycle, or the OODA loop)
OOTW:	Operations Other Than War
OPCOM:	Operational Command
OPCON:	Operational Control
OPS:	Public-Private-Cooperation ⁹⁶ (PPC) (Offentlig Privat Samverkan), the Swedish form of PPP
OR:	Operational Research
OSCE:	Organisation for Security and Co-operation in Europe
OSD:	(UK MoD) Out-of-Service-Date
OTS:	Off-The-Shelf
PACE:	(UK MoD) Performance, Agility, Confidence and Efficiency
PAT:	Principal-Agent Theory
PBC:	Performance Based Contracting
PBL:	Performance Based Logistics

⁹⁶ OPS is, however, only a similar concept, and not identical to PPP. PPP only includes partnerships, whereas OPS also include outsourcing and other forms of cooperation.

PBSA:	Performance Based Service Acquisition
PCP:	Procuring Complex Performance
PDCA:	Plan, Do, Check, Act (the Deming cycle)
PDSA:	Plan, Do, Study, Act (the Shewhart cycle)
PE:	Peace Enforcement
PE:	(UK MoD) Procurement Executive
PEST:	Political, Economic, Socio-cultural, Technological
PFI:	(UK) Private Finance Initiative
PfP:	(NATO) Partnership-for-Peace
PFU:	(UK MoD) Private Finance Unit
PG:	(UK MoD) Purple Gate
PJHQ:	(UK MoD) Permanent Joint Headquarters
PK:	Peace Keeping
PM:	(UK) Prime Minister
PMC:	Private Military Company ⁹⁷
PMESII:	Political, Military, Economic, Social, (legal, ethical, environmental, Information & Infrastructure (and science & technology))
PMS:	Performance Measurement System
PMSC:	Private Military and Security Company
POD:	Port of Debarkation
POE:	Port of Embarkation
POL:	Petroleum, Oil, and Lubricants (Class III supply)
PPBM:	Public Private Business Model
PPC:	Public Private Cooperation (Offentlig Privat Samverkan), the Swedish form of PPP (cf. OPS)
PPP:	Public-Private-Partnership
PSC:	Public Sector Comparator
PSC:	Private Security Company
PSC:	Private Security Contractor
PSM:	Problem Structuring Method

⁹⁷ In practice, there is probably no difference between a Private Military Company (PMC), a Private Military and Security Company (PMSC), a Private Security Company (PSC), and a Private Security Contractor (PSC) in the focal context.

PSO:	Peace Support Operation
PT:	Project Team (cf. IPT)
QCA:	Qualitative Cluster Analysis
QDR:	(US) Quadrennial Defense Review
R&D:	Research and Development
R&M:	Reliability and Maintainability
R&T:	Research and Technology
RA:	(UK MoD) Royal Artillery
RAF:	(UK MoD) Royal Air Force
RAM:	Reliability, Availability, Maintainability
RBV:	Resource-Based View
RE:	(UK MoD) Royal Engineers
REA:	Resource-Event-Actor
REA:	Resource-Event-Agent
REME:	(UK MoD) Royal Electrical and Mechanical Engineers
RFID:	Radio Frequency Identification
RLC:	(UK MoD) Royal Logistics Corps
RMA:	(US DoD) Revolution in Military Affairs
RMCS:	Royal Military College of Science (Cranfield University, UK)
RML:	(US DoD) Revolution in Military Logistics
ROE:	Rules Of Engagement
ROI:	Return on Investment
RQ:	Research Question
RSC:	(UK MoD) Reverse Supply Chain
RSOM:	Reception Staging and Onwards Movement
SAC:	Strategic Airlift Capability
SALIS:	Strategic Airlift Interim Solution
SAM:	Surface-to-Air Missile
SBMO:	Strategic Business Model Ontology
SCC:	Sealift Coordination Centre
SCOC:	(UK MoD) Supply Chain Operations Centre
SCM:	Supply Chain Management
SCPT:	Supply Chain Pipeline Time
SCRM:	Supply Chain Risk Management

