



**NTNU – Trondheim**  
Norwegian University of  
Science and Technology

# Barriers to public procurement for innovation

A case study of ICT projects in the specialised  
health services in Norway

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Oppgavens (foreløpige) tittel <b>Barriers to public procurement for innovation</b>	
Oppgavetekst/Problembeskrivelse Public procurement for innovation has received increased attention as an innovation policy tool over the past few years. Despite of this, public entities still seem to struggle to include innovation in their purchases, probably caused by lack of funds, time, competence, strategic focus, and multiple other reasons. This study will look at the barriers that prevent successful public procurement for innovation, and examine how these obstacles can be overcome. The thesis will contain the following main points:  <ol style="list-style-type: none"><li>1. A review of the relevant literature, resulting in a theoretical framework</li><li>2. One or more case studies in the Norwegian public sector</li><li>3. An analysis of the empirical material using the framework, resulting in recommendations for practitioners, policy makers and researchers</li></ol>	
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## **Preface**

The purpose of this master thesis is to examine the barriers that prevent successful innovation through public procurement to take place, and how these barriers can be overcome. As both innovation and procurement become more important to improve public sector services, this is a field that carries with it a great potential. We hope our paper can be a small contribution to this.

The master thesis was conducted in the field of Strategic Purchasing and Supply Management at the Department of Industrial Economics and Technology Management at the Norwegian University of Science and Technology. Professor Luitzen de Boer and Mieko Igarashi have been very helpful throughout the process, which we appreciate.

We would also like to thank everyone who took the time to participate in the interviews. Their willingness to help and level of reflection were essential to our thesis. It is reassuring to see that so much thought and effort is put into the improvement of our health care sector.

Lastly, we encourage fellow students to write their thesis on the public sector. It is both interesting and rewarding to learn about so large and complex organisations, which provide services that are vital to our society.

Johan and Harald

*Trondheim, June 11<sup>th</sup>, 2013*





## Summary

In this study we have looked at the concept of public procurement for innovation, and tried to reveal the main barriers that prevent successful procurement for innovation to take place. A natural next step has been to explore the nature of these barriers, and through this understand how they can be managed. In order to accomplish this, we have conducted a case study on ICT projects in the specialised health services, building on existing literature in the fields of purchasing, innovation, public management and public procurement.

Similar to scholars before us, we conclude that the key to public procurement for innovation is to have a collaborative relationship between the public customer and the supplier. By this we understand interaction in all the phases of the procurement, including the development and piloting stages of the innovation process. These stages, we found, can either be a part of the commercial procurement, or take place in a pre-commercial procurement preceding it. In case of the first, it is important to ensure that the contract does not restrict the conditions for the development stage with too many specifications. In the case of the latter, the challenge is to avoid a gap between the pre-commercial and ensuing commercial procurement.

In the end, collaborative relationship is about the interaction between people in the supplying and buying organisation. In our case we identified three main actors, namely the supplier at one side, and the procurer and user at the other. We argue that collaborative relationship can only take place if they have the ability (the right competence), willingness (the right incentives) and possibility (the right resources) to take part in such a relationship, and if any of these three factors are not present, they constitute a barrier to public procurement for innovation.

Underpinning all of this is the requirement for a long-term strategic thinking. We argue that public procurement for innovation is distinctly different from regular procurement in the sense that it sets out to explore new possibilities, rather than exploit existing solutions. The advantages of innovation will commonly not manifest itself in the short term, but can have a significant impact on the activities in the long run, and ultimately lead to better public services. A public organisation that primarily focuses on efficiency in the short term will fail to see this benefit, and as such not be able to provide the competence, incentives and resources required for public procurement for innovation to take place.

For practitioners our study comes with implications particularly for managers in procurement and operations, who have to work on providing the conditions for collaborative relationship to take place in the cases of public procurement for innovation. This requires support from top management, who has to see the long-term benefit of this approach. For researchers, we have provided a model on public procurement for innovation, which will be useful for further studies.



## Sammendrag

I denne studien har vi sett på konseptet innovasjon i offentlige anskaffelser, og forsøkt å finne barrierene som er til hinder for dette. Vi har videre undersøkt disse barrierene, for å forstå hvordan de kan håndteres. For å oppnå dette har vi gjennomført en case studie på IKT-prosjekter i spesialisthelsetjenesten, med en foregående litteraturstudie innenfor innkjøp, innovasjon, offentlig sektor og offentlige anskaffelser.

I tråd med forskere forut oss, har vi konkludert med at det avgjørende aspektet for innovasjon i offentlige anskaffelser er en relasjon mellom offentlig kunde og leverandør som bygger på samarbeid og tillit. Med dette sikter vi til omfattende interaksjon i alle leddene av en innkjøpsprosess, inkludert stegene for produktutvikling som den vil omfatte. Denne produktutviklingen kan både skje som en del av den kommersielle anskaffelsen, eller i en foregående pre-kommersiell anskaffelse. I det første tilfellet er det avgjørende at kontrakten som inngås ikke er til hinder for en påfølgende utviklingsfase ved å spesifisere produktet for mye. I det andre tilfellet er utfordringen å unngå at det oppstår en kløft mellom den pre-kommersielle og den kommersielle anskaffelsen.

En samarbeidsrelasjon handler i utgangspunktet om personene som deltar fra leverandøren og kundens side. Her er det tre aktører som er sentrale: leverandøren, innkjøperen og brukeren. Vi argumenterer for at en samarbeidsrelasjon kun kan finne sted om disse aktørene har evnen (den rette kompetansen), viljen (de rette insentivene) og muligheten (de rette ressursene) til å delta. Dersom en av disse faktorene ikke er tilstede, vil det utgjøre en barriere for innovasjon i offentlige anskaffelser.

Grunnleggende for at disse tre faktorene kommer på plass er en langsiktig, strategisk tankegang. Vi argumenterer for at innovasjon i offentlige anskaffelser skiller seg fra vanlige anskaffelser ved at de i større grad tar sikte på å utforske nye muligheter, framfor å utnytte eksisterende løsninger. Det følger av dette at nytteverdien av innovasjonene som regel ikke vil være synlig i et kortsiktig perspektiv, men kan ha vesentlig innvirkning i det lange løp, og med dette bidra til bedre offentlige tjenester. En offentlig etat som hovedsakelig fokuserer på kortsiktig effektivitet, vil i mindre grad være i stand til å se nytten av innovasjon i offentlige anskaffelser, og dermed heller ikke være like villige til å tilrettelegge for dette i form av kompetanse, insentiver og ressurser.

Studien vår er i særlig grad relevant for ledelsen i henholdsvis innkjøp og de operasjonelle enhetene i offentlige etater, ettersom det er deres ansvar å legge til rette for samarbeidsrelasjoner som fører til innovasjon i offentlige anskaffelser. Dette vil imidlertid kreve støtte fra toppledelsen, som må se nytten av dette i et langsiktig perspektiv. For forskere har vi laget en modell for innovasjon i offentlige anskaffelser, som vi mener vil være nyttig i videre forskning.



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# 1 Introduction

## 1.1 Background

The interest for public procurement as an instrument to induce innovation is growing, which has a twofold explanation. The first is innovation. For decades governments have embraced the idea of an innovation policy, where different means are applied to spur innovative activity in the private sector, and through this gain competitive advantage over industries in other countries. A good example of its relevance today is the Innovation Union launched by the EU in 2010, where it is emphasised that innovation is necessary to stay competitive as a region. However, innovation is also increasingly becoming a topic for the public sector in its own right, as it becomes clearer that an efficiency focus alone is not enough to provide quality services to citizens. As such, the governments look both to the private and public sector for the benefits of innovation.

The second reason for the interest is the changing role of public procurement. Similar to how purchasing has received a more prominent role in companies following the realisation in the 1980s that “purchasing must become supply management” (see Kraljic, 1983), an understanding is slowly building that the same applies to the public sector. This is relevant for innovation, as there is an underlying assumption that making purchasing more strategic is related to its ability to contribute to innovation (see Castaldi et al., 2011).

In Norway public procurement for innovation can still be considered to be in its infancy, at least when it comes to implementation. On policy level the topic was raised in 2008 with two white papers on innovation policy and public procurement respectively (Fornyings- og administrasjonsdepartementet, 2008-2009; Nærings- og handelsdepartementet, 2008-2009). In 2013 the same government released its strategy for public procurement for innovation (see Departementene, 2013). As such, the political signals are clear, and it is now up to the public entities to put the ideas into practice. This is no simple task, and to successfully implement public procurement for innovation one will have to overcome many barriers.

This is the starting point of this study, which leads directly to our problem statement:

**Problem statement:**

What are the barriers to public procurement for innovation and how can they be managed?

## 1.2 Research questions

By dividing the problem statement in two parts, we arrive at two research questions for our study.

### 1.2.1 RQ1: What are the barriers to public procurement for innovation?

The first step is to identify possible barriers, which we will do through a literature review of both relevant purchasing and innovation theory. Based on this we will formulate propositions on what we consider the most important barriers, and see if these propositions conform to the empirical data we collect. This part of the analysis will seek to verify or disprove the propositions; to the degree such inferences can be made through our qualitative case studies.

### 1.2.2 RQ2: How can barriers to public procurement for innovation be managed?

A more challenging task, we will attempt to see how identified barriers to public procurement for innovation can be addressed. It is our assumption that few of these barriers will have simple solutions, but indeed that they have numerous underlying causes and influence each other. Nevertheless, through our analysis of the theoretical and empirical study we hope to be able to point to some actions that can lead to more effective public procurement for innovation. This analysis will also follow the propositions that we construct in the theoretical study.

## 1.3 Structure of the study

Our paper follows a traditional structure of theoretical and empirical study followed by a cross-case analysis, as depicted in Figure 1. The theoretical study will have three steps, starting with an examination of the basic concepts of public procurement for innovation (PPI), i.e. what it is, why it is important and lastly how procurement can induce innovation. Following this is a review of frameworks from both purchasing and innovation literature, which can help explain the drivers underlying PPI. As a result of this review we will go through relevant categories and construct a set of propositions, i.e. a number of possible barriers that might exist to prevent successful public procurement for innovation.

In the empirical study, we look at the Norwegian health care sector, where focus is on the procurement of innovative ICT solutions to hospitals. More specifically, we will look at two of four regional health authorities (RHA), with two procurement projects in each RHA. In the cross-case analysis, we will take the empirical findings and compare them to the propositions developed in the theoretical study.

The first research question will be addressed in part in the theoretical study, where we will propose a number of barriers, which we seek to verify through the analysis of the empirical study. This will be summarised in the conclusion. The second research question will be addressed primarily in the analysis, and furthermore in the conclusion.

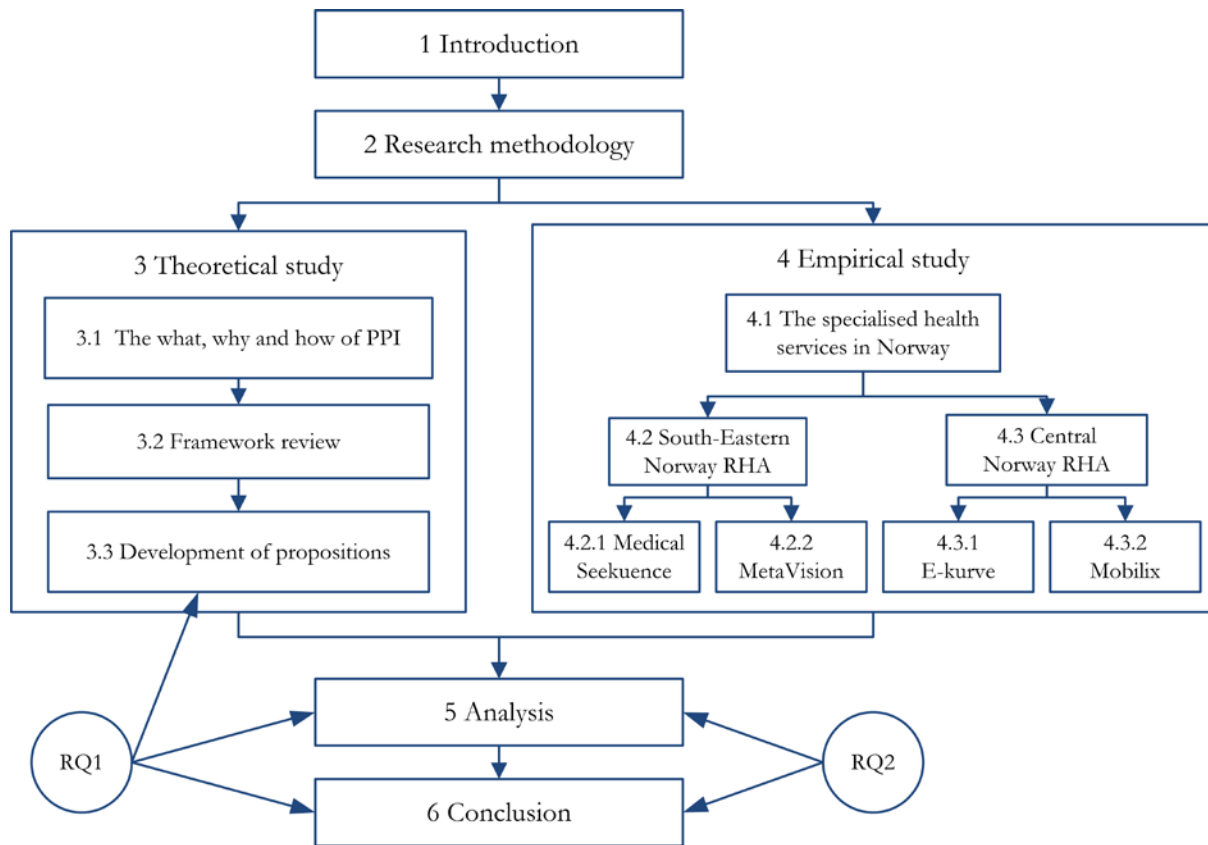


Figure 1: Structure of the study

#### 1.4 Limitations of the study

While the topic of our study forces us to take a relatively broad approach, with the topics of purchasing and innovation in literature, and the health sector as our empirical starting point, we have tried to make some limitations. The reason for this has been both to reduce complexity, and moreover the limitations we have had in terms of time and resources.

First of all, we will focus on barriers at the customer side, i.e. in the public entities, and not look on barriers at the supply side. In our empirical study, we will limit ourselves to projects where the private sector has supplied innovative ICT solutions to the specialised health services through procurement. This is illustrated in Figure 2.

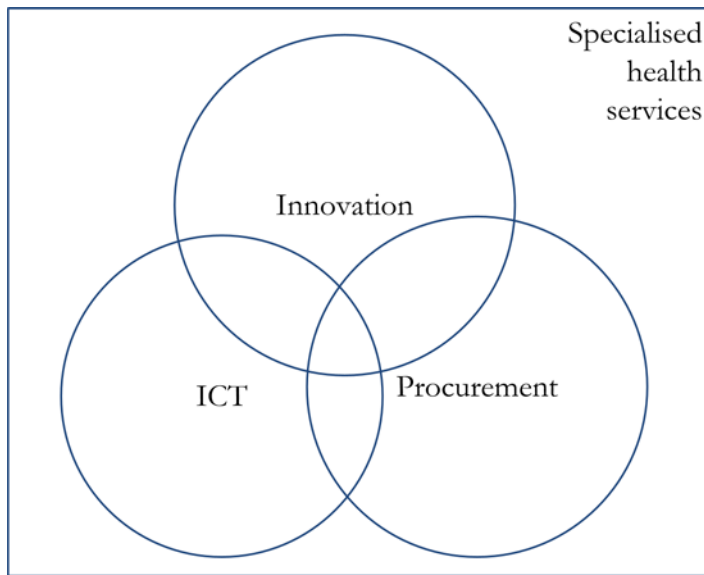


Figure 2: Scope of the empirical study

Furthermore, we do not look at make-or-buy decisions. When it comes to complex ICT solutions, it is unlikely that the specialised health services will move in a direction where this is moved inhouse. As such, it is more likely that they decide to outsource the complete management of ICT of the hospital to an organisation not directly under public control. However, even in this case most of our findings in this study would still apply, e.g. such an organisation would still have to follow the regulation on public procurement. Furthermore, we will not look at concessions and so-called public-private partnerships (PPPs). As far as we are aware of, they are not relevant for ICT solutions in the specialised health services in Norway.

## 2 Research methodology

According to Yin (2009), the research methodology of a study needs to reflect the research objectives. We have chosen to divide our research in two parts in order to answer our research questions: a literature review and an empirical case study. In the following we present our research methodology. First we will present the search strategy, article selection and review procedure of our literature review. Afterwards we will justify the selection of research design and explain the data collection of the empirical data. Finally, we will evaluate the research methodology we have applied.

According to Bryman and Bell (2011), authors addressing methodological issues often make a distinction between quantitative and qualitative research. They describe quantitative research as a research strategy that often emphasises the quantification and measurement in the collection and analysing of data, as opposed to qualitative research that emphasises words rather than quantification. Furthermore, Myers (2008) claim that qualitative research is the most appropriate if you want to study a particular topic in depth, and argue that qualitative research is more suitable if there is not so much previously published of the topic in focus. Although the academic field of public procurement for innovation is receiving an increasing amount of attention, the more specific area of barriers has not been much researched. We therefore argue that a qualitative approach is suitable.

In our research we wanted to investigate barriers preventing public procurement for innovation, and through an in-depth exploration uncover why it seemingly struggles to reach its potential. Furthermore, during the creation of both theoretical background and empirical data we wanted to rely on sources of a qualitative nature, as “qualitative research is uniquely suited to “opening the black box” of organisational process (Doz, 2011, p. 583). Consequently, we have chosen a qualitative approach to our research methodology in this paper.

Dubois and Gadde (2002, p. 555) propose a process where theoretical framework, empirical fieldwork and case analysis evolve simultaneously, and claim that “the researcher, by continuously going ‘back-and-forth’ from one type of research activity to another and between empirical observations and theory is able to expand his understanding of both theory and empirical phenomena”. The process of systematic combining is displayed in Figure 3.

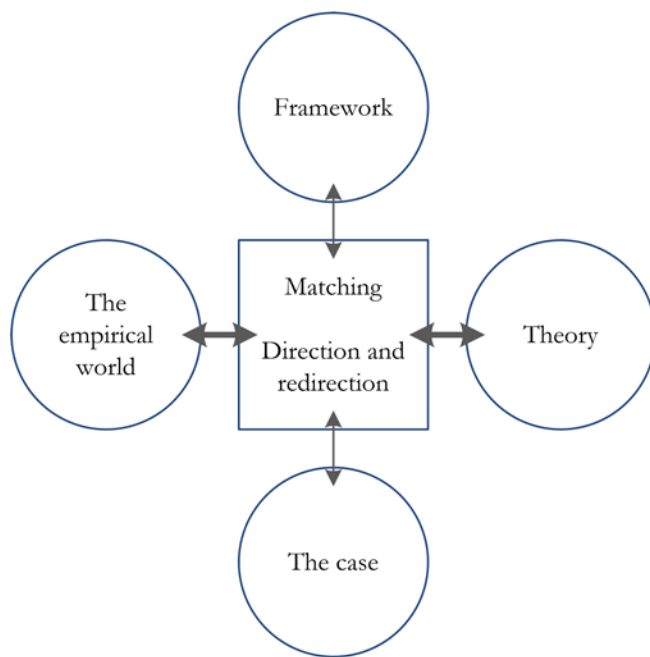


Figure 3: Systematic combining. Adapted from Dubois and Gadde (2002)

In our study we set out to investigate the relationship between barriers to public procurement for innovation found in the literature and in reality. Accordingly, the process of systematic combining is suitable, as it according to Dubois and Gadde (2002, p. 556) can be described “as a nonlinear, path-dependent process of combining efforts with the ultimate objective of matching theory and reality”. In our paper, we agree with Dubois and Gadde (p. 555), who claim that “theory cannot be understood without empirical observation and vice versa”.

During our research we have continuously overlapped between data analysis and data collection, a processes described as *matching* by Dubois and Gadde. Accordingly, we have avoided forcing data to fit preconceived or pre-existing categories of barriers in our framework, and rather applied a parallel development. For instance, some of the analysis uncovered that we were lacking important aspects in our case study, and we therefore arranged two of the last interviews during the last weeks before finalising the paper.

Furthermore, a process described as *direction and redirection* involved the use of multiple sources, which served not as verification, but rather as a provider of new dimensions and unknown aspects of our research problem. Instead of directing data collecting activities towards the search for specific data in line with the current framework, we utilised unanticipated data to further develop our framework and also broaden our search for theoretical concepts. This was the case when we established our potential barriers. The categories are both based on the literature study and what we uncovered as important aspects in reality.

## 2.1 Literature study

In our paper we have conducted a literature study to get an overview of the academic field concerned with our study. According to Yin (2009), a common mistake in case studies is to generalise the results through statistical generalisation. Therefore we wanted to perform a literature search in order to allow us to do analytic generalisation by comparing previously generated theory with the empirical results of our case study.

Our literature study has served as a point of departure for our barrier framework, and we have in our work applied the following classifications of Locke and Golden-Biddle (1997). We aimed to construct an *intertextual coherence* – researching existing knowledge and organising it in order to show how different research relates to each other and our paper. Furthermore, our paper intended to build a *progressive coherence* – outlining the build-up of an area of knowledge that is generally acknowledged. Additionally, we agreed with Bryman and Bell (2011, p 91) who claim that outlining existing literature “is a means of developing the significance of your research”.

### 2.1.1 Search strategy

An important choice when performing a literature search is the distinction between a keyword search and journal search (Bryman and Bell, 2011). Our research theme of barriers to public procurement for innovation has been built upon research from a broad range of subjects, such as innovation, procurement and literature discussing the public sector. As no single journal would be able to cover our research topic sufficiently, we favoured a keyword search over a journal search.

Another important choice is between a systematic review and narrative review (Bryman and Bell, 2011). According to the recommendations of Bryman and Bell, a systematic review in the form of a comprehensive, unbiased literature search is to be favoured in order to ensure replicability and ensure a reliable foundation for the research. Still, we wanted to perform a narrative review without focusing on explicit criteria for inclusion or exclusion of relevant literature, as it according to Bryman and Bell (p. 101) may “be more suitable for qualitative researchers”. We knew that such an approach would reduce the reliability of our study (as further described in 2.3.2), but decided that it was more important to allow the possibility of snowballing in the event of discovering other articles thought relevant in footnotes or bibliographies. The concept of snowballing was an important aspect of our literature search, as our background within strategic purchasing has had limited concern with the public sector and our initial search scope was therefore too narrow.

In the literature search we used Google Scholar as our main search engine, thereby getting an overview of both accessible and non-accessible literature. As Google Scholar comprises sources of a varying quality, we made sure only to rely on peer-reviewed journals and scholarly books.

Consequently, semi-academic articles were excluded. In some cases we used supplemental search engines such as Scopus or ScienceDirect, particularly in the event of searching for a specific article. Our keywords were created based on selected subjects, namely innovation, public innovation, purchasing, public procurement, and public procurement for innovation. Generally, research concerning the private sector was easier to obtain compared to the public sector.

### **2.1.2 Review procedure**

Our literature review was conducted according to the following procedure. First, articles or other sources containing keywords in the title or abstract were included in a pre-selection. Thereafter, the abstracts were read and articles thought to be less relevant were excluded. Finally, the remaining sources were included in a thorough review, and structured in a table sorted by the appropriate research theme. During the review, notes regarding the following were made in the table: authors, year, journal, citations, title, research method, key takeaways and intended use. By structuring the information regarding our literature we wanted to establish an overview and furthermore simplify the process of writing up our theoretical background. The resulting table is presented in Appendix 1.

In the event of discovering relevant literature through references or bibliographies during the process of creating the review table, the new literature was included according to the procedure described. Likewise, if we during the gathering of empirical data uncovered research areas in which our literature background did not describe to a satisfactory level, we applied the systematic combining methodology and expanded our search according to the described procedure.