SDR:	(UK) Strategic Defence Review (1998)
SDSR:	(UK) Strategic Defence and Security Review (2010)
SE:	Systems Engineering
SEK:	Swedish Krona (The Swedish currency)
SFOR:	Stabilisation Force, NATO-led multinational PE force in Bosnia and Herzegovina
SFRY:	Socialist Federal Republic of Yugoslavia
SHIRBRIG:	(UN) Standby High Readiness Brigade
SLA:	Service Level Agreement
SLOC:	Sea Line of Communication
SMART:	Specific, Measurable, Achievable, Realistic and Time bounded
SME:	Subject Matter Expert
SOU:	Statens offentliga utredningar (Swedish Government Official Reports)
SPI:	Smart Procurement Initiative
SPOD:	Sea Port Of Debarkation
SPOE:	Sea Port Of Embarkation
SPS:	Standard Priority System
SPV:	Special Purpose Vehicle
SR:	(UK MoD) Sponsored Reserve
SRD:	(UK MoD) System Requirements Document
SRM:	Supplier Relationship Management
SRT:	(UK MoD) Supplier Relations Team
SSE:	(UK MoD) Support Solutions Envelope
SST:	Soft Systems Thinking
ST:	Systems Theory
STSA:	(UK MoD) Short Term Strategic Airlift (Case C)
SU:	Soviet Union
SWOT:	Strengths, Weaknesses, Opportunities and Threats
TA:	(UK MoD) Territorial Army
TA:	Technical Arrangement
TAV:	Total Asset Visibility
TCC:	Troop-Contributing Country
TCE:	Transaction Cost Economics
TCO:	Total Cost of Ownership

TEPIDOIL:	Training, Equipment, Personnel, Information, Concepts and Doctrine, Organisation, Infrastructure, Logistics (The UK DLoDs)
TG:	Task Group
TLC:	Through Life Cost
TLCM:	(UK MoD) Through Life Capability Management
TLM:	(UK MoD) Through Life Management
TLMP:	(UK MoD) Through Life Management Plan
TOA:	Transfer Of Authority
TRADERS:	(UK MoD) The Rapier Direct Exchange of Repairable Spares
TPL:	Third Party Logistics
TSO:	(UK) The Stationary Office
UAV:	Unmanned Aerial Vehicles
UK:	United Kingdom (of Great Britain and Northern Ireland)
UN:	United Nations
UNEF:	UN Emergency Force
UNFICYP:	UN PK Force in Cyprus
UNIFIL:	UN Interim Force in Lebanon
UNMIL:	UN Mission in Liberia
UNPROFOR:	UN Protection Force
UNSC:	UN Security Council
UNTSO:	UN Truce Supervision Organisation
UOR:	(UK MoD) Urgent Operational Requirement
URD:	(UK MoD) User Requirements Document
US:	United States (of America)
USAF:	US Air Force
USN:	US Navy
USSR:	Union of Soviet Socialist Republics
USUR:	(UK MoD) Urgent Statement of User Requirement
VDS:	Vickers Defence Systems
VfM:	Value for Money
VITAL:	(UK MoD) Visibility-In-Transit-And-Logistics
VM:	(US DoD) Velocity Management
WEU:	Western European Union
WLC:	Whole Life Cost
WMD:	Weapon of Mass Destruction

WP:	Warsaw Pact
WTO:	World Trade Organisation
WW1:	World War I
WW2:	World War II
WW3:	World War III (a hypothetical third world war on European soil)
WWW:	World-Wide-Web
XV230:	Nimrod XV230

Annex A: Interview Guide at FMV

PLACE, DATE AND TIME FOR INTERVIEW

Place:

Date:

Time:

RESPONDENT

What is your name?

What is your rank, or title?

What is your position at FMV?

Do you require anonymity?

Are you willing to validate the transcribed interview?

Are you willing to validate the background description?

Are you willing to validate the system description?

Are you willing to validate the problem formulation?

Would you like to receive monthly updates of the thesis electronically?

Would you like to receive the final version of the thesis electronically?

RESEARCH PURPOSE

The research purpose is to study, analyse, and evaluate Business Models regarding how they can handle the new supply concept that a new logistical interface brings about, with a particular emphasis on the risk taking that is part of the business concept.

What is a Business Model?

What is a Supply Concept?

What is a Logistical Interface?

What is Risk Taking in this context?

What is a Business Concept?

How would you describe the new Logistical Interface?

Which new Supply Concepts does the new Logistical Interface bring about?

THE SUPPLY AND SUPPORT CHAIN

Who are the most important actors in the supply and support chain?

Which are the most important relations between the actors in the supply and support chain?

Which are the most important activities in the supply and support chain?

Which actors in the supply and support chain are responsible for these activities?

Who are the most important actors outside of the supply and support chain?

Which are the most important relations between the actors outside of the supply and support chain?

Which are the most important activities outside of the supply and support chain?

Which actors outside of the supply and support chain are responsible for these activities?

TRANSFORMATION OF THE SWEDISH ARMED FORCES

Which are the major political drivers for change of the of the supply and support chain?

Which are the major military drivers for change of the of the supply and support chain?

Which are the major economic drivers for change of the of the supply and support chain?

Which are the major technological drivers for change of the of the supply and support chain?

Which other major drivers for change of the of the supply and support chain are there?

Which are the major challenges that the political drivers for change have brought about?

Which are the major challenges that the military drivers for change have brought about?

Which are the major challenges that the economic drivers for change have brought about?

Which are the major challenges that the technological drivers for change have brought about?

Which other major challenges are there?

Which are the logistical functions major strengths?

Which are the logistical functions major weaknesses?

Which are the major opportunities for the logistical functions?

Which are the major threats to the logistical functions?

OTHER QUESTIONS

Are you aware of any particular individual that I ought to interview?

Annex B: Interview Guide at DE&S

PLACE, DATE AND TIME FOR INTERVIEW

Place:

Date:

Time:

RESPONDENT

What is your name?

What is your rank, or title?

What is your position at DE&S?

What is your position in the IPT?

Do you require anonymity?

Are you willing to validate the transcribed interview?

Are you willing to validate the case description?

Are you willing to validate the case study (based on several cases)?

Would you like to receive the final version of my thesis electronically?

What is your e-mail address?

Are you willing to answer complementary questions by e-mail?

INTEGRATED PROJECT TEAM (IPT)

What is the name of the IPT?

What (product/service) is the IPT about?

Why (e.g. gap, replacement, policy) was the IPT started?

Who (stakeholders) are involved in the IPT?

Who (end user) will use the product/service?

When did the IPT start?

When will the IPT stop?

When (start, stop) will the product/service be used?

Where (e.g. the UK, in-theatre) will the product /service be used?

How do you work together in the IPT?

How (e.g. integrated, on demand) will the product/service be used?

On a nine grade scale from traditional procurement of equipment (e.g. COTS/MOTS) to acquisition of capabilities, or complex performance (e.g. “power-by-the-hour”), where would you position this IPT?

FROM FACTORY TO FOXHOLE

Who (buyer, supplier, or third party) is responsible for designing the product/service? Is there a transfer of responsibility? If yes, when?

Who (buyer, supplier, or third party) is responsible for building/constructing the product/service? Is there a transfer of responsibility? If yes, when?

Who (buyer, supplier, or third party) owns the product/service? Is there a transfer of ownership? If yes, when?

Who (buyer, supplier, or third party) owns the resources? Is there a transfer of ownership? If yes, when?

Who (buyer, supplier, or third party) is responsible for operations? Is there a transfer of responsibility? If yes, when?

Who (buyer, supplier, or third party) is responsible for planning? Is there a transfer of responsibility? If yes, when?

Who (buyer, supplier, or third party) is responsible for management? Is there a transfer of responsibility? If yes, when?