## **2.2 Empirical study**

### **2.2.1 Selection of research design**

According to Yin (2009) and Wacker (1998), two widely recognised researchers within the field of research methodology, there are no research method superior to the other, although certain research methods fit better to certain purposes. In the following we will present arguments for our choice of research design. First we will explain why we chose to do a case study, then we will outline why we do a multiple-case study rather than a single-case, before finally describing our case selection rationale.

In order to assess when to use different research methods, Yin (2009) outlines three conditions; evaluating the form of the research question, the extent of control an investigator has over actual behavioural events, and the degree of focus on contemporary as opposed to historical events. As we have little control over behavioural events, and our focus is on contemporary events, the logic of Yin essentially leaves us with two possibilities: survey or case study. According to Yin, the difference here lies, somewhat simplified, in whether the research question is in the form of *what* (suggesting survey) or *how* (suggesting case study). As the research questions in our study set



out to uncover both *what* the barriers to public procurement for innovation are and *how* they can be managed, the most natural conclusion would be to do both a survey and case study. However, we have chosen only to do a case study, for two reasons.

The first is quite simply that the timespan of our study has been five months. While it is possible to conduct both a survey and a case study during that time, we decided that it would be better to focus on doing a proper case study. The second factor influencing our decision was an assessment of how important the results of a survey would be to answer the research questions, where we found that it would be helpful, but that it was not critical. As long as we could find the barriers in the cases we examined, this would be verification of its existence. However, the lack of survey would not tell us whether it was a prevalent barrier or not. As such, while a survey would have been useful, a proper case study was more important, so that we could better understand the nature of the barriers, and through this hopefully find out how they could be overcome, i.e. answering our second research question.

According to Yin (2009), a case study is beneficial in order to investigate a phenomenon within its real-life context and when the boundaries between phenomenon and context are blurry. As these characteristics will be representative for our case on specialised health services in Norway, the rationale for choosing a case study is strengthened.

Having settled on case study as our empirical research method, we evaluated the advantages and disadvantages of single- and multiple-case designs (Yin, 2009). Yin recommends using multiple cases whenever there are resources available due to the increased possibilities of experiencing both direct and theoretical replication of events later used for theory building. Furthermore, Yin (p. 61) argues on in favour of multiple-case, as the analytic conclusions “will be more powerful than those coming from a single case”. Still, we acknowledge the arguments of Dubois and Gadde (2002), who claim that increasing the number of cases, with the same available resources, would result in more breadth, but less depth, and furthermore pay attention to the increased resource demand following a multiple-case, as proposed by Yin.

Moreover, during the development of our empirical study attention was given to relevant subareas of our selected cases, concurring to the categories of our proposed framework. Therefore it follows that we according to the classification of Yin have applied an embedded multiple-case study design (see Figure 4). In retrospect we acknowledge that some cases resulted in more insight than others, where e-kurve and Seekuence Medical were particularly valuable. However, it would have been hard to predict which cases that would prove most valuable beforehand.

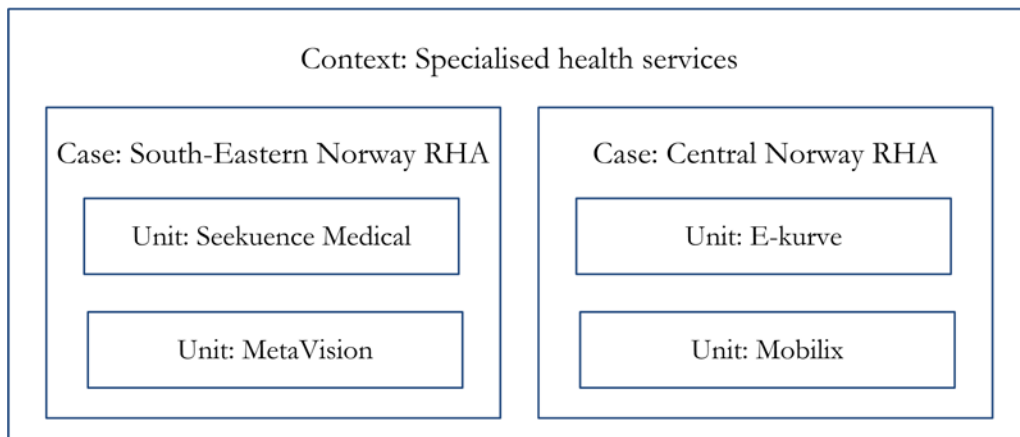


Figure 4: Illustration of the embedded multiple-case study design for this study

### 2.2.2 Data collection

According to Yin (2009) there are six different methods of data collection, out of which we chose to apply three of them: *documentation*, *archival records*, and *interviews*.

An important source of information has been documentation in the form of governmental white papers as well as organisational reports from health authorities. Additionally we have used archival records in the form of survey data from Statistics Norway. We recognise that despite our precautions, our empirical data will to some extent be coloured by the publisher. For instance, the governmental white papers we have used may reflect the political ambitions of the current Norwegian government. In order to mitigate the subjectivity we have applied multiple and supplemental sources whenever possible.

The most important source, however, has been the interviews conducted throughout the study. During our data collection we have met with both regional health authorities, hospital trusts and suppliers, and we have travelled to Oslo, Drammen, Porsgrunn as well as Trondheim in order to perform the interviews. Additionally, we have performed two phone interviews in the event that it was most suitable for the interviewee. An overview of the interviewees is presented in Table 1. During the preparation of the interviews we created an interview guide to structure our interview process. The guide starts with outlining the context for our related case, before examining the connected innovation process. Afterwards we move over to the attached procurement process, and finish our interview with questions in relation to our proposed framework. Our interview guide is presented in Appendix 2. During the interviews our guide served more as guidelines for conversations, as we for instance realised that it was less appropriate to talk about procurement with a person in charge of implementing ICT solutions. We therefore adapted the conversations to the background of the interview objects.

Table 1: List of interview objects. All interviews were recorded and transcribed.

Date	Name	Title	Location	Duration
06.03.2013	Roger Presthus	Account manager, Hemit (earlier project leader e-kurve)	Trondheim	94 min
08.03.2013	Bjørn Grønli and Kjetil Istad	Head of innovation and director of purchasing and logistics, South-Eastern Norway RHA	Oslo	91 min
10.04.2013	Ragnvald Otterlei	Managing director, Posicom	Phone	101 min
16.04.2013	Harald Noddeland	Manager of pre-hospital services, Vestre Viken HT	Drammen	116 min
17.04.2013	Morten Andresen	Founder and vice president of strategy , Imatis	Porsgrunn	104 min
29.04.2013	Roger Presthus	Account manager, Hemit (earlier project leader e-kurve)	Trondheim	94 min
07.05.2013	Ivar Myrstad	Project manager, St. Olav's HT	Trondheim	86 min
16.05.2013	Bård Skage	Head of procurement, Central Norway RHA	Trondheim	74 min
21.05.2013	Andreas Grønbekk	Project manager of regional chart and medication project, South-Eastern Norway RHA	Phone	57 min

According to the classification of Yin (2009) we have performed *in-depth* interviews, asking respondents both about facts concerning the current case as well as their opinions about the events. Yin (2009) suggests that questions asked should be in the form of *how* instead of *why*, so questions are asked in an unbiased way and avoids defensiveness from the informant. We used both *how* and *why* questions in our interviews, as the latter were necessary to uncover causal links. However, we paid attention to asking the questions in such a way that did not come across as accusatory. Furthermore, we allowed our interviewees to assume the role of *informants* rather than *respondents*, so that they were able to provide insights into a matter and also initiate access to corroboratory sources of evidence. According to Yin, interviewees' responses may be bias, subject to poor recall or inaccurate articulation. As we have asked for opinions of the interviewees this is a particular weakness of our case. However, we decided that these opinions

were crucial for our understanding of the cases, because they would uncover aspects that would not be described in other sources. We therefore argue that our choices are justified.

Our data collection process has followed the three principles proposed by Yin (2009) in order to maximise the benefits of our evidence. The three principles are as follows: use multiple sources of evidence, create a case study database and maintain a chain of evidence in the case study.

**Multiple sources:** We have aligned ourselves with Yin (2009, p. 116) who claim that “any case finding or conclusions is likely to be more convincing and accurate if it is based on several sources of information”. Accordingly, we have applied two of the four types of triangulation as proposed by Patton (2002): *data triangulation* and *investigator triangulation*. Data triangulation was established through the use of multiple sources such as documentation, archival records and interviews. We applied a strategy proposed by Yin (2009) in order to ensure a critical interpretation of these accounts, and sought to understand the purpose and audience of the data in order to avoid being misled. Furthermore, we applied four key questions to understand the subjectivity of the sources when analysing documents, archival records and interviews, as proposed by Bryman and Bell (2011):

1. What kind of person, company or organisation has produced the item?
2. Who (or what) is the main focus of the item – one specific politician, expert, organisation or technology?
3. Who provides the alternative voices?
4. What was the context for the item – an interview, the release of a report or an event?

Moreover, investigator triangulation was achieved by having both authors of this paper present at all interviews and read all written material. Still, we recognise the weakness of our investigator triangulation, as both authors have a similar background.

**Create a case study database:** Moreover, we established a case study database through the use of two separate collections. First, we have created a shared *Dropbox* folder containing articles, documents and interview recordings, and second we have created a shared *Skydrive* folder containing our written report. The folder structure makes the raw data available for independent inspection, which according to the principles of Yin increases the reliability of our study.

**Maintain a chain of evidence:** Our last effort was to establish a chain of evidence through the creation of our research methodology. By describing our methodology we aim to allow external observers to follow the derivation of evidence from initial research question, literature review, to final conclusions.

### 2.2.3 Data analysis

As we recognised the arguments of Yin (2009), who claim that “the analysis of data from case studies is one of the least developed and most difficult aspects of doing case studies”, we approached the creation of our data methodology in a systematically way. We aligned ourselves with Eisenhardt (1989, p. 539), who claim that “analysing data is the heart of building theory from case studies”, and wanted to establish a transparent methodology of data analysis based on the work of widely recognised authors.

First, we applied the recommendations of Yin (2009) in order to improve the quality of the research investigation. Yin argues that the best preparation for conducting a case study analysis is to have a general analytic strategy, and furthermore present relying on theoretical propositions as the preferred strategy. Consequently we have applied this strategy in our research, and our theoretical study has resulted in a framework and theoretical propositions, which have furthermore shaped the data collection plan and therefore given priorities to the relevant analytic strategies.

Second, we have applied one of the five analytic technics suggested by Yin (2009) in order to analyse the gathered data, namely the analytical technique of *pattern matching*. During our analysis we have outlined a framework based on a theoretical study suggesting theoretical propositions of expected findings in our case data, and thereafter compared an empirically based pattern with predictions from the theoretical study. The process of pattern finding has followed two subsections.

**Within-case analysis:** According to Eisenhardt (1989, p. 540), within-case analysis “typically involves detailed case study write-ups for each site. These write-ups are often simply descriptions, but they are central to the generation of insight”. The within-case analysis of our case involved the selection of what information to include in the case descriptions presented in Chapter 4, and it was useful both in order with the large volume of data gathered and to familiarise with each case as a stand-alone entity. We recognise this process as important to identify unique patterns of each case before pushing to generalise across cases. Furthermore, we wanted to establish a familiarity with each case in order to accelerate cross-case comparison.

Our write-ups started after the interviews were conducted and consisted of creating detailed descriptions of the cases through the use of interview recordings, documents and archival records. Our descriptions were given a narrative structure according to a time-line arrangement of each case, and all descriptions were written individually for each case.

**Cross-case analysis:** In our cross-case analysis we wanted to identify patterns within and between cases. During the identification process we relied on the theoretical propositions

established based on our theoretical study. This is in accordance with the suggestions of Eisenhardt (1989), who recommend selecting categories or dimensions and then to look for within-group similarities coupled with intergroup differences. In our cross-case analysis, we try to some extent to compare across cases, but perhaps more importantly, we draw different experiences from different cases. This is done in Chapter 5.

According to Eisenhardt (1989, p. 541), cross-case searching tactics “enhance the probability that the investigators will capture the novel findings which may exist in the data”. Consequently, by applying this technique we wanted to go beyond our initial impressions, and we used our theoretical propositions as diverse lenses on the data when we established our data analysis.

## **2.3 Evaluation of methodology**

In order to evaluate the quality of our research methodology we will adopt the four tests proposed by Yin (2009). In the following we will evaluate the extent to which each applied test fulfil the proposed criteria, and furthermore discuss what could have been done differently.

### **2.3.1 Validity**

#### ***2.3.1.1 Construct validity***

Construct validity deals with the extent to which the operational measures we use are actually representing the concepts we study (Yin, 2009). Yin proposes three available tactics in order to increase the construct validity, which we have applied.

Firstly, our study is built on a set of operational measures identified as barriers to public procurement for innovation both through a theoretical study, an empirical study and the subsequent analysis. In our study we have sought to define the constructs we use (see 3.1). Still we realise that various definitions exist both in academia and in real life. Even though we have been consistent in terms of our definitions, it has therefore been a challenge to ensure that operational measures are equally defined by all involved actors. The identification may be criticised of both subjective judgement and inconsistencies regarding perceived definitions amongst involved actors during every part of the process. In order to encourage converging lines of enquiry and mitigate subjective judgement, we therefore applied both data triangulation and investigator triangulation.

Furthermore, our research methodology aimed to establish a clear chain of evidence, and thus allowing external investigators to follow how the measures applied represent the right concepts.

Finally, we applied the last proposal of Yin (2009), as we had key informants review our empirical data after the write-up. We used this procedure in order to corroborate essential facts and evidence in our case report.

### *2.3.1.2 Internal validity*

Internal validity is concerned with the question of whether a causal relationship, whereby certain conditions are believed to lead to other conditions, are distinguished from spurious relationships (Bryman and Bell, 2011; Yin, 2009).

In our study we want to explain why certain conditions in procurement projects of ICT in the specialised health services in Norway are hindering the realisation of the innovation potential in the projects. Our research involves investigating causal links between potential barriers and our case material, and in order to assure the internal validity of our findings we incorporated the analytic technique of pattern matching where we compared an empirically based pattern with a predicted one based on the theoretical study. However, no explicit criteria were given to determine how close a match had to be in order to be considered a match. It follows that the internal validity has been reduced.

Furthermore, we have to a small extent addressed barrier interdependencies. We realise that in order to investigate all causal links related to barriers to procurement for innovation the barriers should have been addressed not only as independent, but also as interconnected conditions. We limited this to concentrate on the link between the each barrier and procurement for innovation, and find that more research would be needed to look at interdependencies. Nevertheless, we try to look at it when answering the second research question in 6.2.

Additionally, internal validity for case studies concerns the problem of making inferences (Yin, 2009). According to Yin (p. 43) a case study “involves an inference every time an event cannot be directly observed”. Much of the information used in our empirical case has been gathered through interviews, and often we collected personal opinions and reflections. Consequently inferences on the interviewees’ behalf and by us naturally have had to be made. It follows that the internal validity of our study has thus reduced the quality of our research methodology, and in order to mitigate this limitation we had the interviewees review our empirical data and correct wrongful inferences.

### *2.3.1.3 External validity*

External validity deals with defining the extent and conditions under which the results from this study can be generalised (Yin, 2009). In our case, the question is whether our findings can be generalised to other public organisations than the specialised health services, other products than ICT solutions, and to other countries than Norway. Unlike other research methods, such as survey, where it is possible to make statistical generalisation, case studies rely on analytic generalisation (Yin, 2009). This means that we generalise our findings according to a broader theory on public procurement for innovation. Therefore, it has been important for us to build a strong theoretical foundation for our study.

However, Yin also states that such generalisation does not happen automatically. Rather, the study must be replicated to other contexts (other organisations, products, countries) to see if the theory holds. As such, each iteration that supports the findings strengthens the theory. This is also one of the reasons why Yin (2009, pp. 60-61) promotes a multiple case study, stating that it leads to “increased possibilities of experiencing both direct and theoretical replication of events later used for theory building”. While all our cases are from within the same context, they also have differences and have provided different insight that one case alone would not have.

### **2.3.2 Reliability**

According to Bryman and Bell (2011) reliability means that a repetition of the research process using the same method must necessarily lead to the same result. Our choices in our research methodology have to some extent lowered the level of reliability.

In our paper we have thoroughly described our research methodology, and hence allowed for replication by other researchers. Our literature search strategy of using explicit keywords and Google Scholar will, as long as articles and journals are not added or removed from the search database, allow for replication. However, our narrative approach, without focusing on explicit criteria for inclusion or exclusion of articles believed to be relevant for our paper, has been coloured by personal bias and our article selection has therefore lowered the reliability of our study. By applying a set of inclusion criteria for article selection, i.e. pursuing a more systematic review, we could have increased the transparency, reduced the personal bias and hence increased the possibility for repetition of our research process.

Additionally, we have developed our empirical study in parallel to the theoretical study according to the arguments of the systematic combining methodology of Dubois and Gadde (2002). Our data collection has therefore been altered all throughout the process in order to concur with newly uncovered aspects of the theoretical study. In particular, the first interviews were performed before our theoretical propositions were established, and we were therefore not able to look for empirical data directly related to the propositions. Completing the theoretical study in advance would have enabled a stricter data collection process and hence easier replication. We recognise these weaknesses in the quality of our research methodology.

### **2.3.3 Total evaluation**

Bryman and Bell (2011) claim that qualitative research suffers from a lack of transparency, is too subjective and difficult to replicate, and furthermore lacks the ability to generalise the finding to a larger population. These are certainly issues that we have struggled with in order to ensure validity and reliability for our study. The lack of transparency we have tried to reduce through clear documentation of our research design and data collection, although the conversational nature of our interviews would make it hard for other researchers to replicate. The matter of



subjectivity we have tried to mitigate through the use of multiple sources, but as this has not always been possible, we have had to take into the account the personal views of our interviewees. In terms of generalisation, we are back to the discussion on statistical versus analytical generalisation, where we have worked to apply the latter through linking our findings with relevant theory.

Perhaps the biggest challenge has been to ensure internal validity and find out what are true causal links, and what might be explained by other conditions. In the end, we arrive at a common challenge for research in social sciences, where the aim is to give meaning to the complexity of reality, but where it often is not possible to observe phenomena in isolation. Keeping the complexity in mind, we have tried hard not to draw too hasty conclusions. Nevertheless, we encourage readers not to jump to the end of this paper, but instead follow its course through literature review, case presentation and analysis, and make up their own conclusion.

In the end, we find that given the time and resources at hand, we have managed quite well with the degree of validity and reliability of our study. It certainly has imprinted in us the critical mind of a researcher.



### 3 Theoretical study

The theory chapter consists of three parts, as outlined in Figure 5. First we go through the definition (what), reasons (why) and government actions (how) of public procurement for innovation. Following this we will review frameworks that give insight to aspects driving public procurement for innovation. Based on these driving forces, or rather the lack thereof, we will in the last part propose a set of possible barriers, i.e. propositions that we would like to investigate further.

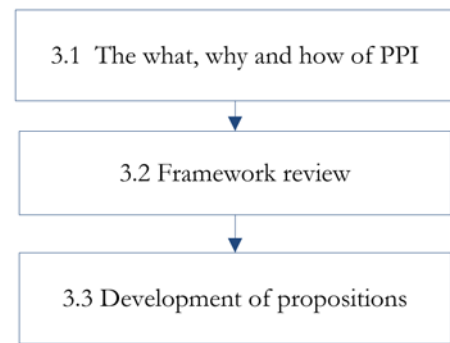


Figure 5: Structure of theoretical study

#### 3.1 The what, why and how of public procurement for innovation

##### 3.1.1 The what of public procurement for innovation

Before defining public procurement for innovation, it is necessary to look at the three words that it comprises. While each of these could result in a discussion of its own, we will limit it here to explaining how we intend to use them.

**Procurement**, or purchasing as it is more commonly called outside the public sector, can be defined as “[t]he management of the company’s external resources in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company’s primary and support activities is secured at the most favourable conditions” (van Weele, 2005, p. 12). Van Weele argues that procurement is a somewhat broader term than his definition of purchasing, while Arlbjørn and Freytag (2012) argue that purchasing is used for manufacturing and procurement in governmental circles. As there is no consistent use in academic literature, we will use the two terms interchangeably. Related terms, such as supply management and acquisition, will not be used. The only deviation we will allow ourselves from the definition given by van Weele is that we consider purchasing, or procurement, an activity that can be performed by any organisation, not only companies. A typical procurement process is illustrated in Figure 6, and we will return to this more in detail in 3.3.2.



Figure 6: Procurement process (van Weele, 2005)

**Public**, in the context of public procurement, denotes the nature of the purchasing organisation. While this could be understood as the entities that make up the local and central administration of a country, and as such distinct from private companies and non-profit organisations, we found in our study preceding this one that the distinction is not always that clear (Bjørnaas and

Schmidt-Horix, 2012). Borderline examples are public commercial enterprises, and in particular state-owned companies. We will not clarify this grey zone here, but instead establish that procurement conducted in the regional health authorities and health trusts of Norway, the subject of our empirical study, falls within our understanding of public procurement. This can be justified both by the nature of the service provided, and the control the government has over these entities through ownership, regulations and the state budget.

**Innovation** can be defined as “the management of all the activities involved in the process of idea generation, technology development, manufacturing and marketing of a new (or improved) product or manufacturing process or equipment” Trott (2008, p. 15). Different types of innovation can be separated by many characteristics, which will only be mentioned briefly here (see Bjørnaas and Schmidt-Horix (2012) for a more thorough description of the nature of innovation). Innovation can be technological or non-technological and pertain to the product itself or the processes that lead up to it. Furthermore, many scholars separate between large, discontinuous, radical innovation and smaller, incremental innovation that builds on existing products and processes. Lastly, it is common to distinguish between innovation initiated by technology-push and demand-pull. Due to procurement representing a demand by a customer it is viewed as a representing demand-pull (Edler and Georghiou, 2007). A typical innovation process is depicted in Figure 7, and we will return to this more in detail in 3.3.2.



Figure 7: Innovation process. Simplified from Rothwell and Zegveld (1985)

With the three terms defined, we can continue to the definition of **public procurement for innovation (PPI)**. Edquist et al. (2000, p. 5) who at that time used the analogous expression public technology procurement<sup>1</sup>, wrote that it “occurs when a public agency places an order for a product or system which does not exist at the time, but which could (probably) be developed within a reasonable period”. In a study made prior to this one, we argued that this definition could need some elaboration. First, we found it was useful to state explicitly that innovation can take place both in tangible goods and intangible services. Furthermore, innovation is not limited to the final product, but can also take place in processes within the firm, such as production or organisation. Lastly, Uyarra and Flanagan (2010) argue that public procurement is a multi-objective policy, in which innovation often has a secondary role with respect to other goals. As such, they reason, public procurement for innovation should not only encompass situations

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<sup>1</sup> In later articles Edquist uses public procurement for innovation, and also explains in Edquist & Zabala-Iturriagoitia (2012a) that this expression has replaced public technology procurement in denoting the same phenomena.

where innovation is the explicit aim of the procurement, but also procurement that leads to innovation by incident. A good example of this is process innovation, which according to Hommen and Rolfstam (2009, p. 21) is incidental, as it “[takes] place entirely within the boundaries of a producer organisation”. Or, put differently, the procuring organisation is purchasing the product, not the underlying processes, and as such any resulting process innovation cannot be intentional from the procurer.

Following these considerations, we propose the following definition of public procurement for innovation (Bjørnaas and Schmidt-Horix, 2012):

**Public procurement for innovation:** A purchase by a public organisation of goods and/or services with the explicit intent or implicit consequence of inducing innovation, whether of the procured product itself or of the underlying processes.<sup>2</sup>

In cases where we want to address the distinction between explicit intent or implicit consequence, we will use the terms explicit PPI, i.e. the intention is to procure innovative solutions either because it does not exist or because existing solutions are considered inferior, and implicit PPI, i.e. where there is no intention to buy innovative solutions, but where the outcome still is that innovation takes place. Primarily we will focus on explicit PPI throughout our study, as we find it will be hard to develop strategies for procurement where innovation is incidental.

It is also important to distinguish public procurement for innovation from regular procurement, which can be done using the concept of exploration and exploitation popularised by March (1991). The idea is that there needs to be a balance between “exploration of new possibilities and the exploitation of old certainties” where “[e]xploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discover, innovation”, while “[e]xploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution” (March, 1991, p. 71). Almeida (2012) has proposed that public procurement for innovation can be understood as exploration procurement, while regular procurement is exploitation procurement. We will also use this distinction.

As a subset of public procurement for innovation is the classification of developmental and adaptive PPI, which essentially builds on the difference between incremental and radical innovation (Edquist and Zabala-Iturriagagoitia, 2012a). Here it should be added that the line

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<sup>2</sup> It should be emphasised that this definition excludes procurement of innovative products that have already been developed. For the same reason, we choose to use the expression public procurement *for* innovation instead of public procurement *of* innovation, as this may be misleading.

between developmental PPI and adaptive PPI is somewhat overlapping, and there also will be different views on where adaptive PPI ends and the continuous improvement of regular procurement begins. According to Hartley (2005) this distinction is elusive, and depends on the perception of stakeholders. Following the distinction between regular procurement and procurement for innovation, as well as the difference between adaptive and developmental PPI, we get three types, as presented in Table 2.

Table 2: Adaptive and developmental PPI

<b>Regular procurement</b>	<b>Adaptive PPI</b>	<b>Developmental PPI</b>
Continuous improvement	Incremental innovation	Radical innovation
Known to the organisation	New to the organisation	New to the world
Exploitation	Exploration	Exploration

More rigorous typologies of public procurement for innovation have been developed by Hommen and Rolfstam (2009) and Uyarra and Flanagan (2010). These are closely examined in our pre-study, but we have chosen not to include them here (see Bjørnaas and Schmidt-Horix, 2012). The main reason for this is that they are not directly relevant for our study, and presenting them would be a digression.

A last expression we would like to clarify at this point is **pre-commercial procurement (PCP)**, which is a procedure proposed by the European Commission for the procurement of R&D (see Apostol, 2012; Edler and Georghiou, 2007; Edquist and Zabala-Iturriagoitia, 2012a). Pre-commercial procurement is the name given to procurement of research and development (R&D) conducted in stages that precede that of commercial procurement, and which therefore is exempted from the EU directive on public procurement. The process will be further described in 0. Edler and Georghiou (2007, p. 954) state that “the more innovative or idiosyncratic an innovation is, the more likely pre-commercial procurement can be appropriately applied”. From this we assume that pre-commercial procurement will be more prevalent in developmental PPI than in adaptive PPI. We do not, however, agree with Edquist and Zabala-Iturriagoitia (2012a) that pre-commercial procurement is something different than public procurement for innovation. We will return to this discussion in the implications for research in 6.4.

### 3.1.2 The why of public procurement for innovation

Scholars generally point to all or some of the following three reasons for why innovation is important in the public sector, which in turn forms the rationale for achieving public procurement for innovation (see e.g. Aschhoff and Sofka, 2009; Dalpé, 1994; Edler and Georghiou, 2007; Edquist and Zabala-Iturriagoitia, 2012a; Rothwell, 1984; Uyarra and Flanagan, 2010)

**Improve public services:** The main goal of procurement in public services is to provide quality services to the population (Dalpé, 1994; Uyarra and Flanagan, 2010). Innovation can play an important role in this, as pointed out by Edler and Georghiou (2007, p. 949): “Public demand, when oriented towards innovative solutions and products, has the potential to improve delivery of public policy and services, often generating improved innovative dynamics and benefits from the associated spillovers.”

**Address societal challenges:** In addition to the primary mandate of providing public services, public entities also receive other instructions from the government, as a means of operationalising political decisions. On a larger scale, these instructions can be connected to societal challenges such as global warming, energy supply or ageing societies Edquist and Zabala-Iturriagoitia (2012a). Innovation becomes relevant to the extent it is required to address these challenges.

**Increase competitiveness:** The objective of national competitiveness, or rather that of industrial organisations within the country, builds upon the notion that innovation leads to competitive advantage and that demand by the public sector can be a strong contributor to this development (Dalpé, 1994; Porter, 1990). Despite this, it can be argued that when it comes to the procurement on the functional level, the competitiveness of the supplier will not be of particular relevance. Instead, the quality of the public service provided and other top-down instructions will guide their decision. As such, competitiveness can be considered a secondary objective to the two aforementioned reasons, and providing innovative solutions will commonly benefit both the public procurer and the supplier. However, in cases where the public sector sources from abroad, the competitiveness of the national industry might even be weakened.

### 3.1.3 The how of public procurement for innovation

The reasons for pursuing public procurement for innovation do not elaborate on how exactly governments can facilitate supplier innovation through its purchasing power. In our pre-study on literature on public procurement for innovation, we identified four main government actions (see Bjørnaas and Schmidt-Horix, 2012). The actions will be described below. Customer-supplier interaction will be further explored in 3.3.3, while customer sophistication and aggregation of demand are relevant for 3.3.5. Demonstration of use pertains more to the diffusion of innovation than the innovative activity itself, and it is not dealt with further in this study.

**Facilitate customer-supplier interaction:** The fundamental aspect of interactive learning in innovation together with the inter-organisational nature of purchasing explains the importance of facilitating the interaction between the public customer and the supplier (see e.g. Edquist et al., 2000; Hommen and Rolfstam, 2009; Rothwell, 1994). The aim is to reduce information asymmetry, i.e. situations where the supplier does not know what the customer needs or the

customer does not know what the market can offer (Edler and Georghiou, 2007). Examples of such facilitation can be the creation of platforms and systems where public entities can communicate their needs, or changing laws to be less stringent in terms of contact to suppliers.

**Increase customer sophistication:** In addition to communicating their demand, public entities can play a more central role in the innovation process, which may take place in the conjunction of the two actors rather than at the supply side alone. Dalpé (1994) noted that customers with great technological capacity can contribute most the innovation. This may necessitate for public entities to build up certain competences.

**Aggregate demand:** It is clear that innovation always entails a certain risk, and this has to be weighed against the potential reward. Aggregating demand, in essence centralising purchasing, can result in the required scale to reduce the market risk for the supplier and justify their development costs (Aschhoff and Sofka, 2009; Edler and Georghiou, 2007; Uyarra and Flanagan, 2010). Aggregation of demand can also lead to process innovation in later stages of the product life cycle (as it can justify processes that require higher investment) and standardisation (adopting a “dominant design” that other markets will follow). Nevertheless, there are also factors that advocate decentralisation, such as taking into account local differences in demand and making it possible for small and medium enterprises (SMEs) to participate in the tendering process.

**Demonstrate use:** A public entity may often not be large enough in itself to provide the required scale for the suppliers to build a sustainable business on the innovation developed. Aggregation of demand may not be feasible, or not enough, and the role of the public body will instead be to act as a show case for future customers (Aschhoff and Sofka, 2009; Edler and Georghiou, 2007; Moore, 2006). In other words, the possibility for consequent diffusion becomes important as to whether the supplier will proceed with the development. Examples of such spillover effects can be municipalities adopting the solution from the piloting municipality, or health trusts in other countries expressing interest in the product.



### 3.2 Framework review

Several studies and frameworks exist to organise and structure procurement, innovation and procurement for innovation. We will now examine a selection relevant to our paper. The purpose is to create a foundation upon which we build a framework structuring barriers to public procurement for innovation. The aim is to create a foundation for establishing different categories affecting public procurement for innovation. We have chosen research concerning both generic purchasing and generic innovation in addition to articles discussing the two concepts and how they relate. An overview illustrating whether the chosen articles relate to purchasing and innovation is displayed in Table 3. Most of the literature presented is based on the private sector and we will therefore end the presentation by outlining research concerning public innovation and purchasing.

Table 3: Overview of articles

	Purchasing		Innovation	
	Private	Public	Private	Public
Castaldi et al. (2011)	x		x	
Roy et al. (2004)	(x)		x	
Jean et al. (2012)	x		x	
Loewe & Dominiquini (2006)			x	
Schlegelmilch et al. (2003)			x	
Cousins et al. (2008)	x			
Potts & Kastle (2010)				x
Telgen et al. (2007)		x		

#### 3.2.1 Castaldi et al. (2011) Strategic purchasing and innovation

Castaldi et al. (2011) suggest that innovation through purchasing is closely linked to making purchasing strategic, and argue that strategic purchasing can contribute to firm innovation activities. In their study, they develop a relational view of strategic purchasing where the purchasing function does not only include the resources of the purchasing function in itself, but also resources from the external relations with the firm's suppliers and from the internal relations with other functions in the firm.

First, they argue that the *quality of the purchasing function* is determining purchasing contribution to innovation. They state that "the same relations that render purchasing strategic are also instrumental for using innovation to build competitive advantage" (Castaldi et al., 2011, p. 984) and argue that a strategic purchasing function possess several of enabling factors for innovation. The strategic nature of the purchasing function is only one of the dimensions determining its quality, and the other dimensions include the knowledge and skills of purchasing professionals,

resources available, the status of purchasing in top management, and the risk perspective of the function.

Moreover, Castaldi et al. (2011) advocate the degree of *purchasing integration* as positively related to a contribution of purchasing to innovation. Purchasing integration describes the extent to which purchasing is related to other functional areas, and includes participating in cross-functional teams, being involved in strategic decisions, and aligning purchasing' knowledge and capabilities with other functional areas.

Finally, the extent to which suppliers are involved is related to the purchasing contribution to innovation. According to Castaldi et al. (2011), the *supplier involvement* is characterised by the degree that purchasing is aware of the company's supply base and that key suppliers are clearly distinguished and engaged through long-term relations. In addition, emphasis is put on the responsibilities the suppliers assume regarding the development of a part, process or service for the benefit of a buyer's current or future development projects.

Based on the rationale above, Castaldi et al. (2011) establish a conceptual model stating that the purchasing contribution to innovation is dependent on the quality of the purchasing function, purchasing integration and supplier involvement. The purchasing contribution is defined as “the input, support and necessity of the purchasing function for the firm's formal and informal innovation processes” Castaldi et al. (2011, p. 989), and this is illustrated in Figure 8.

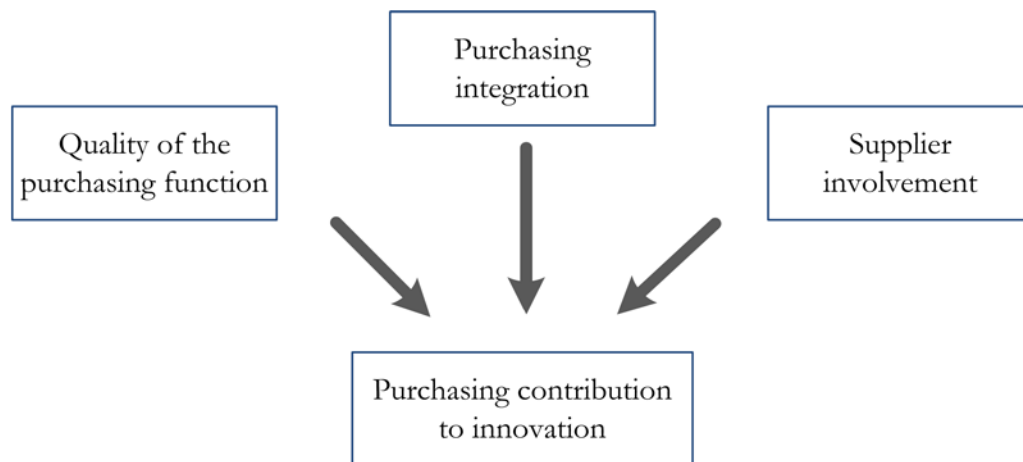


Figure 8: Purchasing contribution to innovation. Adapted from Castaldi et al. (2011)

### 3.2.2 Jean et al. (2012) Drivers and dependence outcomes of supplier innovation generation in customer-supplier relationships

In their study from 2010, Jean et al. build on the knowledge-based view of Grant (1996) and examine how the supplier innovation generation in customer-supplier relationships is based on knowledge and learning. They identify factors in relation to customer-supplier relationships that influence the process of innovation generation, namely supplier market knowledge acquisition, relationship learning, systems collaboration and technological uncertainty, and outline how innovation in customer-supplier relationships is based on “the application (or utilization) of external knowledge to generate new products or processes in exchange relationships” Jean et al. (2012, p. 1005). In Figure 9 the factors positively related to supplier innovation generation are displayed, and they are briefly described below.

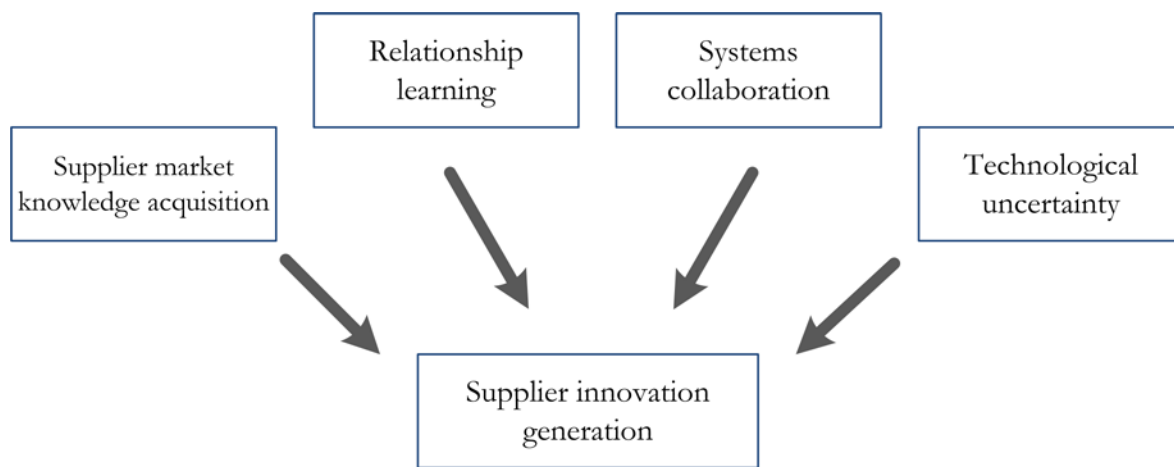


Figure 9: Supplier innovation generation. Adapted from Jean et al. (2012)

The first factor is *supplier market knowledge acquisition* and *relationship learning*. The rationale is based on the relationship’s ability to create new knowledge in order to facilitate innovation, an extension of viewing innovation as the outcome of knowledge integration, application, and reconfiguration as proposed by Grant (1996).

The second factor is *systems collaboration*, which Jean et al. (2012, p. 1011) define as “the extent to which customers and suppliers strive to make and keep their supply chain systems compatible with each other”, and claim that system collaboration may eliminate potential integration barriers between exchange parties, and thus facilitate interaction and coordination between customers and suppliers. Accordingly, the ability to identify and exploit information from the environment increases and systems collaboration may stimulate innovation generation.

The third factor is *technological uncertainty*. According to Jean et al. (2012), unpredictable changes in the technological environment may result in a shorter product life cycle, forcing firms to introduce innovations both in order to avoid the threat of being obsolete and also being able to capitalise on emerging markets.

Accordingly, the study shows how market knowledge acquisition, relationship learning, systems collaboration, and technological uncertainty may drive supplier innovation generation in customer-supplier relationships.

### 3.2.3 Roy et al. (2004) Innovation generation in supply chain relationships

In their study on innovation generation in supply chain relationships, Roy et al. (2004) investigate how both internal and external factors in upstream supply chain relationships affect innovations. After conducting an extensive literature review, they propose that innovation generation in supply chains relationships is a consequence of interactions between buyers and sellers. They argue that buyer-seller interactions form the basis of knowledge transfer and therefore the adaptive learning process. Furthermore, they claim that innovation is the result of an interactive learning process. Accordingly, they base their research on buyer-seller relationships and aim to explicate the link between interaction and innovation generation.

Roy et al. (2004) propose two segments of factors that may affect innovation generation in a supply chain relationship. The first segment involves factors that are internal or dyadic to the interfirm buyer-seller relationship. These factors may be managed bilaterally through managerial action on either side of the relationship, and include factors such as *IT adoption, commitment, and trust*. The other segment includes factors external to the relationship and these are generally not under the control of the dyad. The external factors include *tacitness of technology, stability of demand, and network connections*. A figure illustrating the finding of Roy et al. (2004) is displayed in Figure 10.

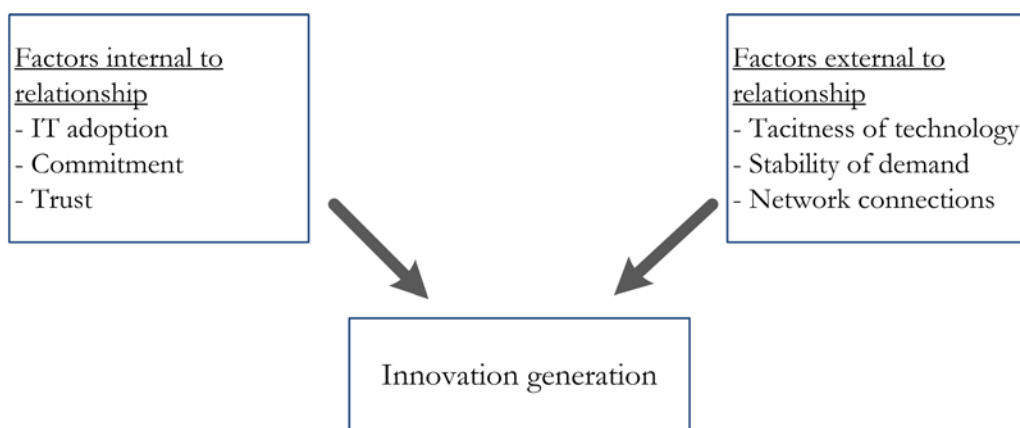


Figure 10: A model of innovation generation in supply chain relationships. Adapted from Roy et al. (2004)

### 3.2.4 Loewe and Dominiquini (2006) Overcoming the barriers to effective innovation

In their study, Loewe and Dominiquini (2006) investigate 550 large companies in order to uncover and structure the keys to a systematic innovation capability. First, they discover that several obstacles are consistent across industries, and furthermore that the examined companies deals with the obstacles in a piecemeal rather than a systematic way. Consequently, the companies' innovation efforts fail or at best result in a one-time success the company would be unable to repeat.

In order for companies to achieve a systematic process enabling repeated innovation, Loewe and Dominiquini (2006) create a framework of four keys related to the innovation effectiveness of a company. Together, the keys address underlying interrelated root causes of innovation effectiveness and the four keys are leadership and organisation, culture and values, people and skills, and processes and tools. The framework is displayed in Figure 11.

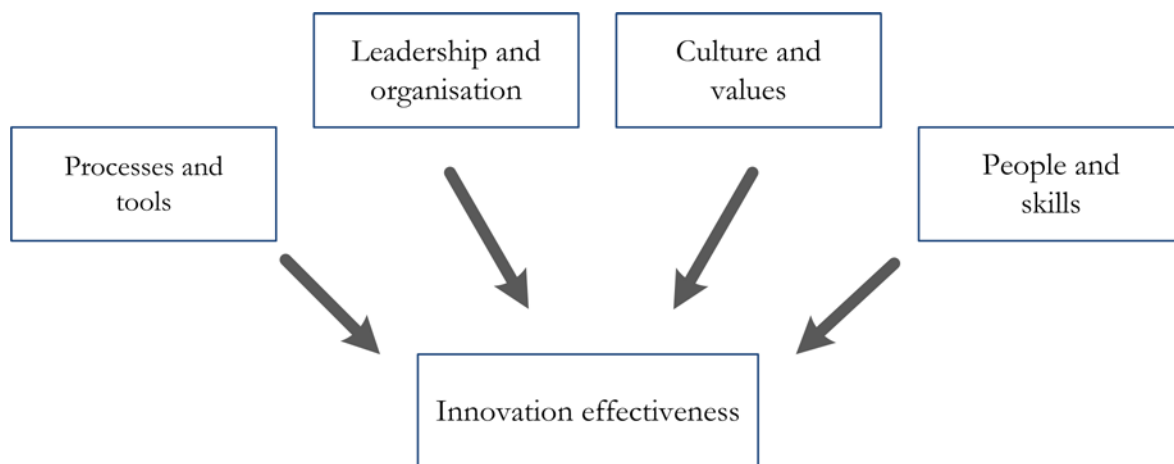


Figure 11: Keys to a systematic innovation capability. Adapted from Loewe and Dominiquini (2006)

In their study, Loewe and Dominiquini (2006) describe how *processes and tools* involve a systematic approach with supporting tools enabling idea generation and elaboration, in addition to pipeline and portfolio management. Furthermore, *leadership and organisation* is described in terms of visionary leaders and organisation aligned around a common definition of innovation, while *culture and values* involve a collaborative, open culture with incentives positively related to challenging the status quo. Finally, *people and skills* contribute to innovation effectiveness through a critical mass of people across the organisation proficient in innovation skills.

### 3.2.5 Schlegelmilch et al. (2003) Strategic innovation

Based on a theoretical foundation, Schlegelmilch et al. (2003) establish a formal specification of the strategic innovation construct and describe strategic innovation as the concept of applying innovation to corporate strategy. Furthermore, they define strategic innovation as “the fundamental reconceptualization of the business model and the reshaping of existing markets (by breaking the rules and changing the nature of competition) to achieve dramatic value improvements for customers and high growth companies” and aim to distinguish the concept from more incremental improvements in cost, quality or both (Schlegelmilch et al., 2003, p. 117).

The authors identify four drivers (see Figure 12) that jointly foster strategic innovation, namely culture, processes, people and resources. According to Schlegelmilch et al., a prerequisite for strategic innovation is a company’s dominate *culture*, routines and unwritten behaviour, and the establishment of a questioning attitude that challenges orthodoxies in addition to a deep sense of urgency. Furthermore, they claim that the traditional analytic strategy innovation *process* should be challenged by a process of creative exploration in order to identify opportunities overlooked by conventional processes.

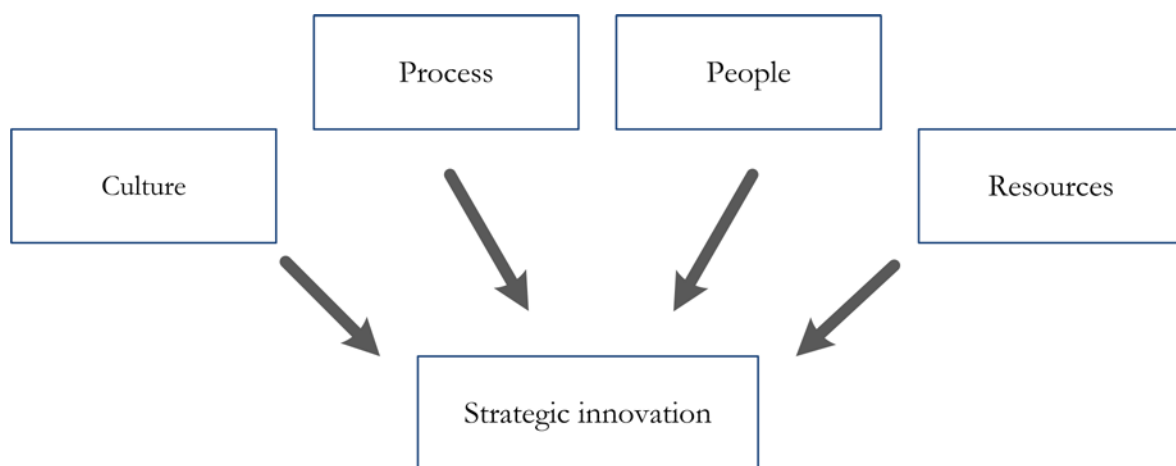


Figure 12: Drivers to strategic innovation. Adapted from Schlegelmilch et al. (2003)

In addition, Schlegelmilch et al. argue how *people*, both within and outside the company, have crucial influence on strategic innovation, as it requires as broad-based perspective. Accordingly, the dialogue about strategy and innovation should cross-functional and hierarchical boundaries, and people outside the company should be involved in order to provide an outside-in perspective. Finally, Schlegelmilch et al. argue contrary to conventional logic that is claiming that companies should leverage its existing *resources* and match internal capabilities with outside opportunities, which according to the authors is biased for the status quo and thus constraining a company’s future. Instead, they argue that strategic innovators should create strong relationships within networks providing complementary capabilities, and thus be able to assess business opportunities without being constrained by where the company it at the given moment.