Who (buyer, supplier, or third party) is responsible for renovation/repair? Is there a transfer of responsibility? If yes, when?

Who (buyer, supplier, or third party) is responsible for maintenance? Is there a transfer of responsibility? If yes, when?

Who (buyer, supplier, or third party) is responsible for financing? Is there a transfer of responsibility? If yes, when?

Who (buyer, supplier, or third party) is responsible for Risk Management? Is there a transfer of responsibility? If yes, when?

If 3PLs are used: which ones?; in which phases?; and for which purposes?

Could you exemplify typical risks in the different phases?

Who is responsible for these risks?

Which, if any, are there the consequences for the military supply chain with the emergence of outsourcing, contracting, and establishment of Buyer-Supplier partnerships, and of Buyer-Supplier alliances?

RISK MANAGEMENT

Do you identify risks in cooperation with the supplier? If no, why not?

Do you analyse risks in cooperation with the supplier? If no, why not?

Do you decide on a response to a risk in cooperation with the supplier? If no, why not?

Do you decide who should take responsibility for a risk in cooperation with the supplier? If no, why not?

On a nine grade scale from no transfer of risk to the supplier to total transfer of risk to the supplier, where would you position this IPT?

What is the most typical risk in this type of acquisition?

How would you typically analyse and respond to this type of risk?

Would this course of action (COA) typically be regulated in the contract? If yes, how would you regulate? If no, how would you manage this risk?

THE CONTRACT

On a five grade scale, what timeframe does the contract cover? (Less than 1 year; 1-5 years; 5-15 years; 15-30 years; or No time limit) Why did you select this timeframe?

On a five grade scale, what specificity does the contract have? (Very specific in nature; More general in nature; or Not specific at all - Outlines philosophy) Why did you select this specificity?

On a five grade scale, what scope does the contract have? (Several binders, full from cover to cover; A few pages) Why did you select this scope?

What types of issues are regulated in the contract?

What types of issues are intentionally not regulated in the contract? Why are these issues omitted from the contract?

Is risk sharing addressed in the contract? If yes, how? If no, why not?

Is reward sharing addressed in the contract? If yes, how? If no, why not?

Is information sharing addressed in the contract? If yes, how? If no, why not?

THE RELATIONSHIP

On a five grade scale, what type of relationship do you have with the supplier? (Arm's length; Partnership Type I; Partnership Type II; Partnership Type III; or Strategic alliance) Why did you select this type of relationship with the supplier?

Is there a limit regarding how far to the right you can move as a Public entity in the military domain? If yes, why?

Is there a contradiction between VfM and longevity of relationship? If yes, could you please elaborate? If no, could you please elaborate?

PROJECT EVALUATION

Which were the three most positive aspects (strengths) of this IPT?

What are the Lessons to be Learned (LL) because of these positive aspects?

Which were the three most negative aspects (weaknesses) of this IPT?

What are the Lessons to be Learned (LL) because of these negative aspects?

Where there any delays in completing this IPT? If yes, in which phases of the project? If yes, why did it occur? If yes, how was this handled? If no, how would you have handled delays?

Where there any problems with quality in this IPT? If yes, in which phases of the project?
If yes, why did it occur? If yes, how was this handled? If no, how would you have handled quality problems?

Where there any cost overruns in this IPT? If yes, in which phases of the project? If yes, why did it occur? If yes, how was this handled? If no, how would you have handled cost overruns?

IMPORTANCE OF PPP/PFI CHARACTERISTICS

On a five grade scale, how important is competition before partnership? (Not important; Very important)

On a five grade scale, how important is Value-for-Money (VfM)? (Not important; Very important)

On a five grade scale, how important is transfer of risk? (Not important; Very important)

On a five grade scale, how important is the whole life cycle cost perspective? (Not important; Very important)

On a five grade scale, how important is risk sharing? (Not important; Very important)

On a five grade scale, how important is reward sharing? (Not important; Very important)

On a five grade scale, how important is information sharing? (Not important; Very important)

On a five grade scale, how important is trust between buyer and supplier? (Not important; Very important)

On a five grade scale, how important is the type of relationship between buyer and supplier? (Not important; Very important)

On a five grade scale, how important is longevity of relationships? (Not important; Very important)

How important is the formal contract? (Not important; Very important)

IMPORTANCE OF MILITARY LOGISTICS PRINCIPLES

Are you aware of the (five) principles of military logistics?