### 3.2.6 Cousins et al. (2008) The supply wheel

Cousins et al. (2008) propose a framework that provides a classification of five decision areas that make up a purchasing strategy, and outline how this relates to the corporate and business strategy of an organisation. An illustration of the supply wheel is displayed in Figure 13. A key point of the model is that all elements are related, and that altering one of the elements will affect the others.

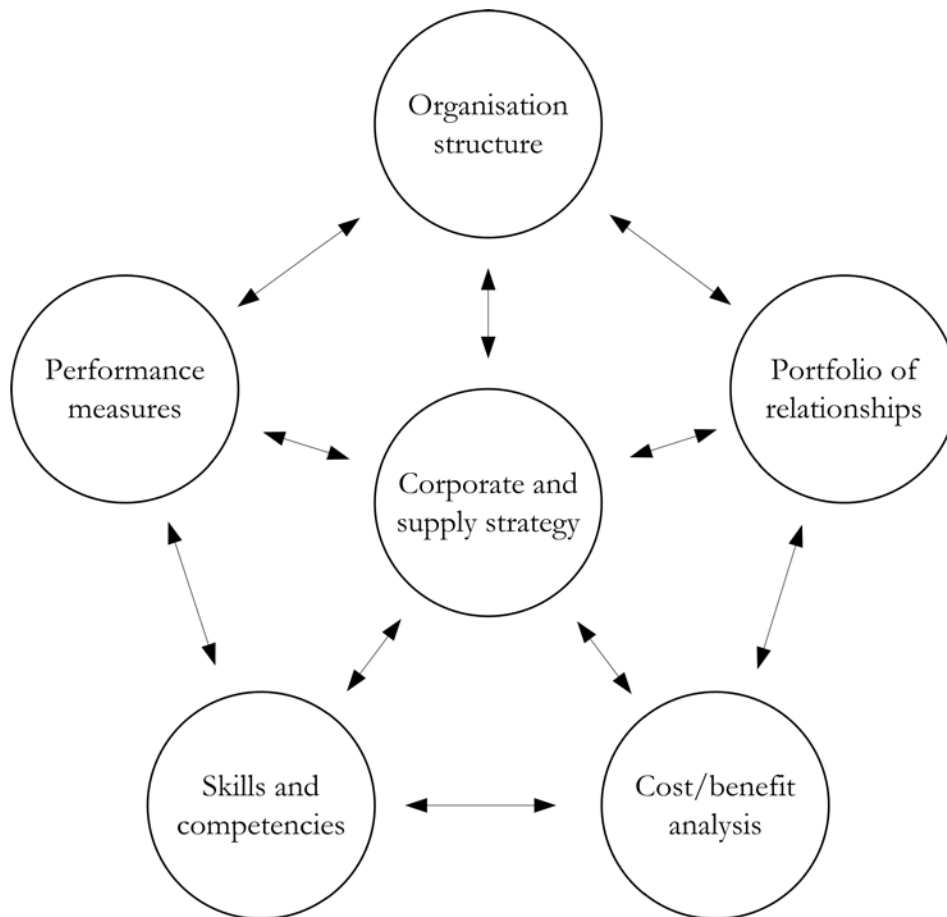


Figure 13: The supply wheel. Adapted from Cousins et al. (2008)

In the centre of the supply wheel is *corporate and supply strategy*, and it illustrates how the remaining elements must be aligned with the corporate and business strategy of the organisation. Cousins et al. (2008, p. 13) state that “only when the activities and strategies of the purchasing function are aligned with the overall strategies of the firm can purchasing be a strategic function.”, and accordingly differentiate between purchasing as a strategic function and purchasing strategy.

There are five circumferential elements of the supply wheel, the first of which is *skills and competencies*. Cousins et al. (2008, p. 111) argue that a variety of skills and competencies must be at a required level in order to be able to fulfil the organisations strategic objectives, and claim that an organisation “is only as good as the skills and competencies that its personnel possess”. Second, the *organisational structure* of supply may have profound effects on corporate and supply

strategy. Traditionally, organisational design have varied from vertical functional silos and cross-functional teams, and according to Cousins et al. there are three basic types of structures for organising purchasing: centralised, decentralised and hybrid structures. The third circumferential element involves managing *inter-firm relationships* from a strategic perspective. Cousins et al. claim that a typical distinction of relationships is made according to a spectrum ranging from adversarial and transactional based to highly collaborative partnership arrangements, and furthermore define relationships as processes. Accordingly they imply that relationships require inputs, often in the form of resources, and also outputs, such as price or cost reduction. Fourth, the element of *cost-benefit analysis* focuses on balancing cost, benefits and relationship strategies within the supply chain. According to Cousins et al., all costs along the entire procurement value chain should be evaluated, and developing a total cost of ownership model might provide valuable assistance in purchasing decisions. The fifth and last circumferential element is *performance measurement*. Cousins et al. claim that a purchasing and supply chain performance measurement system should assist strategy implementation through systematic monitoring and evaluating purchasing activities. They argue that as purchasing has become more strategic, the traditional short-term efficiency measures are becoming less suitable, and they claim that a more systematic approach is appropriate.

### **3.2.7 Potts and Kastle (2010) Public sector innovation research**

In a study investigating the analytic context of public sector innovation studies, Potts and Kastle (2010) outline a practical model of public sector innovation.

The authors start off by presenting the Schumpeterian perspective of private sector innovation, where innovation is the basic dynamic mechanism of market economy growth and organisations engage in innovation as a response to innovation in other organisations. Furthermore, Potts and Kastle (2010) outline a considerable theoretical foundation and argue that the competitive incentive of the private sector is a very weak force in the context of public sector innovation. Instead, the authors claim that the public sector is striving towards *efficiency*, as a result of seeking to maximise deliverables from a finite budget.

Furthermore, Potts and Kastle (2010) argue that the incentive structure of the institutional domains is profoundly different. They claim that in terms of motivation and accountability, the incentive structure of the private sector is relatively straight-forward; accountability is to the owners of the business, while motivational incentives often are monetary rewards. These concepts are often aligned in the private sector, as seen in an entrepreneurial start-up, where those who back the innovation receives both due compensation if the innovation is a success as well as carries the risk if it fails.



As a contrast, public sector innovation involves “an instrumental disjointed phase, where a mandate of political entrepreneurship is then passed to the public sector to develop and implement, but with none of the excitement and prospect attaching to the idea being carried through” Potts and Kastle (2010, p. 125). Furthermore, failure is particularly expensive in the private sector as a result of competitive media and opposition monitoring. Consequently, the actors responsible for performing the innovation will not be involved in the reward structure, while they still will be held accountable if the innovation fails. This creates an *asymmetric incentive structure*.

### 3.2.8 Telgen et al. (2007) Public procurement in perspective

In their study from 2007, Telgen et al. aim to put public procurement in perspective by combining existing literature and grouping it for clarity and oversight. According to them, it is well accepted that public procurement differs from purchasing in the private sector, and that the demands on public procurement are greater and more highly varied. Furthermore, the claim that these demands are additional to those on private sector and therefore define the complexity of public procurement.

First Telgen et al. (2007) start with external demands. They explain that *transparency* is demanded by public procurement, in order to assure equal opportunities for all bidders and clear process, and that the public sector is expected to act with *integrity*, in order to avoid improper, wasteful or corrupt practices. Furthermore, the public entities are held *accountable* for the effectiveness, efficiency, legal and ethical manner of public procurements and are expected to set an example by *exemplary behaviour*.

Second, public procurement must *simultaneously serve multiple goals*, both in terms of various internal goals – such as cost efficiency or the delivery of services – and political goals. In addition there are several stakeholders – such as citizens, elected officials and procurement officers – that may have different objectives or conflicting interests in which public procurement must relate.

Third, public procurement is *budget driven* and the budget that determines what is procured. In addition, the budgets are open and accessible to the public, thus changing the relations between buyers and suppliers considerably. Furthermore, the public sector is often characterised by layers of government and consequently mutually dependent budget situations. These arrangements may cause sub-optimisation. Additionally, the specific cultural setting of public organisations, where employees are somehow concerned with public interests, causes risk aversion and a tedious decision-making processes.

Fourth, the process of public procurement is restricted by *regulatory demands* and it is consequently bound by legal rules and organisational procedures. These regulations are often extensive and

dominate the image and activities of public procurement. According to Telgen et al. (2007), some authors see the regulation of procurement process as the determining characteristic of public procurement, and the rules often prevent establishing and engaging in long-term relationships with suppliers.

Fifth and last, the public organisations inhibit *multiple roles*. They are large buyers and according to Telgen et al. (2007), the share of the national economy involved in public procurement typically range from 10 per cent up to 80 per cent for some developing countries, while they predominately buy goods and services from the citizens they are expected to serve. Additionally, public entities face the situation of reciprocity when they are buying from supplies that are buying from the same public entities. Lastly, by its very nature the public sector is both a player, decision maker on the rules of the game and referee, as it determines the rules and regulations according to which it has to operate.

Telgen et al. (2007) outline how public procurement is forced to balance a number of interests while operating under complex and sometimes conflicting demands. A summary of these demands is presented in Table 4.

Table 4: Demands on public procurement (Telgen et al., 2007)

<b>External demands</b>	Transparency Integrity Accountability Exemplar behavior
<b>Internal demands</b>	Simultaneously serving multiple goals Several stakeholders
<b>External pressures</b>	Budget structure Mutually dependent budget situations
<b>Regulatory demands on procurement</b>	Difficult to establish long-term relationships
<b>Adoption of multiple roles</b>	Large buyers Reciprocity Both player and decision maker

### 3.2.9 Comparing the frameworks

The purpose of presenting the frameworks above was to create a foundation for the following development of propositions in the next part. In comparing the frameworks, we found five categories which occurred in many of the frameworks (as shown in Table 5), and which we found to be the most important for further exploration. This decision is also in part based on what we observed was relevant in the initial stages of our empirical data collection (see discussion on systematic combining in chapter 2). From the aggregation into five categories it follows that there are certain categories that we did not include, such as performance measurement and cost-benefit analysis from Cousins' supply wheel, or technological uncertainty from Jean et al. As such, there might be barriers that we will not describe in this study. However, we think that we have covered the most important categories. Unlike the other frameworks, we have also decided to merge knowledge and organisation, as we find them to be tightly integrated, as we will describe in 3.3.5. The five categories will form the basis for the development of the propositions in the next part.

Table 5: Categorising barriers to public procurement for innovation

	<b>Strategic nature</b>	<b>Process</b>	<b>Relationship</b>	<b>Culture</b>	<b>Knowledge and organisation</b>
<b>Castaldi et al., 2011</b>					
Purchasing integration					x
Supplier involvement			x		
Purchasing function	x				
<b>Jean et al., 2012</b>					
Supplier market knowledge acquisition			x		x
Relationship learning			x		
Systems collaboration			x		
Technological uncertainty					
<b>Roy et al., 2004</b>					
IT technology adaption			x		
Trust			x		
Commitment			x		
Tacitness of technology					
Stability of demand					
Network connections			x		
<b>Loewe and</b>					

<b>Dominiquini, 2006</b>					
Leadership and organisation					x
Culture and values				x	
People and skills					x
Processes and tools		x			
<b>Schlegelmilch et al, 2003</b>					
Culture				x	
Processes		x			
People					x
Resources					
People and skills					x
Processes and tools		x			
<b>Cousins et al, 2008</b>					
Organisation structure					x
Portfolio of relationships			x		
Cost-benefit analysis					
Skills & competencies					x
Performance measures					
Corporate and supply strategy	x				
<b>Potts and Kastle, 2010</b>					
Efficiency					
Asymmetric incentives				x	
<b>Telgen et al., 2007</b>					
External demands		x			
Internal demands					
External pressures					
Regulatory demands on procurement		x	x		
Adoption of multiple roles					

### 3.3 Development of propositions

In the last part of the theory chapter, we will go through the five categories identified, as shown in Figure 14. These are categories that we expect to contribute to public procurement for innovation, and where it therefore should be possible to uncover potential barriers.

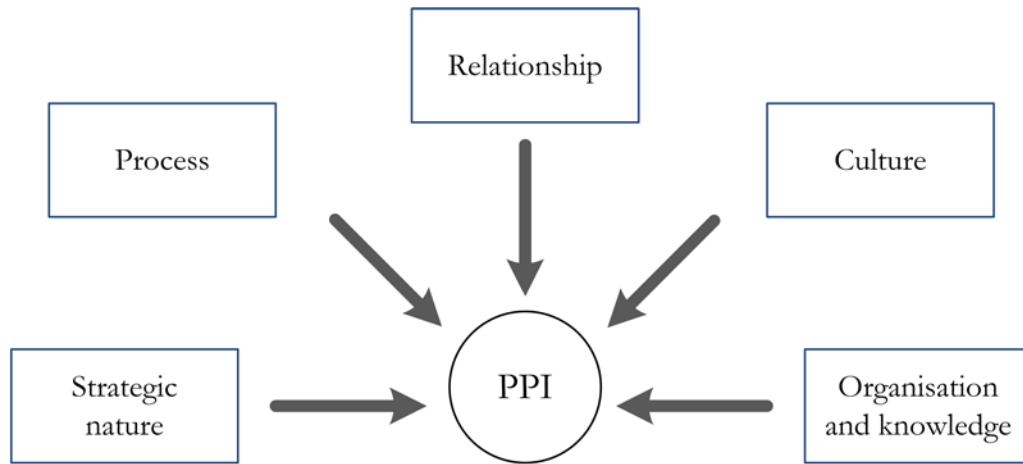


Figure 14: Categories for potential barriers

In the following we will go through each of the five categories, drawing from the frameworks already presented, and supplement this with other applicable theory. Based on this we will develop a set of potential barriers, or propositions, which we will use in our cross-case analysis in chapter 5, in light of the empirical data collection in chapter 4. Primarily we will look at the five categories independently, although we assume that they will be dependent on each other. When answering RQ2 in 6.2 we will also try to draw some links between the different categories. However, the focus will be on each proposition independently, in order not to create a complexity that exceeds the size of this study.

The development of the propositions will be conducted as follows. First we will present the concept, focusing on private purchasing literature. Based on this we will formulate a supposition which suggests a causal link to innovation. Next, we will turn to the public sector, and consider the applicability of the first supposition. Following this we will make a second supposition that the casual link in the first supposition is not sustained, and hence constitutes a barrier. Putting together the two suppositions we will formulate a proposition.

### 3.3.1 Strategic nature of procurement

Before we look at the role or nature of purchasing in an organisation, we present the definition of strategic purchasing by Carr and Smeltzer (1997, p. 201): “The process of planning, implementing, evaluating and controlling strategic and operating purchasing decisions for directing all activities of the purchasing function toward opportunities consistent with the firm’s capabilities to achieve its long-term goals”. Carr and Pearson (2002) describe how a purchasing function can range from nonstrategic, or clerical, to strategic. The differences between the two are described in Table 6.

Table 6: Differences between clerical and strategic purchasing. Based on Carr and Pearson (2002)

	<b>Clerical purchasing</b>	<b>Strategic purchasing</b>
Focus	Short-term	Long-term
Importance in the eyes of top management	Purchasing viewed as nonvalue-adding by top management	Purchasing viewed as important resource by top management
Involvement in strategic planning process	Purchasing personnel provide minimal input to the firm’s decision-making process	Purchasing involved in firm’s strategic planning process
Status compared to other functions	Purchasing has a low status compared to other major functions in the firm	Purchasing treated as an equal to other major functions in the firm
Interaction with other functions	Purchasing is reactive rather than proactive in performing purchasing activities	Purchasing proactively seeks opportunities to provide input
Purchasing competence	Purchasing professionals have little relevant purchasing skills with respect to strategic planning and managing the firm’s suppliers	Purchasing professionals possess the knowledge and skills to perform at a strategic level, and receive training to enhance their skills

According to Carr and Pearson (2002, p. 1034), “a strategic purchasing function conducts activities that require more proaction on the part of purchasing staff as it interacts with others within and outside of the firm”. The last part illustrates how strategic purchasing is a central theme both for the organisation across functions (see 3.3.5) and the relationship to external organisations (see 3.3.3). However, it is important to note that the other four categories do not necessarily require the presence of a strategic procurement function. In fact, Castaldi et al. (2011) uncovered a group of companies that they called entrepreneurial, which had a low to medium degree of strategic purchasing, due to the fact that they were small in size and could not hold a large purchasing staff. Nevertheless, these companies scored high on supplier involvement, and the purchasing contribution to innovation was similar to that of companies that had a strategic purchasing function.

In this category we will consider the nature of the strategic purchasing function, which is defined by the following four indicators: “(1) presence of a long term plan including supplier relationships; (2) alignment between purchasing and firm strategy; (3) top management including input from purchasing about future supply needs and constraints; and (4) coordination of purchasing strategies across business units.” (Castaldi et al., 2011, p. 987). Keeping the entrepreneurial companies in mind, we still find that for most organisations, especially larger ones, there is likely to be a strong link between the degree of strategic nature of the purchasing function and its impact on innovation. We therefore present the following supposition:

**Supposition:** Procurement for innovation requires a strategic purchasing function

Harland et al. (2007) present seven stages of public procurement, which can be viewed as moving from clerical to strategic (see Figure 15). They argue that most public procurement entities fall within stages 2-5, i.e. that there is no alignment with government policy objectives. They furthermore state that innovation becomes a priority only in the seventh stage, when procurement has become a deliverer of broader government policy objectives.

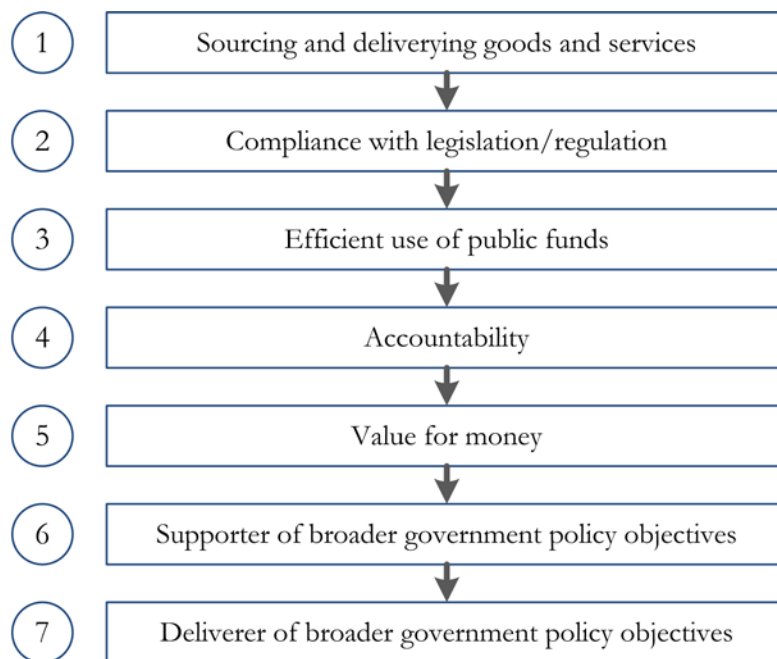


Figure 15: Stages of public procurement. Adapted from Harland et al. (2007)

Following this, we formulate the following supposition:

**Supposition:** Procurement does not have a sufficiently strategic role in the public sector.

Putting together the two suppositions, we arrive at our first proposition:

**Proposition 1:** The lack of procurement as a strategic function is a barrier for public procurement for innovation

### 3.3.2 Process

A common innovation process model is illustrated by what Rothwell and Zegveld (1985) labelled the third generation innovation process, see Figure 16. While newer models exist, including aspects such as cross-functional organisation (see 3.3.5) and inter-organisational interaction (see 3.3.3), the model still gives a good understanding of the common steps of the innovation process. It starts with an idea, which either comes from an identified demand (demand-driven, pull-driven) or through new technologies or other possibilities at the supply side (supply-driven, push-driven). Following this are steps of development and prototyping, before production is scaled up and commercialised for the market place.

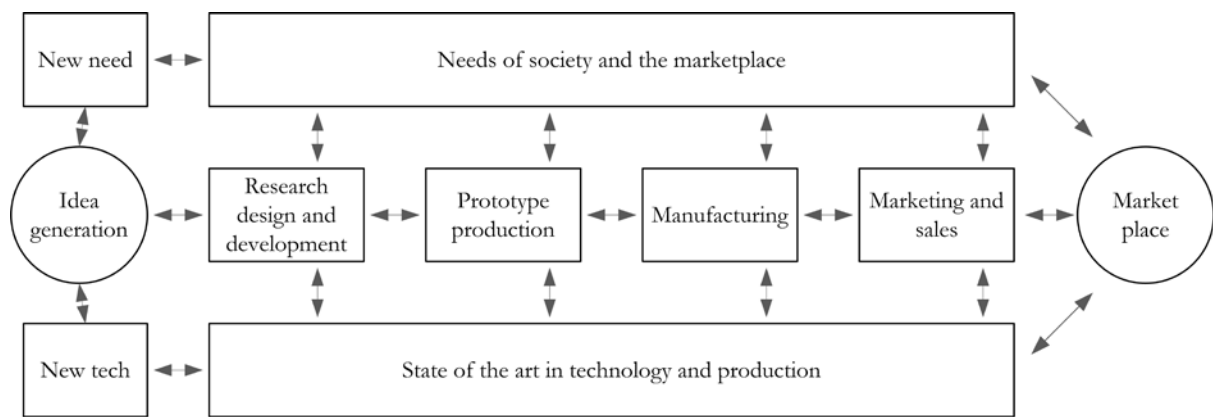


Figure 16: Third generation innovation process. Adapted from Rothwell and Zegveld (1985)

While this model is directed specifically towards innovation within traditional manufacturing, a similar structure will apply for other types of innovation. An example of this is given by the Stage-Gate model introduced by Cooper (1990) see Figure 17. This model also introduces another important concept in innovation theory, namely the existence of evaluation gates, where a senior group can decide to continue on to the next phase, kill the project, or do the previous phase again.

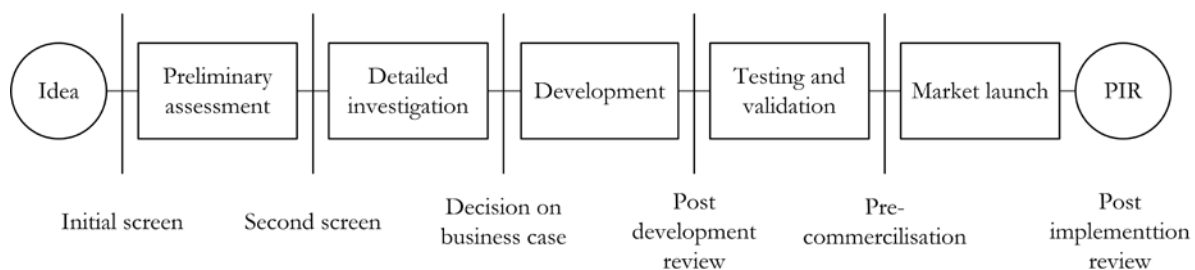


Figure 17: Stage-gate model. Adapted from Cooper (2009)

The purchasing process is, at first sight, very different to the innovation process. One model for a purchasing process is provided by van Weele (2005), see Figure 18. It starts with a demand from an internal customer, which is then translated into a specification. This in turn forms the basis for the supplier selection, which for the public sector commonly takes the form of a



tendering process, to ensure equal treatment. After the contract has been signed, the following steps relate to order fulfilment, i.e. that the external supplier delivers what the internal customer requested.

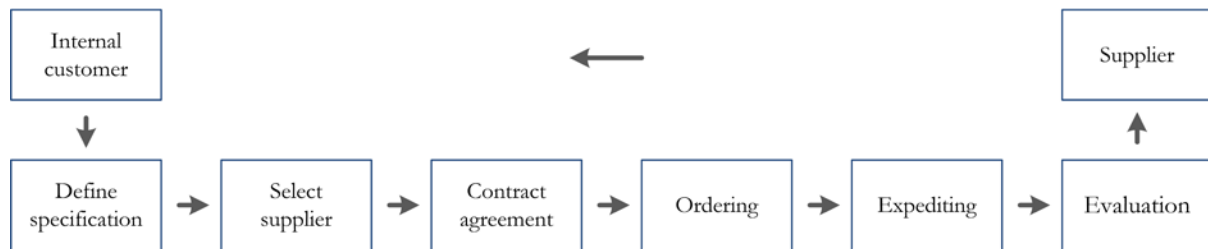


Figure 18: Purchasing process. Adapted from van Weele (2005)

Some scholars have argued that this model does not take into account the need for interaction with the market before the contracting stage, as the purchasing organisation may not be able to set the specifications alone. van der Valk and Rozemeijer (2009) suggest an expansion of the van Weele model to include this, see Figure 19. The topic of interaction will be further explored in 3.3.3.

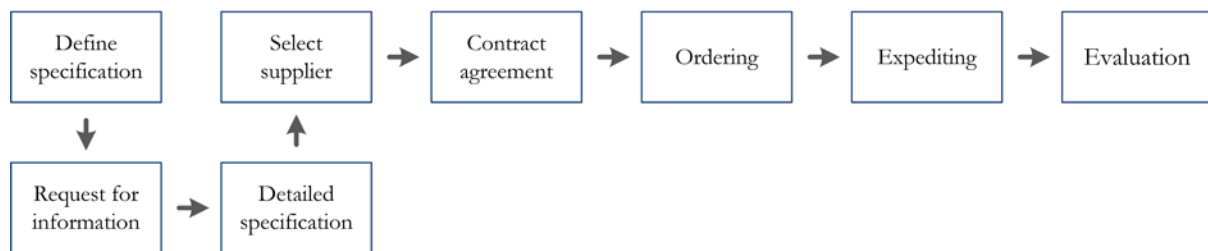


Figure 19: Expanded purchasing process. Adapted from van der Valk and Rozemeijer (2009)

Upon closer examination, we find that the innovation process and the purchasing process share the same start and end in the case of demand-driven innovation. Both start with a demand and end with the fulfilment of this demand. The nature of demand is not the same, however. In the case of the innovation process, the demand refers to the external customer, while in the case of the purchasing process, it is an internal customer. Nevertheless, when it comes to public procurement for innovation, we think that the innovation and purchasing processes should be viewed in conjunction and not separately. We therefore formulate the following supposition:

**Supposition:** Procurement for innovation can only take place when the innovation process is a part of the purchasing process.

In terms of public procurement, there is little literature that shows to any link between the procurement and innovation process, even in literature specifically addressing public procurement for innovation. However, some scholars (Apostol, 2012; Edler and Georghiou, 2007) mention the concept of pre-commercial procurement in Europe, which is presented in

3.1.1. This model describes how it is possible to divide the procurement into different stages, with innovation stages taking place before the commercial procurement, and the pre-commercial procurement process is illustrated in Figure 20. The idea by the European Commission is that it is possible to involve multiple companies in each of the stages, and make separate arrangements for each stage. However, it should also be possible to have only one company throughout the pre-commercial procurement phase. Nevertheless, Edler and Georghiou (2007), state that “to preclude monopolistic structures resulting from pre-commercial procurement, at least two competitors should enter the field-test stage.” In either case, when reaching the commercial stage, the public organisation needs to conduct a normal tendering process, where anyone, not only those participating in the pre-commercial stage, can participate.

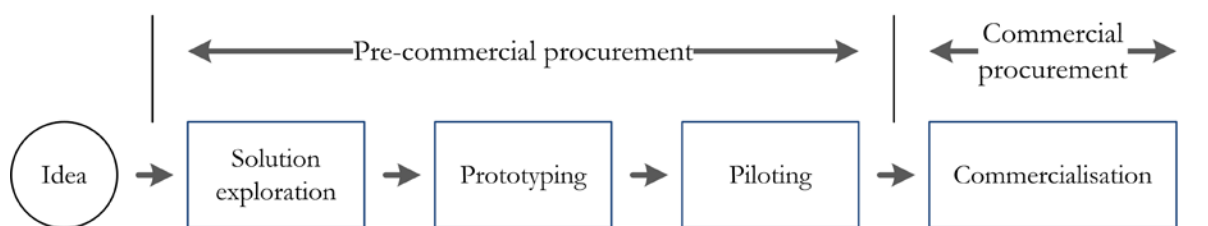


Figure 20: Pre-commercial procurement process. Adapted from European Commission (2007)

However, as Apostol (2012) points out, the adoption until 2010 of pre-commercial procurement was rather poor, and we can therefore assume that such procurement processes are still not adopted in many public entities. We therefore formulate the following supposition.

**Supposition:** The innovation process and purchasing process are not linked in the public sector.

Putting together the two suppositions, we arrive at the following proposition:

**Proposition 2:** The lack of integration of the innovation process in the purchasing process is a barrier to public procurement for innovation.

As part of the procurement process, in particular the phase of supplier selection, it befits to mention the procedures outlined in the EU directives on public procurement, which also pertain to Norway. These directives have been subject to significant discussion, both in academic world and in the member countries. It has also been suggested that the directives inhibit the flexibility of the procurers, such as restricting the interaction with suppliers (Telgen et al., 2007). In the following we present the four procedures in directive 2004/18/EC<sup>3</sup>, as presented in Figure 21, which are built on the principles of transparency, equal treatment and non-discrimination (Arrowsmith and Treumer, 2012). However, these principles are gradually weakened for the

<sup>3</sup> We will here not describe directive 2004/17/EC which regulates procurement for water, energy, transport and postal services sectors. Competitive dialogue was not added to this directive, as procurements covered by these regulations can use the negotiated procedure for this. 2004/18/EC also does not cover concessions.

more exceptional procedures, which in turn require a higher degree of justification by stringent criteria. In addition to the four existing procedures, we will present a procedure which is suggested for the new directives to replace 2004/18/EC, called Innovation Partnership (Apostol, 2012).

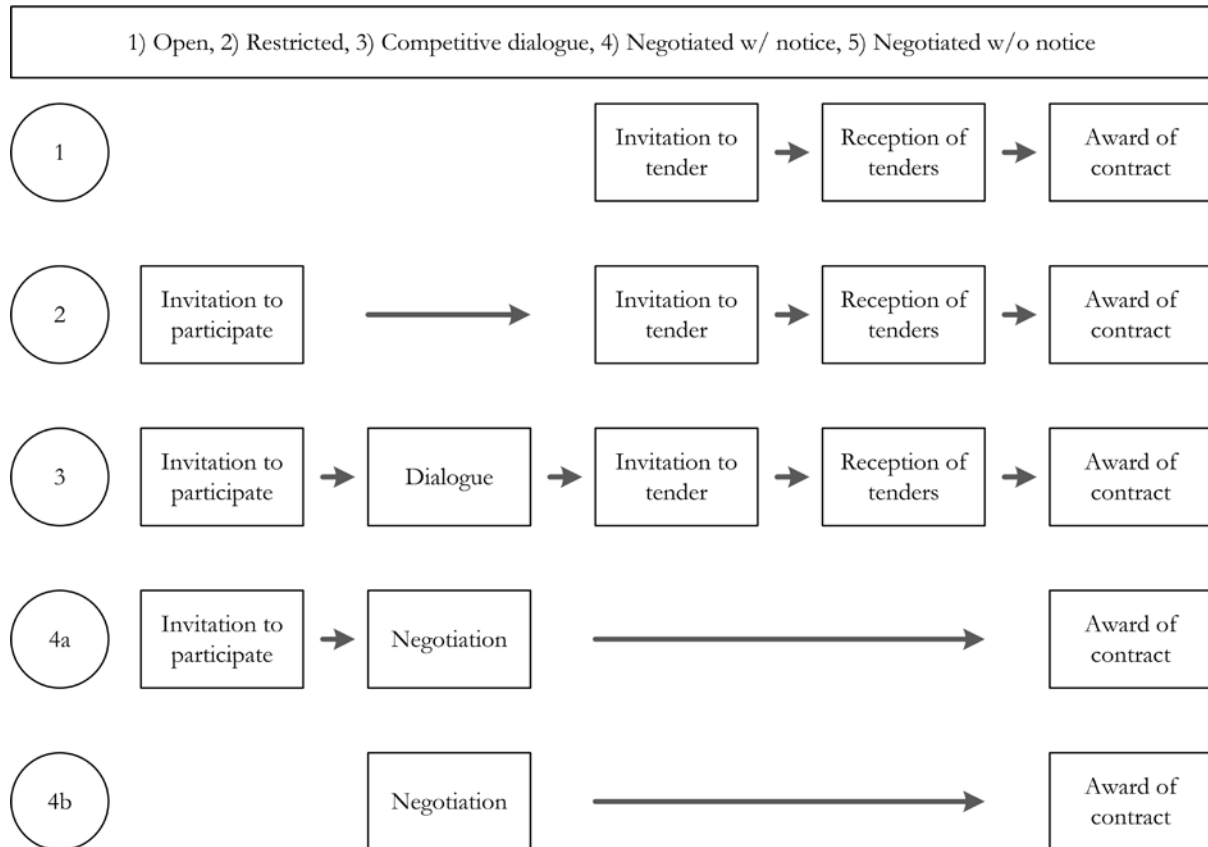


Figure 21: Procurement procedures in the EU/EEA

The **open procedure** is a straightforward procedure, which starts with an invitation to tender (ITT), followed by the reception of tenders and the award to the supplier to score best on the award criteria.

The **restricted procedure** adds a stage preceding the open procedure, which is the invitation to participate (ITP), which allows the contracting authority to shortlist a minimum of five suppliers in order to reduce procedural costs. The remaining stages are similar to the open procedure, and it does not open for dialogue with the suppliers.

**Competitive dialogue** was added to EU directive 2004/18, the current directive on public procurement, as there was a need for a procedure that was more flexible than the restricted procedure and more transparent than the negotiated procedure. It was in particular constructed to accommodate complex procurement projects, including complex ICT projects, where the contracting authority does not know the technical specifications of the tender upfront. The

competitive dialogue adds a dialogue stage to the process, which takes place after shortlisting a minimum of three suppliers. This dialogue stage allows the contracting authority to have separate dialogue with each of the qualified candidates. It is also possible to have smaller bidding processes throughout the process, followed by new dialogue sessions, in order to improve the final bid, which will be similar to that of the open and restricted procedure.

The **negotiated procedure** can be considered the most extraordinary procedure, which can only be chosen if it is covered by one of the explicit exceptions given in the EU directive. The procedure takes two forms, one with notice, and one without. The negotiated procedure with notice starts with the ITP, and a shortlisting of minimum three candidates. It is followed by a negotiation stage, where the contracting authority negotiates directly with the candidates, until they have signed the contract. As such, there is not necessarily a tender process as with the other procedures. The negotiated procedure without notice is similar to this, only that prior announcement and shortlisting is not necessary, i.e. the contracting authority moves directly to negotiation.

**Innovation Partnership** is a new procedure suggested for the new EU directive to replace directive 2004/18. One problem it aims at addressing is the gap between the pre-commercial procurement of R&D services and the ensuing procurement of the products developed. This commonly requires a new procurement process, following one of the above-mentioned procedures, but with the Innovation Partnership it might become possible to continue with the earlier selected partner. However, exactly how this new procedure will be formulated, if included at all, has not yet been decided, and as such we will not discuss this further in this study.

### 3.3.3 Relationship

Håkansson and Snehota (1995, p. 25) describe relationship as “mutually oriented interaction between two reciprocally committed parties”, and assign it four structural characteristics (continuity, complexity, symmetry, informality) and four process characteristics (adaptations, cooperation and conflict, social interaction and routinisation). Without going into detail on these characteristics, it is common to draw relationship along a continuum with adversarial arm’s-length relationships, managed by contract, at one end and close strategic collaboration, managed by trust, at the other, where Araujo et al. (1999) observe that there has been a shift in focus towards the latter. Cousins et al. (2008) suggest that adversarial relationship are suited for low dependency, low risk routine products, while closer collaboration is required for high dependency, high risk strategic products.

While this is a simplification of a more nuanced spectrum of relationships, it is still possible to follow the argumentation that procurement for innovation entails risks, and hence closer collaboration would be necessary in order to mitigate this risk. A different approach is taken by Araujo et al. (1999), who form four interface categories based on the level of interaction between the supplier and customer and essentially how much freedom the supplier is given to provide own solutions. The interfaces and effects on innovativeness are displayed in Table 7.

Table 7: Interface categories (Araujo et al., 1999)

<b>Interface category</b>	<b>Characteristics</b>	<b>Customer benefits Innovativeness</b>	<b>Customer costs Innovativeness</b>
Standardised	No directions. No specific connection between user and producer contexts.	None.	No direct costs. Allows only indirect feedback to suppliers based on sales figures.
Specified	Precise directions given by customer on how to produce.	Minimal (supplier can propose changes to blueprints).	Suppliers used as capacity reservoir. Development of supplier resources may suffer.
Translation	Directions given by customer based on user context and functionality required.	Supplier has some leeway to propose innovative solutions.	Supplier may not know enough about customer context to innovate radically
Interactive	Joint development based on combined knowledge of use and production.	Supplier learning about user context opens up the gamut of solutions offered.	Requires investments in joint development and learning.

A similar line of thought is found in the field of supplier involvement, where Petersen et al. (2005), use the concept of spectrum of supplier integration as shown in Figure 22.

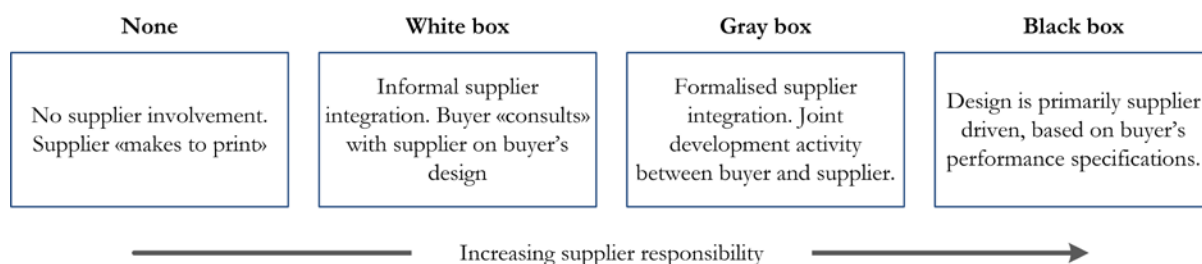


Figure 22: Spectrum of supplier integration (Petersen et al., 2005)

The interaction between user (customer) and producer (supplier) is an important aspect in innovation theory (see Lundvall, 1988), which goes together the interactive interface (and to a certain degree the translation interface) in the case of Table 7, and the “gray box” in Figure 22. It follows that interaction or collaboration between supplier and customer should have a positive impact on innovation. We therefore formulate the following supposition:

**Supposition:** Procurement for innovation requires strong relationships with suppliers with frequent interaction.

However, collaboration also comes at a cost, and this not only pertains to the costs of investing in the relationship. A common implication of close collaboration is the pursuit of a single sourcing strategy, as it is too costly, and often not even feasible, to engage in a similar relationship with multiple suppliers. The challenge with a single sourcing strategy is that it can lead to asymmetric dependency between supplier and customer and result in opportunistic behaviour from the supplier - and the lack of competition (see Cousins et al., 2008). As Arlbjørn and Freytag (2012) state, the EU directive on public procurement puts a high emphasis on procedures that promote a fair and open competition, which suggests a more adversarial approach. This is also reflected in the conclusion of a paper by Waluszewski and Wagrell (2013, p. 1), who state that “as long as the basic policy foundation is the belief that a supplier-public user interaction shall be as close to a traditional market as possible, the ‘thick’ interaction, recognised as being critical for renewal of resources, will be seriously limited. We therefore formulate the following supposition:

**Supposition:** Relationships between the public sector and suppliers are characterised by an adversarial arm’s length relationship.

Combining the suppositions, we arrive at the following proposition:

**Proposition 3:** The lack of collaborative relationships with the suppliers is a barrier for public procurement for innovation.

### 3.3.4 Culture

In innovation theory the concept of organisational culture for innovation is often presented as a strong driver for innovation (see e.g. Geroski, 1998; Hamel, 1998a; Hamel, 1998b; Kim and Mauborgne, 2004). Schlegelmilch et al. (2003, p. 120) summarise it as incorporating a “questioning attitude”, while Loewe and Dominiquini (2006, p. 25) describe it as a “collaborative, open culture and incentives that reward challenging the status quo”, and furthermore argue that mistakes are a “necessary part of innovation”. These concepts are almost absent from purchasing literature, although uncertainty and risk in purchasing has been addressed (see e.g. Cousins et al., 2008; van Weele, 2005). This raises the discussion as to whether purchasing theory can learn something from innovation theory and if procurement for innovation requires an organisational culture for innovation. Based on this, we formulate the following supposition:

**Supposition:** Procurement for innovation requires an organisational culture for innovation.

Turning more specifically to the public sector, many scholars point to a lack of culture for innovation, and in particular to the lack of incentives (see e.g. Albury, 2005; Borins, 2001). Potts and Kastle (2010) argue that the innovation incentive in the public sector is different from in the private industry, and point to three main differences: the relationship between policy entrepreneurship and policy delivery, the incentive to develop and champion new ideas, and the differential contexts of experimentation and failure (see Table 8). Following this, we formulate the following supposition:

**Supposition:** The public sector does not have a strong culture for innovation.

Table 8: Differences between private and public innovation. Cited from Potts and Kastle (2010)

Private	Public
“Those who back the idea, either financially or by working for it, expect due compensation if it succeeds but they also carry the risk if it fails”	“When they succeed, the higher echelons take the credit; when they fail, lower echelons take the blame”
“A profitable innovation is often observable and able to be commensurably rewarded”	“Absence of feedback of success”
“Failure is thus an acceptable cost of doing business provided that learning occurs”	“The down-side losses from risk-taking and experimentation are booked by the public sector but few up-side benefits are carried because of capture”

Combining the two suppositions we arrive at the following proposition:

**Proposition 4:** The lack of culture for innovation is a barrier for public procurement for innovation.

### 3.3.5 Knowledge and organisation

The knowledge-based view (KBV) of the firm states that “firms exist as institutions for producing goods and services because they can create conditions under which multiple individuals can integrate their specialist knowledge” (Grant, 1996, p. 112). An implication of this is that the aim of any organisational structure can be viewed as combining the knowledge of individuals. This has been used as an argument to move from a vertical functional organisation to a horizontal cross-functional organisation. The advantages of cross-functional teams are presented both in innovation theory (e.g. Rothwell and Zegveld, 1985), as well as purchasing theory (e.g. Cousins et al., 2008). According to Castaldi et al. (2011), internal integration of the purchasing function is an element of strategic purchasing, which in turn contributes to innovation. This can also be linked to the point of customer sophistication mentioned in 3.1.3, where the customer plays an important part in the innovation process. We therefore build the following supposition:

**Supposition:** Purchase for innovation requires cross-functional organisation.

While theory describes the use of cross-functional teams in the public sector (see e.g. Piercy et al., 2012), and often that more of it is needed, there is no easy saying to what extent cross-functional organisation is common in the public sector. In the following supposition we assume that it is not:

**Supposition:** Procurement in the public sector is not organised across functions.

Putting together the two suppositions, we get the following proposition:

**Proposition 5:** The lack of cross-functional organisation is a barrier to public procurement for innovation.

However, purchasing is not only organised across functions, but for larger organisations also across layers. Cousins et al. (2008) present a comprehensive comparison of the advantages and disadvantages of centralisation and decentralisation<sup>4</sup>, see Table 9. To overcome some of the disadvantages of the two structures, organisations often opt for a hybrid solution, where some purchasing is done on local level and some on central level. Despite this, organisations normally need to decide upon the degree of centralisation of purchasing.

This has implications also for innovation, and there is little literature that suggests that either is better. As discussed in 3.1.3, economies of scale and standardisation normally have positive effects on innovation, and tied to strategic purchasing the possibility of policy deployment is

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<sup>4</sup> They also present two other structures, atomisation and federalisation, but we will not go into the details of these here.



important. At the same time extensive centralisation would not take into account the differences in demand across the regions, and put distance between the internal customers and the purchasing function. However, decentralisation would duplicate skills, and it might be harder pool the required knowledge for purchasing for innovation.

Table 9: Advantages and disadvantages of centralisation and decentralisation. Adapted from Cousins et al. (2008)

<b>Advantages of centralisation</b>	<b>Advantages of decentralisation</b>
Economies of scale	Autonomy
Standardisation	Variety/diversity
Policy deployment	Local prudence
Financial control	Cross-deals
Auditing and policing	Local satisfaction
Common ICT and systems	Inter-divisional competition
Staff exchange	Staff exchange
<b>Disadvantages of centralisation</b>	<b>Disadvantages of decentralisation</b>
Resentment in the regions	Suppliers 'divide and confuse'
Bucking the system	Cost anomalies
Missed opportunities	Skills shortages/duplication
'Overweight' overheads	Lack of financial control
Slow response	Local covert deals

From the discussion above, we find that there can arguments both for and against centralisation in terms of procurement for innovation, but that there are indications that at least a certain degree of centralisation is required. This is also in line with one of the four strategies presented in 3.1.3, i.e. aggregating demand. As such we formulate the following supposition:

**Supposition:** Procurement for innovation requires centralised purchasing.

As the public sector covers a wide compilation of organisations, we can expect that there are examples of both centralised and decentralised organisation. As such, if lack of centralisation is a problem, it might not apply everywhere. Nevertheless, to accommodate our search for barriers, we will form the supposition that it generally is too decentralised:

**Supposition:** Purchasing in the public sector is too decentralised.

Following these two suppositions, we arrive at the following proposition:

**Proposition 6:** The lack of centralised purchasing is a barrier for public procurement for innovation.

### 3.4 Overview of the potential barriers

The theory chapter was introduced by the *what*, *why* and *how* of public procurement for innovation, which reveals the complexity of the concept. Next we looked at relevant literature that could help describe the drivers to public procurement for innovation. Based on this we established five categories, in which we arrived at six possible barriers that we want to examine closer. These are:

- P1. The lack of procurement as a strategic function is a barrier for public procurement for innovation
- P2. The lack of integration of the innovation process in the purchasing process is a barrier to public procurement for innovation.
- P3. The lack of collaborative relationships with the suppliers is a barrier for public procurement for innovation.
- P4. The lack of culture for innovation is a barrier for public procurement for innovation.
- P5. The lack of cross-functional organisation is a barrier to public procurement for innovation.
- P6. The lack of centralised purchasing is a barrier for public procurement for innovation

This is also displayed in Figure 23, where the propositions are shown as barriers for the different categories that lead to public procurement for innovation. We will return to these propositions in chapter 5, when we analyse the empirical data presented in the next chapter.

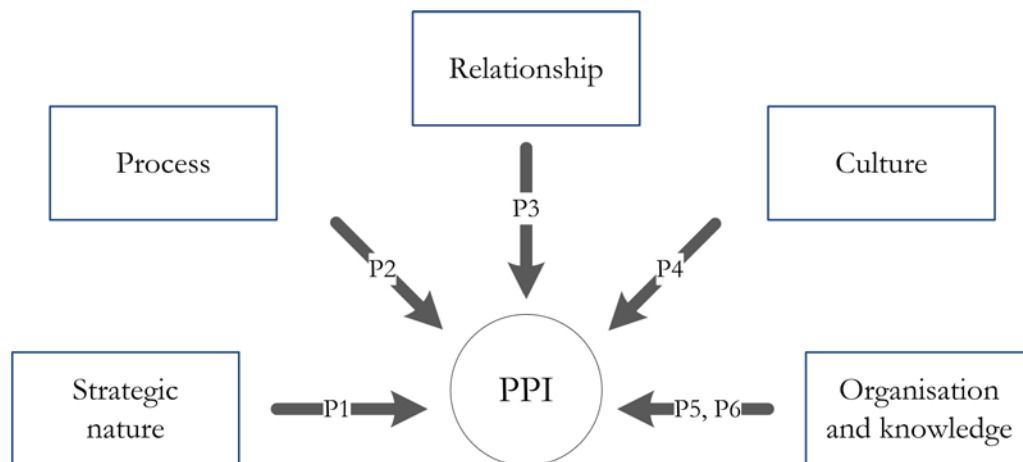


Figure 23: Potential barriers to public procurement for innovation

## 4 Empirical study

This chapter (see Figure 24) will start with describing the Norwegian specialised health services in general, as well as innovation, ICT and procurement in particular. After this, two of the four regional health authorities are presented, together with two projects for both. This is based on the interviews (see 2.2.2).