If yes, on a five grade scale:

How important are these principles? (Not important; Very important)

How important is the principle of foresight? (Not important; Very important)

How important is the principle of economy? (Not important; Very important)

How important is the principle of flexibility? (Not important; Very important)

How important is the principle of simplicity? (Not important; Very important)

How important is the principle of co-operation? (Not important; Very important)

Is there a contradiction between any of the principles of military logistics and outsourcing, contracting, partnerships, or alliances? If yes, could you please elaborate? If no, could

you please elaborate? If yes, which perspective will prevail in defence acquisition?
Could you please elaborate?

PUBLIC PRIVATE PARTNERSHIP (PPP) TERMINOLOGY

In PPP theory, PPPs are described in terms of: activities (lease, transfer); actors; relationships; roles; responsibilities (design, build/construct, own, operate, manage, renovate, maintain, finance); and resources; and issues of trust, longevity of relationships, Value-for-Money (VfM), risk sharing, reward sharing, and information sharing. Is it reasonable to use the same terminology in the military context? If no, why not? If yes, is the list exhaustive also from the military point of view? If no, which terms would have to be added to the terminology in order to make it more suitable to the military context?

FRAGMENTATION OF THE MILITARY SUPPLY CHAIN

Does the introduction of more actors in the supply chain, with different roles and responsibilities in different parts of the supply chain, lead to a fragmentation of the supply chain into a supply/support network? If yes, which are the major consequences of this fragmentation?

If there is a fragmentation of the supply chain, does this fragmentation have any consequences for supply chain management, or command and control in the supply chain? If yes, which are these consequences? If yes, do you use any incentive mechanisms in your relationship with your supplier to handle these consequences? If yes, which ones? If yes, are any of these mechanisms regulated in the contract? If yes, how? If no, why not?

If there is a fragmentation of the supply chain, does this fragmentation have any consequences for Supply Chain Risk Management? If yes, which are these consequences? If yes, do you use any incentive mechanisms in your relationship with your supplier to handle these consequences? If yes, which ones? If yes, are any of these mechanisms regulated in the contract? If yes, how? If no, why not?

RISK MANAGEMENT (ADDITIONAL QUESTIONS)

Do you use any particular classification, categorisation or taxonomy of risks? If yes, which one? (i.e. which types of risks do you identify?)

Do you use a risk register, portfolio, or database to document the risks? If yes, which headlines do you use? If no, why not?

How do you identify the risks?

How do you analyse the risks?

How do you decide on a response to the risks?

How do you decide who should take responsibility for the risks?

Does the fact that the acquisition occurs in a military context have any consequences for risk identification, analysis, and response? If yes, how? If no, why not?

PROJECT EVALUATION (ADDITIONAL QUESTIONS)

How do you evaluate the project?

When (e.g. milestones, deliveries, regular intervals) do you evaluate the project?

Do you evaluate the project together with the supplier? If yes, how? If no, why not?

Which Measures of Effectiveness (MoEs) do you use in this IPT?

Which Measures of Performance (MoPs) do you use in this IPT?

Does this IPT influence the management of the military supply chain? If yes, how? If no, why not?

Does this IPT influence Risk Management in the military supply chain? If yes, how? If no, why not?

ADDITIONAL INFORMATION ABOUT THE IPT

Can I find more information about the IPT on the Internet?

If yes, on which URL (Uniform Resource Locator)?

Can I find more information about the IPT in published reports?

If yes, in which reports?

Are there any other members of the IPT that you think I should interview? If yes, who?