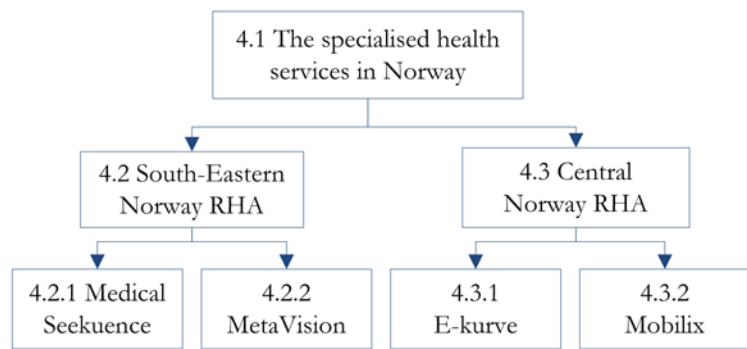


Figure 24: Structure of the empirical study

### 4.1 The specialised health services in Norway

The responsibility to provide healthcare in Norway has been split between the municipalities and the state. The municipalities provide primary healthcare through services such as the general practitioner scheme (“fastlegeordningen”) and nursing homes. The state, through the ministry of health and care services, provides specialised health services, which is the focus of this thesis. This is organised in four regional health authorities (RHAs), which in turn are divided into hospital trusts (HTs), as displayed in Figure 25. These hospital trusts consist of public hospitals and psychiatric institutions, as well as some other institutions (ambulances, rehabilitation, laboratories, etc.).

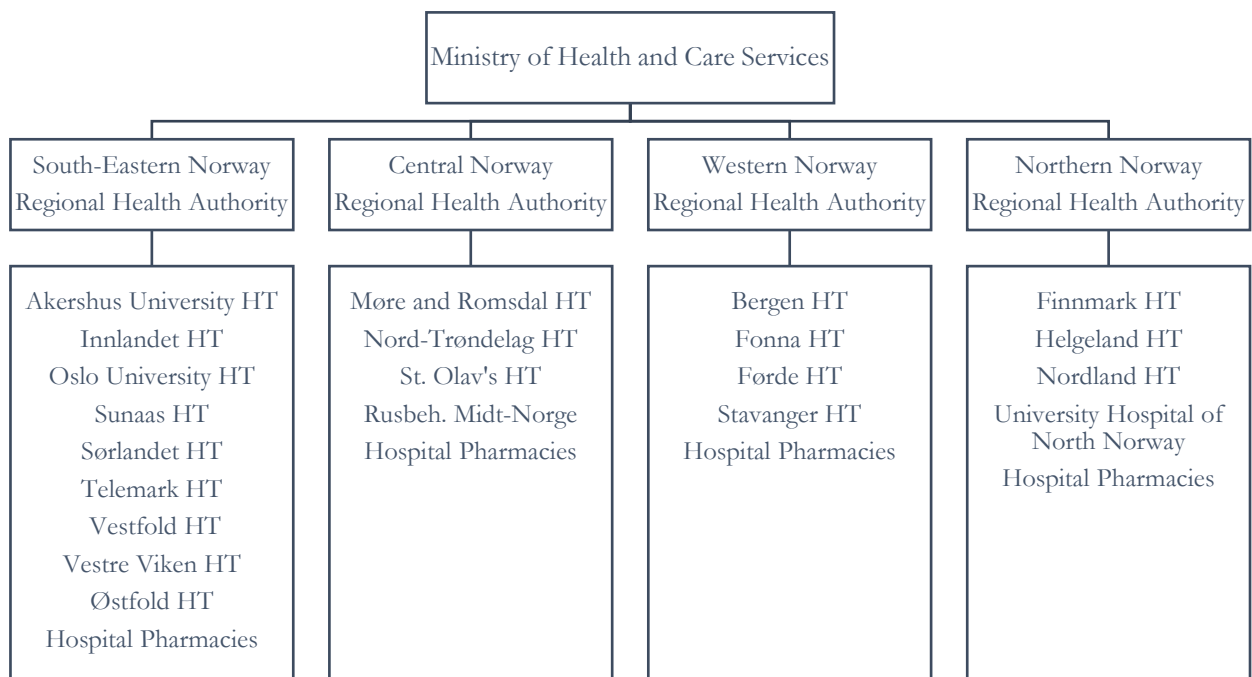


Figure 25: Organisation of specialised health services in Norway

In 2011, the state spent 109 billion NOK on specialised health services (SSB.no, 2012). In the South-Eastern Norway RHA one third was spent on procurement of goods and services, excluding investments (Eilertsen, 2012), a figure which is likely to be the same in the remaining regions. This includes the procurement of health services from private institutions, which in 2011 was 11 billion NOK, or 10% of the total budget (SSB.no, 2012).

#### **4.1.1 Innovation in the specialised health services**

In their white paper on innovation, the government emphasises that healthcare should be a prioritised sector (Nærings- og handelsdepartementet, 2008-2009). This is rationalised both by the magnitude, with public expenditure at 9% of GDP, as well as the need for better services as a result of demographic changes in the population. The goal for innovation is stated in the yearly mission documents, and further elaborated in an action plan called “Demand-driven innovation and industrial development in healthcare” (Helsedirektoratet, 2011). Furthermore, the Norwegian Directorate of Health has established a competence network called InnoMed, which aims to support the execution of need driven innovation projects, as well as disseminating the knowledge gathered in these projects.

The concept of need driven innovation is separated from innovation based on internal research. The latter makes up a large proportion in health services, in the South-Eastern Norway Regional Health Authority alone it was 1.7 billion NOK in 2011. This research focuses on the core tasks of the hospital trusts, such as medical treatment and biotechnology, and is often connected to research communities at the universities. While innovation originating from research might end up being commercialised in separate companies, with the help of so-called technology transfer offices (such as Inven2 in Oslo and NTNU TTO in Trondheim), the primary characteristic of these innovation project is that research and development is done in house.

This is different to the need or user-driven innovation, which in this case refers both to innovation initiated by users inside of the hospital trusts, but also ideas that come from private companies. While some of these ideas may also be used as input for in house development, they commonly evolve into projects with external actors, where development is done externally. A result is that the commercialisation phase requires that the solution is purchased. Therefore, this type of innovation is more interesting in terms of public procurement for innovation.

#### **4.1.2 ICT in the specialised health services**

In their white paper on information and communications technology (ICT) the government lay out a digital agenda for Norway in an effort to continue the digitalisation of the public sector in order to both gain benefits of improved solutions and to reduce costs of unnecessary paperwork (Fornyings- og administrasjonsdepartementet, 2012-2013). Again, the healthcare sector is presented as a prioritised sector, due to its size and the impending challenges. The focus is here

on care services, and innovative solutions that allow citizens to stay in their homes and take control of their health without the need of hospitals and/or manual care labour. However, the digitalisation of journal systems is also mentioned. Furthermore, public procurement for innovation is explicitly stated as a tool to achieve innovative ICT solutions in healthcare. In the mission documents to the regional health authorities, no further directions are given. However, the four regional health authorities have developed a plan for a common ICT strategy (Nasjonal IKT, 2012).

In all of the regional health authorities the responsibility of ICT systems, and the purchase thereof, has been outsourced to an independent organisation, which remains wholly owned by the respective regional health authority. In the South-Eastern RHA this is Sykehuspartner, while in the Central RHA it is Hemit, both established in 2003. Hemit runs and maintains 900 servers and 14 000 computers, as well as more than 1 000 systems and applications. This illustrates the size and complexity of ICT systems in specialised health services.

A fundamental system in modern hospitals is the Electronic Health Record (EHR) system, which collects and displays information about patients for a variety of applications. In the Central RHA the system used is Doculive by Siemens, while in the other three regional health authorities they have, or plan to, move over to the EHR by DIPS. Over time, these systems have become more sophisticated, with a wide range of additional modules, as well as separate systems that are integrated with it, although it remains primarily a system that registers data. Examples of separate systems that are integrated with EHR are picture archiving and communication systems (PACS), which are used to manage pictures taken with medical imaging instruments such as digital radiography. Other systems that interact with EHR will be described in the cases below.

#### **4.1.3 Purchasing in the specialised health services**

In their white paper on public procurement, the government describe how improved purchasing can lead to better and more cost effective services, and how it can be used as a policy tool in challenges such as the environment, social responsibility, universal design – and innovation (Fornyings- og administrasjonsdepartementet, 2008-2009). The focus on innovation was further elaborated on in their “Strategy for enhanced innovation effect in public procurement” (Departementene, 2013). Towards the regional health authorities this has become part of the mission documents, where they are expected to use purchasing as a means to foster innovation. As a result of this, the regional health authorities produced a report called “Promote innovation and innovative solutions in the specialised health services through public procurement” (Nasjonal arbeidsgruppe, 2012). Here functional requirements instead of specific technical requirements and increased market dialogue are presented as important aspects.

Purchasing in the specialised health services happens on three levels: 1) In the hospital trusts (local level), 2) in the regional health authorities (regional level) and 3) on the national level through Helseforetakenes Innkjøpsservice (HINAS), an organisation owned by the four regional health authorities. Over the past ten years, purchasing has been consolidated and centralised, alongside other administrative functions. There have been three developments supporting this. Firstly, many standalone hospitals have merged into hospital trusts. An example of this is the merger in 2009 of the four Oslo hospitals to become Oslo Universitetssykehus HT. As such, day-to-day purchasing that had previously been conducted in each hospital was moved to the new local level of hospital trusts. Secondly, the 2002 hospital reform transferred the responsibility of the specialised health services from the counties to the state, resulting in the establishment of the regional health agencies and more administrative functions in the regional layer. This is also illustrated by the establishment of Hemit and Sykehuspartner in 2003.

Thirdly, HINAS was established in 2003 to conduct procurement on the national level, and in 2012 entered agreements for 2.6 billion NOK. The Minister of Health and Care Services has pointed to procurement as one of three functions that can be further centralised to the national level (Helse- og omsorgsdepartementet, 2013). The other two areas are construction and ICT. A report on centralisation of state procurement concluded that three dimensions are decisive to whether or not to centralise: 1) The degree of standardisation and requirement for individual/local adaptation, 2) The possibility to regulate all terms by contract instead of other relation, and 3) The relative size of the public procurer in the market (Oslo Economics et al., 2011). According to the report, centralisation is suitable when there is a high degree of standardisation, the procurement is easily regulated through contract and the state does not become a too dominant buyer.

## **4.2 South-Eastern Norway Regional Health Authority**

The South-Eastern Norway RHA administers the largest of the four regions, providing health services to a population of 2.8 million citizens. Together there are around 150 employees in the different administrative functions, including departments for Purchasing & Logistics and Research & Development. In addition to this comes Sykehuspartner, who has taken over ICT, Human Resources and regional purchasing and logistics. Most of Sykehuspartner's 1 000 employees work with ICT, around 40 work with purchasing and logistics. The total amount spent on procurement in the region is 20 billion NOK a year.

Due to an increasing recognition of the significant amount of money spent on purchasing, and the fact that it operates in a professional supply market, the purchasing function has received a more strategic role – albeit slowly. To a larger degree, procurement is used to fulfil strategic decisions, such as finding regional ICT solutions, and made with a long-term perspective, where

the focus is on quality and total cost of ownership. An assessment made by McKinsey is that the procurement function today is in the “second generation”, where procurement still remains primarily a support function. In their procurement strategy for 2013-2016, the aim is to get to the fourth and final generation, which is a fully strategic procurement function (Helse Sør-Øst RHF, 2013). According to Kjetil Istad, director of purchasing and logistics in the South-Eastern Norway RHA, there is a clear relation between making procurement more strategic and procurement for innovation. At the same time, he argues, radical innovation is seldom achieved through traditional commercial procurement, but rather in development projects in the pre-commercial procurement phase.

The focus on pre-commercial procurement is currently strong in the South-Eastern Norway RHA. One reason is the general attention the concept receives in the public sector through Europe; another is the cooperation between Istad and Bjørn Grønli, the head of innovation in the South-Eastern Norway RHA. A common problem they have experienced is the procurement of large ICT solutions, that later turned out not to meet expectations. Instead, they find there should be pre-commercial stage with piloting beforehand, with the possibility of proceeding with a scaled commercial procurement or not. This pre-commercial procurement is modelled after the European Commission, which also promotes the use of competition throughout the stages. However, here it becomes important who initiates the pre-commercial innovation project. According to Morten Andresen, founder of Imatis, when they come with an idea, they do not accept that the idea is taken and announced in a competition. If that happens, they walk away from the project.

Regulations are also a hot topic in terms of market dialogue and early market involvement, where historically procurers have been too cautious in interacting with the suppliers, in fear of violating the rules of non-discrimination. This has been fuelled by a significant amount of cases submitted by suppliers to the KOFA (Norwegian Complaints Board for Public Procurement). As such, many have developed risk aversion, where the main objective is not to get complaints afterwards. However, according to Istad it is fully possible to have dialogue with the suppliers and still follow the regulations, as long as it is done properly. In his opinion, dialogue is not only important for procurement for innovation, but for procurement in general.

Another challenge is capacity. Early market involvement requires time and resources, both scarce. Istad suspects that many procurers still begin the procurement process too late, create the specifications without interaction with the supplier, and often end up with too detailed specifications. Today, procurers in the South-Eastern region use more time on the early phases, such as organising supplier conferences, but Istad considers there is still potential to improve on that. Despite the fact that market interaction is increasing, the number of KOFA cases has been

reduced. This should, however, also be seen in connection with a significant increase in the fee for complaints. In addition to more early involvement, the South-Eastern Norway RHA have established own teams to follow up entered agreements, as well as keeping steady relations with the larger suppliers.

Traditionally procurement in the South-Eastern Norway RHA has been very fragmented, commonly in each hospital. This has made it harder to have the competence building required to conduct good procurements. The consolidation into hospital trusts has made it less fragmented, and in the case of the South-Eastern region, much has also been elevated to the regional level. Not only has this been necessary for competence building, but also in order to link purchases to regional strategic decisions. This is particularly true organisational changes, which are often accompanied with innovative solutions. In many cases, however, this regionalisation has been recent development. For example ICT system were often purchased on a local level, which means that different health trusts within the South-Eastern region have different systems, and in some cases even within the health trusts. It is only recently that the regional health authority decided to go for one single EHR system for the whole region.

To help combat the problem of distance to the users, the regional health authority has established product councils, which are groups consisting of clinicians from the different hospitals within a specific department. These meet with the purchasers once a month, and for procurement projects some of them are selected to form the project team. According to Istad, this arrangement has been successful in ensuring integration of operations.

A problem found with the different layers of procurement is that the supplier does not always know where to “enter” the system. In many cases they will go to the health trusts to present their ideas, while it may in fact be more correct to address the regional health authority. Another problem can be that the suppliers are too small. While innovation often resides in the small and medium sized enterprises, procurement in the South-Eastern region often experience that they come with too small solutions, instead of complete packages. The latter is preferred in order to reduce the supply base. In addition, the companies are often fragile in terms of economic strength, where the procurers have to assess whether it will be able to supply. The suggestion from Grønli is for suppliers to go together to offer a complete package. This has worked well for Imatis on several occasions (see also 4.3.2), when large and small suppliers have gone together to supplement each other. However Andresen finds that it is a challenge to cooperate only with small suppliers, with Imatis being relatively small itself, and that such a network commonly do not become sufficiently competitive.

In the following we will describe two projects in the South-Eastern Norway RHA. The first is Seekuence Medical, the result of an innovation project, which is now struggling to reach the



phase of commercialised procurement. The second is MetaVision, a procurement project that has required product development, as well as changes in the work processes.

#### 4.2.1 Seekuence Medical

Seekuence Medical is a product for video documentation of surgery and examination. It is a tool designed to efficiently bookmark, store and retrieve important and interesting events out of the often enormous video amount produced during surgery and examination. Afterwards the bookmarked events may easily be edited, commented or reported to an EHR system.

The history of Seekuence Medical (see Table 10) starts with a product with similar concept. The product, called Posicap Sport, is a software solution that allows trainers to instantly tag important happenings in video recordings, which makes it more efficient to find these sequences later on. It was developed in 2000 and sold to the Norwegian School of Sport Sciences for the use in football matches. Later it was also sold to other countries.

Table 10: Process of Seekuence Medical

2000	Development of Posicap Sport
2007	Initial dialogue
2008	Development contract entered
2009	Development starts
2011	Development ends, but product not completely integrated
2013	Decision to integrate the product with DIPS

More by coincidence some physicians from Sykehuset Buskerud participated in a meeting in 2007, where Posicom presented their product. The physicians suggested that the same functionality would be useful in operations, which could take hours and it would be useful to easily be able to go back to specific sequences. Posicom evaluated the possibility to enter the healthcare sector, and through market research concluded that such a product did not yet exist, and that there was a market for it.

Posicom initiated a pre-study with Sykehuset Buskerud, with the financial support of Innovation Norway, a public organisation working to promote innovative solutions. The results of the pre-study were positive, and Sykehuset Buskerud and Posicom started a development project in 2008, with the financial support of Innovation Norway. However, the project got a late start, as Sykehuset Buskerud was not ready. One reason for this was that the hospital changed name to Drammen Sykehus and was consolidated with other hospitals into Vestre Viken HT.

The development project started in the latter part of 2009, and required further development of the Posicap system, among other ensuring better security and multiple users. Posicom was frustrated that the process was slow and had the opinion that Vestre Viken HT needed to dedicate more resources to the project, instead of letting clinicians work with testing and feedback on top of their operational tasks. In addition to this, Vestre Viken HT moved over to a new EHR system, DIPS, which was not the system that Seekuence Medical originally was set out

to be integrated with. The integration was the responsibility of Vestre Viken, but when the development project ended in 2011 and there were no funds left, the product was not yet integrated.

One of the challenges experienced by Posicom during the development of Seekuence Medical has been the lack of dedicated personnel involved from the hospital. Enthusiasts have done a lot of the project work at evenings as an additional work assignment, resulting in a development process with hampered progress. According to Harald Noddeland, manager of pre-hospital services at Vestre Viken, there are a lot of creative and inventive personnel at the hospital, but they are restricted by requirements of operating as efficiently as possible. Therefore, activities beyond daily operational tasks that do not result in immediate value are neglected. Noddeland reasons that innovation projects are not profitable within strongly pressured and short-term oriented budgets. Resources available to health services are scarce, and budget constraints with short-term perspectives are hindering investments in innovation with potential financial gain in the future. For the health services it is more important with liquidity this year or the next than a potential reward over a ten-year period. Additionally, Noddeland claims that the increase in service quality is not a strong enough incentive and that Vestre Viken requires monetary rewards with immediate effect on the bottom line. The consequences of budget constraints further affect Seekuence Medical, as video processing is not part of a life threatening operation at the hospital. Noddeland explains that scarce resources will be allocated according to the degree of necessity for life threatening tasks rather than to fund the development of video processing.

At the time that the funds from Innovation Norway were used up, the delay caused throughout the development stage had resulted in a prototype that was still not integrated with the EHR system. In addition to this delay, by which the innovation project never was completely finished, there was no further plan for scaled piloting, to see if the prototype worked in different departments. This has been problematic, as neither Vestre Viken nor other hospital trusts would risk procuring a product that has not been properly tested and evaluated in scale. In spring 2013, Vestre Viken decided that it would use of its own money to finance the integration with DIPS, and to make use of it in a number different departments (without reaching a scale that required a tendering process). Following this it can be that Vestre Viken or other hospital trusts decide to procure solutions with such functionality, in which case Seekuence Medical would have a strong position, both as few competitors can offer this, and because they would be able to show that it already works.

There are two reasons for why Vestre Viken now is willing to spend from their own budget, while initially more cautious. Firstly, the preliminary assessment of the innovation project, although it was not completely finished, were positive and it was possible to see how the product

would improve the clinical work. Secondly, Vestre Viken is now less occupied with the consolidation process and migration to DIPS, which had taken up much resources. Nevertheless, in the opinion of Noddeland, it would have been better if there were a funding structure that did not stop with the prototype or small-scale pilot, but which made it possible to have a pilot sufficiently in scale to have a proper evaluation phase. This should come either from Innovation Norway, or alternatively from the regional health authority. Without such financial support it has taken time to find the funding for the rest of the project.

#### 4.2.2 MetaVision

MetaVision is a system dedicated to digitalising the chart functionality of EHR. Documents containing “chart functions” – graphical visualisation of clinical patient information as a function of time – constitute a large share of the remaining paper-based work processes related to patient journals, and digitalising chart functionality is one of the biggest remaining challenges of creating electronic health records. In addition to visualisation of charts, MetaVision will act as a medication and planning tool, and the system is developed by the software company iMDsoft. Furthermore, it is used to facilitate a continuous patient care and to share patient data across all units during the patient care. By streamlining workflow and documentation, MetaVision aims to increase patient safety through focusing on both the present and planning of patient observation and medication in addition to acting as decision-support for clinical staff.

The first inquiry for such a system at South-Eastern Norway RHA was made in July 2006 (see Table 11), i.e. two years after a similar inquiry in the Central Norway RHA (a process further described in 4.3.1). This was done on a local level, first by Rikshospitalet and Ullevål Universitetssykehus, which later became part of Oslo Universitetssykehus HT, and resulted in a contract with iMDsoft. Akershus University HT did the same, although at this time there was no regional coordination for the implementation between the different health trusts. A result of this was among other that the different hospitals configured the system differently. Until 2009 MetaVision was installed in 65 places, and this period also required training of clinicians as well as improvements of the original product.

Table 11: Process of MetaVision

2006	Local procurement
2007	Started work on regional framework agreement
2007	Tendering process
2008	Tender won by iMDsoft
2008	Entered into framework agreement
2010	Specification
2010/2011	Design, configuration, test
2011	Piloting
2011	Scaling up
2014 (expected)	Piloting at Østfold HT
2014 (expected)	New framework agreement

At the end of 2007 South-Eastern Norway RHA decided to make a framework agreement that would direct the system used for digitalisation of chart functionality by the hospital trusts in the region. Using resources from the relevant clinical operations, a specification set containing around thousand specifications was written. The chosen procurement procedure was the negotiated procedure with notification. After the invitation to participate six suppliers qualified. These made a presentation, after which the South-Eastern Norway RHA went into negotiation with three. The negotiation essentially took the form of a case, where the suppliers had to show how their systems fulfilled the different specifications by showing how it would look like with dummy patients. Following these solutions, it was possible for the South-Eastern Norway RHA to see how many of the thousand specifications were fulfilled, and how many would need to be developed or should be discarded. Through further negotiation, the solution that was chosen was iMDsoft's MetaVision. In the contract entered provisions were made for how development of functionality not yet existing should take place and when it should be delivered. However, Noddeland finds that it was a mistake to enter it as a framework agreement that was not binding for all health trusts, as it increased the uncertainty for the supplier and made the threshold higher for the health trusts that did decide to use the system, as they would have to contribute to the development costs. This was later solved by making it mandatory for all health trusts to support the development costs, whether they chose to use the system or not.

After tendering, the resources available to development of a chart solution for all health trusts in South-Eastern Norway RHA were aggregated in a regional project organisation, and Oslo Universitetssykehus became the pilot hospital. However, the design review board had participants from all health trusts. Furthermore, the project was divided into two core solutions. The first concerned surgery and intensive care, and this core solution has been through specification, design, configuration and testing, and piloting started in the first quarter of 2011. The second core solution concerned general ward, emergency and outpatient clinic. This solution performed specification in 2010, before design, configuration, testing and piloting in 2011.

The implementation of MetaVision has required a considerable amount of modification and development. In addition, the implementation process has included comprehensive demands regarding standardisation within the region. According to Andreas Grønbekk, project manager of the regional chart and medication project in South-Eastern Norway RHA, the standardisation has taken the form of unexpected additional work, but parameter definitions are necessary as a foundation for the implementation process. Grønbekk illustrates this process by describing how there previously were 320 different chart solutions at general wards in the region. Furthermore, MetaVision lacks functionality for the whole organisation and compatibility across hospital departments such as intensive care, general ward surgery remains to be implemented. Consequently, a lot of the development has been related to the complexity of a larger hospital,

and much work is put into making a continuous chart independent of location and time. Grønbekk explains that chart functionality of medication is especially challenging, as medicating a patient is tightly connected across hospital departments. Previously there has been a lot of malfunction related to real-time issues and information loss during cross-department transitions, and improving within these areas has proven to be both challenging and time-costly.

Currently, MetaVision is scheduled for a new pilot at Østfold HT in 2014. As the old framework agreement has expired and is not suitable for this new situation, a new framework agreement with related tendering is also scheduled for 2014. Based on the experiences obtained from the present implementation, South-Eastern Norway RHA is preparing the tender process by establishing requirements through wanted qualities rather than requirement specification. The qualities will be system independent and unrelated to previous solutions, and this is in contrast to the previous tender. The aim is to generate specific requirements during the tendering process, and not in advance. Grønbekk suspects that applying this approach on the previous tender would have been beneficial in order to be more efficient in the subsequent development and improvement process. Still, he realises that it would have been difficult; as experiences obtained from the current regional framework agreement is a prerequisite for the modified approach.

According to Noddeland, the time frame of six years (4+1+1) had not been sufficiently long to capture the required length of the project, and a new framework agreement would be an unnecessary obstacle at best. As he sees it, such a project is a large investment from the regional health authority, both in terms of organisational changes, but also in the solution of the supplier. As such it would not make sense to switch supplier every six years. Grønbekk agrees with this, but at the same time finds that being forced to reconsider existing solutions and suppliers occasionally could also be useful in order not to get stuck with an inferior product.

### **4.3 Central Norway Regional Health Authority**

The Central Norway RHA administers the central region of Norway, providing services to around 700 000 inhabitants spread over three counties (Helse- og omsorgsdepartementet, 2010). The region has 15 procurers, three in the regional health authority and the remaining in the three health trusts, as well as one in Hemit. The total amount spent on procurement in the region is 5 billion NOK per year.

While there is a plan to make the procurement function more strategic, according to Bård Skage, head of procurement in the Central Norway RHA, the procurement function is still relatively far from becoming strategic. He gives several reasons for this. One is simply the lack of labour, illustrated by the 15 procurers in the Central region compared to 130 in the South-Eastern region. The consequence is that they have to prioritise urgent operational tasks, such as ensuring that there are agreements for all product groups, on behalf of more long-term strategic matters,

such as competence building and procurement planning. However, Skage argues, it is not as simple as employing more procurers either. It is hard to find good candidates, who are knowledgeable both of purchasing in general, as well as the particularities of public procurement, and who furthermore have an understanding of the health sector. Furthermore, Skage sees restrictions in the organisational structure, which he considers another impediment towards making the procurement function more strategic.

The organisation of procurement in the health region follows what they have called a network structure, where each health trust has a procurement department, which is connected to the procurement department in the regional health authority. There is a mutual understanding in the network, led by Skage, that regional procurement in many cases will be a beneficial arrangement, and a binding agreement that resources are allocated to these projects. However, as the procurers in the health trusts are employed by the health trusts, there can also be conflicts of interest, for example when an urgent local procurement is prioritised. This could, Skage argues, be solved by moving towards a more centralised line structure, where procurers are moved to a regional unit, similar to Sykehuspartner in the South-Eastern region. It would not necessarily remove all the procurers from the health trusts, but move the centre of gravity to the region. Another step in this direction would be to elevate the regional purchasing function from a department under department under the director of administration and project management to an executive function of its own.

The proposed shift towards a regional organisation of procurement follows a trend of more products being procured regionally. Roger Presthus, account manager in Hemit, is certain that such centralisation is the right way to go, especially for ICT solutions that require specific procurement competence, such as about change processes. As such, centralisation is a necessity for building competence. Skage also maintains that it would be easier to build competence with more control over the procurers. He is not too concerned that this would take away the autonomy of the health trusts, and argues that there is still enough freedom for local adaptation. He does, however, see that not all products are suitable for centralisation, whether from local to regional level, or the next step to national level. In his experience it is easy to do when the operational department is clearly defined and the product is relatively standardised. For ICT hardware there is already several national framework agreements, and also ICT services should be possible to move to the national level. However, he is more cautious towards complex ICT systems, describing failed efforts to procure a nationwide logistics and finance system. If the health services in Norway cannot agree on systems for the support functions, he asks rhetorically, how can they then adopt common clinical information systems.

An important prerequisite for moving procurement to the regional and national level, is, according to Skage, standardisation. Standardised treatment processes across hospitals lead to standardised products, which makes it possible to centralise procurement. This is the role of operations, he maintains, e.g. orthopaedic surgeons in different hospitals have to agree what requirements they have for hip replacements. This has proven to be a challenging task, as clinicians want to focus on their core activity, treatment of patients, and often do not have the time to work on standardisation and take part in procurement projects. As such, Skage explains, too much time is spent on establishing the projects, and getting the right resources for the team. Sometimes the procurement has stopped completely because of this. In his opinion, procurement must be a more prominent part of the managerial responsibility at the different departments, and there has to be an understanding of the role procurement has in the treatment of patients, so that the necessary resources are provided for the projects. Because, as he points out, everyone can feel it if the products are not in place. To get a stronger involvement from operations, they are considering to establish product councils similar to those in the South-Eastern region.

According to Skage, it is the clinical operations who has the ownership of what is being procured, and who decides what the demand should be. When talking about public procurement for innovation, he argues, it is rather operations who have to decide if they want to have something new. The role the procurement function is to lead the process, and to ask the right questions. In the procurement handbook for the region there is a checklist for points to consider, such as issues regarding the environment and ethical procurement. Innovation is also mentioned, although without further guidelines on how to induce innovation through procurement.

In terms of interaction with the market, Skage finds that they have not been good enough at making a proper market analysis, pointing to a combination of lack of resources, competence and time. While it is important to control the dialogue through the official procurement process, where there is commonly a single point of contact, he thinks that much more can be done in the planning stage. As long as non-discrimination is ensured, he is very positive to more dialogue with the market, such as organising supplier conferences and other arenas where operations can meet the suppliers for dialogue. However, so far this has not been done extensively. One problem, Skage finds, is that procurers have been afraid of interacting with the suppliers. He does not attribute this so much regulation as to reputation, and the consequences of making mistakes. The result is that procurers are more interested in doing the process right, instead of what gives the best product. The focus on minimising risk and avoiding finger pointing, he reasons, does not go well with thinking innovation. However, he does find that there has been a small change lately, which may lead to a less risk adverse culture.

In the following we will look at two projects that took place in the Central Norway health region. The first is e-kurve, a procurement project that has brought with it a significant amount of development. The second is Imatis Mobilix, which was part of a large contract awarded to Telenor for the construction of a new hospital in St. Olav's HT. This part will also include reflections on other projects done by Imatis.

#### 4.3.1 E-kurve

E-kurve is a clinical information system for the general hospital wards, which is supposed to meet three demands identified by operations in the hospitals in Central Norway. The first demand was a system that would display data of the patients, such as observations, assessments and history of treatments. This was called "kurve" or chart, deriving from chart functions that were used to visualise the observations. The second demand ("medisin") was a tool that would make it possible to manage the medication given throughout the hospitalisation. The third demand ("forordning") was a tool to plan and book observations and treatments of the patients from the different departments in the hospital.

These three demands were requested separately when Hemit put up a request for dialogue and pre-qualification in July 2004 (see Table 12). In addition they requested a clinical information system on anaesthesia and intensive care, as well as one for maternity wards. An important aspect of the procurement was that the systems should be integrated both with each other and with existing systems at the hospital, such as Doculive, the EHR system in the region.

Hemit decided to use what today would have gone under the name of competitive procedure, instead of the common open procedure, as it was not

possible for them to settle the detailed specifications of the requirements in the beginning. A first meeting with eight qualified suppliers was held in August, where the process was explained. In the first period, however, the overall functional requirements were outlined internally in the Central Norway health region, i.e. between Hemit and the operations in the hospitals. This resulted in a draft of the specifications, which was used for the dialogue with the potential suppliers in October and November. The specifications were then adapted to a final versions, and tenders were submitted in December.

Table 12: Process of e-kurve

2004	
- July	Request for dialogue
- August	Initial dialogue
- September	Draft of specifications
- October	Input from suppliers
- November	Final specifications
- December	Tenders submitted
2005 Spring	Contract entered
2005	Development and clarification of contract
2007-2008	Test version
2009-2010	First piloting session
2012-2013	Second piloting session
2013-2014	Possible deployment



Throughout the process it became clear that three of the demands were so closely linked to each other that it should be considered one system. This was called Kurve-Medisin-Forordning (KMF), which later became the name e-kurve. Siemens won this tender, which required new product development, as well as for anaesthesia and intensive care, for which they already had an existing system, PICIS. Siemens had had a long history of supplying to hospitals in Central Norway, through the EHR system Doculive. The last system, which was similar to the other but specifically for maternity wards, was awarded to Cardiac (later Imatis), who developed a product later named Natus. The contracts were signed in spring 2005.

Siemens started developing the system, and the first test version of the e-kurve system came in 2007-2008, but turned out to be quite different to what the clinicians actually needed. In part this was because the clinicians did not manage to articulate what they needed. Another challenge was the different perceptions of integration. The requirement had been that the system “should be integrated with...”, but this was very vague, and it required significant efforts from both sides to clarify the contract. Integration turned out to be considerably more complex than initially anticipated. The first piloting session took place in 2009-2010, but revealed that further development was still needed. Perhaps more importantly, it became more and more apparent that in addition introducing a new system to the hospitals, it would also change the work processes, and process changes were required to move from the paper-based system to the digital systems.

A second piloting session was initiated in 2012, and the current plan is to start full deployment in the end of 2013. This however depends on the evaluation of the pilots, where the preliminary response appears divided. Some are very content with the system and want to have it deployed throughout the whole hospital trust. Others are more cautious, and find that the system still does not cover all the functionality required. In addition to the evaluation, the Central Norway RHA has to make a decision as to whether they should stay with their current EHR system, Doculive, or move over to DIPS, as the rest of the health regions. This decision could also impact the future of e-kurve, which is currently integrated with Doculive.

The specifications that were developed in 2004, which were used for the supervision of the contracts, failed to encapsulate the complexity and uncertainty of the systems. Looking back, Roger Presthus, at the time project leader for the procurement of e-kurve, sees that more interaction and a stepwise progress would have been needed. It was naïve, he argues, to assume that the requirements specified in 2004 captured demand well enough. Instead there should have been a much longer period before the formal procurement started, with dialogue conferences and interaction with the suppliers. There had been some, but it was not sufficient. It would have

been better, Presthus maintains, to run it as a development project much further, instead of locking the specifications so early.

One of the challenges in capturing the demand has to do with the collaboration between Hemit and the operational units. When the first prototype was presented, the physicians claimed that they had not been involved, while other physicians had in fact been involved when making the specifications. The problem, Presthus explains, is that physicians are a heterogeneous group, who like to represent themselves, but not physicians in the health trust as a whole, and especially not throughout the region. In addition to this, it is hard to motivate physicians and other clinicians to prioritise working on procurement projects, while they also have to work on operational tasks. A possibility is for clinicians to take a complete break from clinical work in order to contribute to large procurement projects, but here it is both hard to find the funding and the willingness among the employees.

Another problem with locking specifications early is that they are likely to describe a solution that supports the current work processes, as opposed to how the work processes should actually be. Presthus explains that most of the time they have used on e-kurve has been on improving the work processes in the clinical operations, so that they can actually use new ICT tools that support such processes, and adds that “You think you are going to implement an ICT solution, but you actually carry out a gigantic transformation process”. This awareness did not exist at the time that e-kurve was procured, but is improving. Now, Hemit has employed three change managers, who help with the change processes in the health trusts. This includes preparing the users for what is to come, but also to get the necessary management commitment to implement it. An important prerequisite to all of this is to standardise processes, such as the course of a treatment, across the departments and health trusts. According to Presthus, the Central Norway RHA should become stricter on demanding and enforcing such standardisation in the various clinical areas.

If he would have carried out the same procurement again, Presthus explains that he would have asked for funding to use much more time on the first part of the procurement process, and spend more time on market dialogue. One possibility could have been to ask some suppliers to make a prototype, both to learn more about the solution and to see if the suppliers are capable. As such, the first goal would not have been to create the technical specifications, but instead to learn more about own demand and what the market can deliver. This would also postpone the choice of supplier to a latter point, where it might be clearer what the award criteria should be.

#### 4.3.2 Mobilix

Imatis Mobilix is a software solution initially developed in 2004 by Cardiac (later Imatis) for the new hospital buildings of St. Olav's HT in Trondheim. The idea behind Mobilix is to simplify logistical operations by replacing fixed communication points with mobile communication. The solution consists of an underlying system, a messaging server that handles the different devices that need to communicate with each other. These are primarily Cisco wireless IP phones, which have software installed that allow clinicians to log onto the common network. The clinician chooses a role, which in turn gives him/her a responsibility, for example for a certain section. If a patient in a ward in that section pulls the cord, this clinician will get this signal directly to the phone, instead of having to be near a screen to receive the signal. The Mobilix system is used for all types of messaging, for the clinicians, staff transporting the patients, and so on. All in all, the system has 5 000 to 6 000 users and around 100 000 messages are sent through the system every day.

The construction of the new university hospital in Trondheim is an enormous project, with a budget of roughly 12 billion NOK to build an area of 200 000 square metres in the period of 2002-2013. One part of the project is the ICT infrastructure, for which Helsebygg Midt-Norge in July 2003 issued an open call for tenders, and which was awarded to Telenor in January 2004. Ementor, one of the competitors, filed a complaint to KOFA and won, but no new tendering process was initiated. The contract was signed in February 2004, amounting to 335 million NOK for the period of 2004 to 2006. Telenor also won the consecutive contract for 2007 to 2009, signing a new contract in January 2007 worth 360 million NOK. Together with maintenance, the whole contract was estimated at around 1 billion NOK.

Telenor became the role as turnkey contractor, by which it was responsible for designing, project planning, delivery, implementation and training for the entire ICT infrastructure. Subcontractors included HP, Cisco and Cardiac. Cardiac was a small Norway based ICT company, which had delivered ICT solutions to the petroleum industry since the early 1990s. This was their first step into the healthcare sector, which was made possible by the fact that they had references of similar systems working on a large scale in the petroleum industry. Telenor needed their competence, and they entered a partnership for the delivery to St. Olav's HT. The health care part of Cardiac was later established as a separate company, called Imatis.

Imatis developed the Mobilix, building on the platform they had delivered to the petroleum industry, and delivered it to the first hospital building in 2005. As more buildings were constructed, the solution was installed in more places. The deployment of Mobilix was successful, and there were no major problems with the delivery from Imatis. However, there were weaknesses with the IP phones by Cisco, as well as network problems, both affecting the

usability of Mobilix. Because of these problems, although they were fixed, the hospital also did not rely on the system for life-critical situations, and they decided that emergency signals should still go to the pager of the physician currently on duty and not the wireless IP phone.

The delivery to St. Olav's HT was important for Imatis, who now had a reference in the healthcare sector, and decided to pursue the market further. They have won several large contracts, both abroad and in Norway. In many cases they deliver to newly constructed hospitals, and they frequently partner up with larger corporations, such as HP and telecom companies. This has seemingly worked better than partaking in more specific procurement projects, which used to have overly detailed specifications. An example is the delivery of Natus to the Central Norway RHA, which had more than 5 000 specifications, compared to the 200 in the significantly larger delivery to St. Olav's HT. Andresen notes that it was impossible to come up with any smart solutions, as specifications were "almost given for every single button, defining the colour, what it should say on the button, and where on the screen it should be placed". As such, even though a new product was required, the customer had already set clear directions for the development. Presthus, who followed the procurement from Hemit, agrees that this was too specified. According to Andresen, the customer must stick with functional requirements and give the suppliers the freedom to find the right solutions. While health authorities have improved in the latter years, Imatis still encounters situations with too specified requirements.

Imatis has experienced that it is hard to take part in a normal procurement process with new ideas, as it is often necessary with prior references just to be qualified. The hospitals are reluctant to purchase unless someone has done it before. Andresen describes innovation projects an alternative way in, where they take their ideas to hospitals and start projects with the financing of Innovation Norway, through this creating the necessary references for procurement. Here, Andresen finds that there are significant differences between Norway and a large innovation project Imatis had together with the regional health authority of Zealand, Denmark.

The innovation project in Denmark consisted of pilots in 15-20 departments in the whole region. While first reluctant, Imatis convinced Innovation Norway that such a scale was necessary in order to test collaboration across departments and hospitals in the region. The project was set up with a steering committee and decision gates, so that it was evaluated along the way. However, the progress was so successful that some of the decision gates were skipped. In parallel to the development of the ICT solution, a lean project was running, to see how to make the required organisational changes following the new solution. The innovation project was a success, and made it possible for the regional health authority to close two of six emergency departments. When they later issued a call for tenders in order to purchase the solution for all departments, Imatis was the only possible supplier.

Funding for the project was ensured for the complete large scale pilot from the very beginning, with 17 million NOK invested by the regional health authority, 6 million NOK coming from Innovation Norway and 5 million NOK from Imatis. This allowed them to have a full time project leader, as well as freeing the time of clinicians required in the project. This contrasts to the Imatis' experience in Norway, where projects often rely heavily on the limited funds by Innovation Norway, and the participation in the project is something that comes on top of the day-to-day work of the clinicians, which in turn slows down the whole project. However, Andresen also sees that the Norwegian health regions are learning from the Danish model, and they are currently involved in two innovation projects that follow a similar structure.

Nevertheless, Andresen experiences reluctance in Norwegian hospitals for long term investments, such as in innovation, for several reasons. One is that the reward system is built up around the yearly budgets, i.e. a physician is measured on what is gained in that year, and not what might be gained in five years. Furthermore, the hospitals do not always see the gain of the solutions, as they do not measure the impact. This contrasts to the project in Denmark, where an evaluation resulted in the reduction of departments and consequent cost savings. Another problem is that many hospitals struggle with their finances, in several cases running a deficit, which forces them to focus on short term challenges. While the regional level gives a lot of attention to innovation, it gets lost on the way to the local level, where hospitals are busy firefighting. According to Andresen the hospitals need to balance their budget, and then ensure that part of the budget is allocated to innovation projects, claiming that commitment will only take place if they have to use their own money. It should also be considered to take some of the money allocated to innovation in Innovation Norway, and give it directly to the budgets of the health trusts. Lastly, Andresen suggests to focus on fewer projects and ensure proper commitment, instead of having many small projects without proper ownership, as he experiences is the case now.



## 5 Analysis

In this chapter we will analyse the empirical data we collected against the six propositions we formulated in the theoretical chapter. An overview this is shown in Table 13. Rather than a summary of the analysis, the table provides a description following the different propositions. It also illustrates some challenges in doing a proper cross-case analysis. First, for some propositions we will primarily look at the regional health authorities, while for others the project – and in most cases we will try to combine the two. Secondly, our analysis is not so much comparative, searching for best practice and compare the different projects against this, as it is finding evidence and underlying reason for the different propositions in different places as one project or regional health authority alone is not sufficient for this.

Table 13: Overview of cross-case analysis

	South-Eastern Norway RHA		Central Norway RHA	
	<u>Seekuence Medical</u>	<u>MetaVision</u>	<u>E-kurve</u>	<u>Mobilix</u>
<b>Procurement as a strategic function</b>	Procurement becoming more long-term and strategic, but still not entirely focused on value-for-money and contributor to overall strategy.		Procurement generally not strategic, focus is primarily on short-term operational tasks. The aim is to make it more strategic.	
<b>Integration of the innovation process</b>	Primarily an innovation project, without a plan for commercial procurement.	Innovation took place after contract for commercial procurement.	Innovation took place after contract for commercial procurement.	Innovation took place after contract for commercial procurement.
<b>Collaborative relationship</b>	Interaction in all stages, but delayed due to lack of available clinicians.	Specifications done without supplier, but negotiations. Contract specifies what to develop.	Specifications made in dialogue with suppliers. Contract specifies what to develop.	Specifications done without supplier, but primarily functional requirements. Contract less detailed.
<b>Culture for innovation</b>	Historically procurers have been afraid of making mistakes. Improving, but still a challenge.		Historically procurers have been afraid of making mistakes. Improving, but still a challenge.	
<b>Cross-functional organisation</b>	In some cases a challenge to involve operations in procurement, but product councils improves on this.		Involving operations in procurement a challenge, hard to get management of departments to allocate clinicians for procurement projects.	
<b>Centralised purchasing</b>	Continuous centralisation through consolidation of hospitals into health trusts and more recently regionally through Sykehuspartner.		Similar tendency towards centralisation, and ICT has been regionalised for some time already. Procurement in general more fragmented across health trusts than in the South-Eastern region.	

Another reason that we cannot do a best practice comparison is that we simply do not have the means to clearly assess whether or not the projects have been successful. In fact, this can be attributed to the elements of Cousins supply wheel that we did *not* include when making the framework comparison (see 3.2.9), namely performance measurement and the concept of cost-benefit. These were not included because no other authors had mentioned it, and we found little evidence for it in the initial stages of our data collection, which perhaps is attributed to the fact that most of the projects were still ongoing. According to the experience of Andresen of Imatis, the specialised health services in Norway do not extensively evaluate the impact innovation projects has on the organisation. If this is true, then the lack of right performance measurement might be another barrier to consider.

Without a clear cost-benefit evaluation of the projects, we looked at two dimensions that we could at least roughly interpret: the degree of innovation and time used compared to anticipated timespan. The placement along the two dimensions is displayed in Figure 26. Starting with the degree of innovation, it is hard to place the projects in terms of adaptive or developmental PPI, primarily for the reason that they all had a combination of both. Mobilix and Seekuence Medical were adapted from other industries, but to the degree that it required more developmental than what can ascribed as purely adaptive. Similar with e-kurve and MetaVision, there were existing solutions, but still quite some development was required. As such, this raises the question as to how important the degree of novelty is, as opposed to for example the impact the new solution has on the organisation.

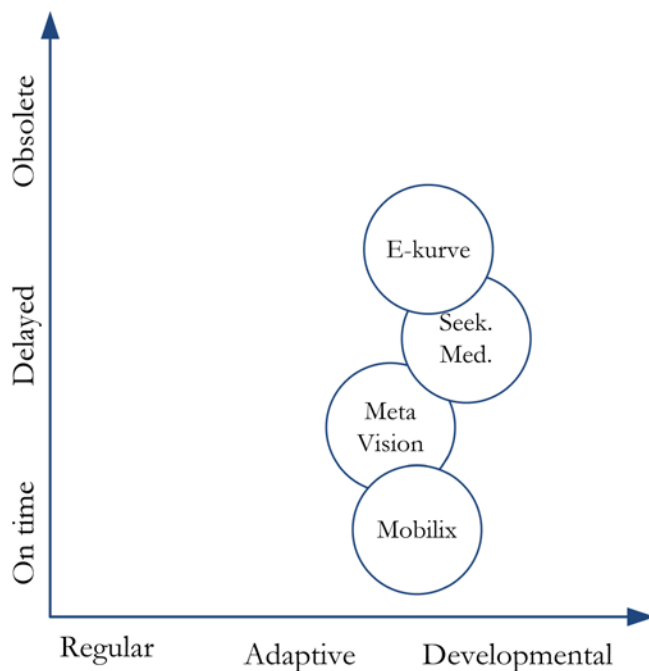


Figure 26: Time and degree of innovation for the four projects



In terms of timespan, assessment is similarly difficult. All projects took much longer time than anticipated, perhaps with the exception of Mobilix. However, this was not only due to problems delaying the different phases, but also the fact that the projects turned out to be much larger than anticipated. As such, the question is, what delay was due to what? At least for e-kurve it should be possible to say that almost nine years goes beyond what is reasonable even for such a complex project. However, this does not mean that it has become obsolete, although the Central Norway RHA is at a point where they need to consider whether or not to proceed with the deployment of e-kurve.

In the following we will go through each of the six propositions, and see if they hold (RQ1). In addition we will try to understand the barriers better, so that we can see how they can be managed (RQ2).

### 5.1 Lack of procurement as a strategic function

In the theoretical chapter, we formulated the following proposition:

P1: The lack of procurement as a strategic function is a barrier for public procurement for innovation.

Following the literature, we distinguished between clerical and strategic purchasing. While strategic purchasing is a broad topic, and can include the other categories, we also argued that there are certain fundamental indicators that make a purchasing function strategic. These are, as described in 3.3.1 and paraphrasing Castaldi et al. to fit the specialised health services:

- 1) A long term procurement plan
- 2) Alignment between procurement and strategy of the regional health authority
- 3) The directors in the regional health authority including input from procurement
- 4) Coordination of procurement strategies across health trusts

It was clear from the interviewees in both regions that with procurement making up a third of the expenses, it was necessary to see procurement as a strategic function. It was also evident that procurement had come a long way over the past ten years, when it was primarily a clerical function. However, the maturity of the procurement function was different in the two regions, with South-Eastern Norway RHA generally being one step ahead. Procurement was both a part of the 2013-2020 strategy of the RHA, albeit relatively small, and they had a separate procurement strategy for 2013-2016. In the assessment made by McKinsey, the procurement function was described as second generation, on a scale from zero to four, and still presented as a support function, rather than one that was strategic. At the same time, Istad stated that a value for money over the long term was becoming more common concept in the region. Procurement was relatively centralised through Sykehuspartner, which suggests a certain degree of

coordination across the health trusts. Considering all of this, we would place the South-Eastern Norway RHA between step four and five, see Figure 27.

In Central Norway, the situation is a bit different. No mention is made in the 2020 strategy of the RHA, and we also did not find a concrete procurement strategy like the one for South-Eastern Norway RHA, only a more general statement that procurement should become more strategic. Skage assesses that procurement cannot yet be described as a strategic function, and that it is hard to take care of long-term strategic tasks while the limited human resources are tied to doing short-term operational tasks. The lack of a director position for purchasing also indicates a lack of status, and it is less likely that procurement is an important input to top level strategy. As such, the procurement function could be considered less mature than in South-Eastern Norway, placed on the third stage: efficient use of public funds.

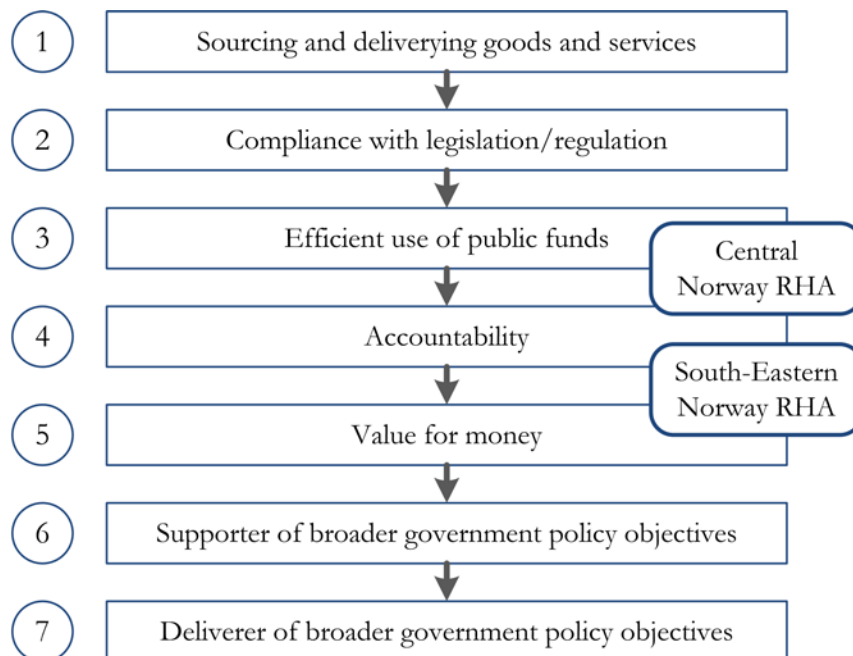


Figure 27: Position of the two regional health authorities in the seven stage model

Of the two regions it is the South-Eastern Norway RHA that has taken the lead in public procurement for innovation, which may of course be coincidental, but we still think can be attributed to the fact that the procurement function operates on a higher strategic level. It is also the impression of Istad that making procurement a more strategic function is strongly related with public procurement for innovation. At the same time, it does not remove the possibility of having public procurement innovation without the presence of a strategic purchasing function. However, the regional health authorities do not quite fit the “entrepreneurial” organisation described by Castaldi et al., who are able to stimulate innovation without having a strategic purchasing function.

According to Harland et al. innovation becomes a priority only on the last stage of the seven stage model. This implies that innovation only is a priority when government policy objectives are. This is true in one respect, as the strong pressure from government to do something with public procurement for innovation certainly is an important reason as to why public procurement for innovation is a hot topic in the specialised health services. At the same time, we would argue that it is possible for a public entity to see the value of innovation without being told to innovate. If adapting a truly long-term perspective, it should be clear for the regional health services that innovation can help improve their health services to citizens.

In summary, we find that moving the procurement function from a short-term efficiency focus to a long-term strategic value for money focus has a positive impact on public procurement for innovation. This can also be explained by the fact that procurement for innovation requires a long-term perspective to see the benefits. At the same time, we also see the benefit of reaching the last stages in the Harland model, but argue that it should also be possible to have focus on procurement for innovation in the fifth stage (value for money). As such, we argue that the lack of a sufficiently strategic procurement function is a barrier to public procurement for innovation.

## **5.2 Lack of integration of the innovation process**

In the theoretical chapter, we formulated the following proposition:

P2: The lack of integration of the innovation process in the purchasing process is a barrier to public procurement for innovation.

Looking at typical representations of a demand-driven innovation process and the procurement process, we found that, while different in many aspects, both processes shared the same start, a demand, and the same end, fulfilment of that demand. This led us to suggest that these processes should be viewed as integrated, rather than independent of each other. While the lack of integration does not mean that there is no innovation, we would think that it is important to know when and how the innovation takes place. This becomes clearer when looking at the process of the four projects we described, as shown in Figure 28.

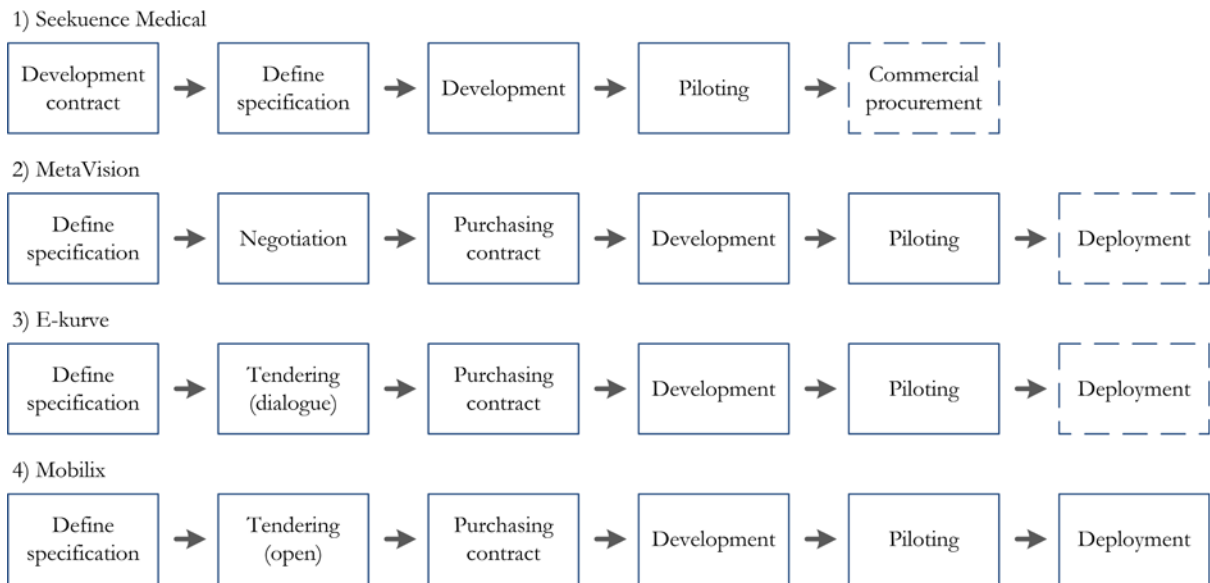


Figure 28: Process of the ICT projects

Of the four projects we have looked at, three are typical procurement projects (MetaVision, Mobilix, e-kurve), while the last is a typical innovation project (Seekuence Medical). The crucial difference between the two is that in the case of traditional procurement projects, the development and piloting stages comes after the decision to procure on a commercial basis is taken, while for the innovation project this takes place beforehand, in what can be considered a pre-commercial stage. However, for the innovation project the aim too is to eventually reach a commercial procurement stage. We therefore find that there are two main places the innovation process can be integrated in the procurement process, either as part of the commercial procurement or in a separate pre-commercial procurement. This is illustrated in Figure 29.

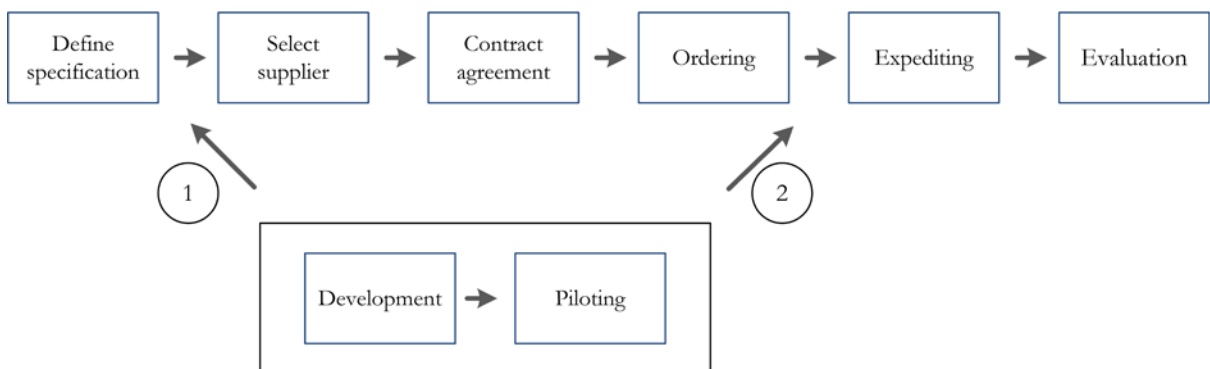


Figure 29: Possible points for integration of the innovation process

The implications of this difference are substantial. Moving the development (design & prototyping) and piloting (testing & validation) stages before the final decision on a scaled, commercial procurement of the solution would mean that procurement is split in two, a pre-commercial and a commercial phase. One advantage of this is that it is not necessary to lock specifications in one large tendering process, and in such a way offset the risk associated with the

uncertainty that follows procurement for innovation. In addition to this, it would be easier to terminate the project along the way, if it turns out that it does not meet expectations. In other words, it would be possible to introduce gates after different stages, as proposed by the Stage-Gate model by Cooper (see 3.3.2).

The case of Seekuence Medical illustrates possible challenges that may arise having development and piloting in a pre-commercial stage. Although Posicom had successfully developed a prototype, the piloting phase was not sufficiently comprehensive, and hence failed to produce the necessary validation in order to transition to the stage of commercial procurement. Apparently this is not an unusual problem, and one cause appears to be funding. A typical innovation project funded by Innovation Norway commonly ends with the prototype and a small pilot, which for ICT solutions does not validate if it works in more complex environments. This gap in funding can be addressed either by extending the funding by Innovation Norway, or by allocating additional resources in the procurement budget of the hospital trust or regional health authority. According to Andersen of Imatis, the latter would lead to more customer commitment to the project.

In addition to the potential problems of creating a gap between the pre-commercial and commercial procurement, such an approach would be more resource intensive than the usual approach. If, as the pre-commercial procurement model by the European Commission suggests, more than one company are included in the pre-commercial stages, this would naturally increase costs. As such, the stage procurement model should only be applied if there is a high degree of uncertainty connected to the procurement, and the benefit of learning from multiple companies is high. This would in particular be useful for radical innovation, i.e. in the case of developmental PPI. However, other aspects may be important when considering whether innovation should be conducted through pre-commercial or commercial procurement. In cases where the supplier comes with the idea, there might be no other way than to do it through pre-commercial procurement.

To summarise, we suggest that the innovation process needs to be more consciously included in the procurement process. Perhaps the most important decision is whether innovation should take place as part of the commercial procurement or through a pre-commercial procurement. Today, we do not see this more as coincidence than an informed decision. Innovation projects are started without any clear plan for ensuing procurement, and procurement projects are started without considering if there needs to be a pre-commercial procurement. As we see it, choosing the wrong process might turn out to be a substantial barrier to public procurement for innovation. An example of this is e-kurve, where Presthus also suggested that it might have been better to procure prototypes first, to understand better how to specify the commercial

procurement. In the end, this is also about acknowledging the fact that external innovation is a part of managing external resources, and as such concerns procurement (see definition of procurement in 3.1.1).

### 5.3 Lack of collaborative relationship

In the theoretical chapter, we formulated the following proposition:

P3: The lack of collaborative relationships with the suppliers is a barrier for public procurement for innovation.

Following the logic of scholars before us (see 3.3.3), we argued that public procurement for innovation required interactive learning, which in turn called for close collaboration between the supplier and customer. Both in the South-Eastern RHA and Central Norway RHA they emphasised the importance of dialogue and early involvement of suppliers, and they considered that this was a pre-requisite for arriving at innovative solutions. However, as Istad pointed out, market analysis and dialogue is something that should be done for any procurement; it is simply good procurement practice. As such, if it is the intention to conduct procurement that leads to innovative solution, i.e. explicit PPI, one could argue that the amount of market dialogue needs to be higher than for normal procurement, and that the involvement of suppliers needs to come earlier than for normal procurement.

To achieve this, two elements become important: time and money. By the first we mean the time from a demand is communicated from the clinical operations, to the required delivery. Logically, the shorter this time, the harder it will be to have extensive dialogue with the market. Therefore, the procurement function needs to communicate to clinical operations that needs that require the procurement of innovative solutions must be communicated early. As for money, it should be clear that more dialogue with the market will require that both customer and supplier put in more work hours, which translate to labour costs. This problem is visible in Central Norway RHA, where the lack of procurers and focus on urgent operational procurement will make it hard to allocate resources to extensive dialogue. Here it could be necessary to have a clear link between the cost put into additional resources and the resulting benefit. Unfortunately, in terms of innovation such cost-benefit links can be hard to establish.

In the procurement projects, and in particular e-kurve, we learnt that dialogue had taken place. E-kurve followed the competitive dialogue procedure, where they had a session with each qualified candidate before they finalised the tender specifications. However, as Presthus argued, this was not sufficient. The tender specifications they formulated at that time were not good enough to capture the uncertainty and complexity of the project and this led to problems afterwards. Much more interaction with the supplier would have been required, and perhaps

even pre-commercial stages where the candidates are asked to develop prototypes – before the tender specifications for the procurement are defined. With this we are back to the discussion from 5.2 on whether development stages should take place before or after the tendering process. However, here we want to focus on the nature of the tender specifications and its role in determining the nature of the relationships.

Several of the interviewees argued that the RHAs historically had been far too detailed in their tender specifications, which in turn made it impossible for the suppliers to come up with new solutions. This is particularly well illustrated through the experiences by Andresen and Imatis, who in the development of Natus had to fulfil 5 000 specifications, essentially killing any innovative activity. Presthus described a similar situation for e-kurve. Once the contract was signed, the focus was order fulfilment according to the set specifications, instead of interactive learning. In other words, it is necessary to reduce the amount of specifications, and move to functional requirements instead of technical specifications, as stated in the document on public procurement for innovation by the RHAs.

The effect of reducing the specifications essentially opens up for more interaction *after* the contract has been entered. As not all details have been set in stone, the supplier and customer can collaborate along the way and are freer to address challenges that arise and which were not known upon entering the contract. This fundamentally shifts the relationship between supplier and customer. The public procurer will have to give up the possibility to control the supplier through a detailed contract, and instead trust that the supplier's ability to develop a good solution. In other words, reducing the dependency on contractual specifications and introducing functional requirements moves the relationship from strictly contractual arm's length towards collaborative.

As we found in both regions, the practice of over-specifying the tender specifications and resulting contract has been reduced significantly, although it still occurs. This is not surprising, as reducing specifications can reduce control, which might be uncomfortable for the procurer. It requires a culture of trust and taking risks, something we will discuss further in 5.4. According to what we have found, we find it reasonable to state that it is better to address the uncertainty that public procurement for innovation through stepwise interaction with the supplier, which requires trust, than to manage it through contract alone.

Some scholars have argued that the nature of the public sector prevents it from having close relationships with its suppliers. Based on the discussion above, we want to give a bit nuanced picture of this. As we have seen, there is nothing preventing public procurers to move from a relationship governed primarily by contract to one built on trust and collaboration. At the same time it is true that the public sector is different than the private sector, but not insomuch because

of the regulation, as the conditions that underlie them: transparency, equal treatment and non-discrimination. The result is that each new contract requires them to give all suppliers the same opportunities, i.e. they cannot prefer the existing supplier. As such, while it is not a problem to have strong collaborative relationships, the length of the relationship might not always be as long as in the private sector. However, this too should be stated with care. As we saw, Siemens has had a long history with providing ICT solutions to the hospitals in Central Norway. Furthermore, it is hard and not really desirable to be completely free of the dependencies that arise throughout the solutions that are delivered. This is well illustrated with the question the Central Norway RHA is facing on whether or not to switch from Siemens' Doculive to DIPS. As the switching costs are immense, it is clear that they cannot toggle back and forth between the two systems every fourth year, but rather need to make a long term assessment.

Summarising our analysis, we can divide collaborative relationship into two: the interaction that takes place prior to the tendering process and signing the contract, and the interaction that takes place after. While we found that interaction to clarify the specifications is important for any procurement, we reasoned that the intensity needed to be higher and the timespan longer for public procurement for innovation. In terms of interaction after the contract, we suggested that the contract was essential to whether the relationship would take form of arm's length contract fulfilment or interactive collaboration between supplier and customer. We find that collaborative relationship in all stages of the procurement process, including innovation, is necessary for successful procurement for innovation. As such, the lack thereof will constitute a barrier to public procurement for innovation..

#### **5.4 Lack of culture for innovation**

In the theoretical chapter, we formulated the following proposition:

P4: The lack of culture for innovation is a barrier for public procurement for innovation.
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When we investigated the literature in our study we uncovered that researchers propose a distinct culture for stimulating innovation, and that the absence of such a culture can act as a barrier. We found that incorporating a questioning attitude in addition to having a collaborative, open culture and incentives positively related to challenging the status quo are characteristics of culture that generates innovation. In literature describing the public sector, we saw that scholars argued that this culture for innovation was lacking, among other due to an asymmetric incentive structure. We also questioned whether a lack of culture for innovation can be considered a trait of purchasing in general, and therefore a possible problem for public procurement.

Starting with the specialised health services in Norway as a whole, it can hardly be argued that innovation does not take place. The South-Eastern Norway RHA spends 1.7 billion NOK on



R&D, and innovation is increasingly a topic, with own organisations like Inven2 and NTNU TTO to commercialise research findings. However, this falls within the domain of research-driven innovation, and for user driven innovation the picture is somewhat different. Also this part receives a significant amount of attention these days, facilitated among other through InnoMed. However, attention from above is not necessarily the same as a culture for innovation. Speaking with the interviewees, a more nuanced picture emerges. Noddeland claimed that many clinicians are genuinely interested in improving their working environment. However, he also pointed to the fact that there is not really time to work on this, as everyone is busy with their daily schedule. This leaves only a smaller selection of enthusiasts, who are willing to work in the evenings or weekends. Skage also mentioned such enthusiasts, but was not so sure if the only problem is that clinicians are not given time to work on innovation projects. For many, he argued, partaking in such projects (here referring to procurement projects) is not that appealing if it is not directly connected to clinical work. We will not conclude here whether or not there is a culture for innovation in the specialised health services in Norway, as there is not enough empirical data to do this, but only take notice that there seems to be a lack of dedicated time for personnel to engage in improvement projects. We will return to this in 5.5.

Turning to the procurement function in the two health regions, we have more information, and the keyword appears to be risk aversion. Both Istad and Skage found that procurers have been afraid of making mistakes, and while it has improved, this is still often the case. Istad attributed this to a strict, and in his opinion wrongful, interpretation of the regulations, which among other has led procurers to avoid interaction with suppliers, not to risk any differential treatment and ensuing complaints in KOFA. Skage found that the problem in Central Norway ultimately is that there is too little room to make mistakes, as this often results in negative sanctions. The result is too often that the procurers focus on doing the process right, instead of procuring the best solution, which might require innovation. It is also interesting to note that neither Istad nor Skage, or for that matter any of the interviewees made any mention of positive incentives for procurers. From this we conclude that there is indeed a lack of culture for innovation in the procurement function in the two regional health authorities, and that this is a barrier to public procurement for innovation.

Constructing an incentive structure that encourages procurers to take more risk and procure new solutions that involve uncertainty can be a challenge in itself, but there can also be underlying factors that make this even harder. If the procurement function or the public entity as a whole strives towards short-term efficiency, and constructs its incentives accordingly, this will fit poorly with innovation, which may prove less efficient in the short to medium term. As such, moving towards an incentive structure that rewards procurement of innovation will require performance

metrics that measure something else than efficiency, and which might not actually be possible to measure in the short term.

In summary, we find that there is a tendency of risk adversity in the procurement function of the specialised health services, and this has been and continues to be a barrier to public procurement for innovation. At the core of this is an incentive structure that promotes efficiency and status quo, rather than procurement of innovative solutions. At the same time, we do not propose to make all procurement projects a quest for innovation, but rather find a balance between efficiency (exploitation) and innovation (exploration).

### **5.5 Lack of cross-functional organisation**

In the theoretical chapter, we formulated the following proposition:

P5: The lack of cross-functional organisation is a barrier to public procurement for innovation.

The advantages of cross-functional organisation are found both in innovation and procurement literature, and can be traced to the knowledge-based view (KBV), whereby organisational structures exist to combine different types of knowledge. In our theoretical study we found evidence that integrating purchasing with other functional areas has a positive effect on purchasing contribution to innovation. At the same time, organising across functions is a challenging task, and we considered that this could be a barrier in the public sector.

All the four projects that we looked at had a cross-functional team, which was common for larger projects in both of the health regions. Nevertheless, several of the interviewees considered it a challenge to get clinicians to participate in these teams, as they were tied down with their daily work. In the case of Seekuence Medical, Ragnvald Otterlei, managing director of Posicom, voiced his frustration that there had been a lack of dedicated personnel at the hospital to work with the development, which had delayed the project significantly. For e-kurve too it had been hard to get physicians to work in the procurement project, with the additional problem that when other physicians were asked to test out the first prototype, they claimed that they had not been involved. Skage also explained that establishing the projects were too time-consuming. Only Istad found that this was not too large of a problem, as they for procurement in the South-Eastern Norway RHA had established product councils, which ensured better integration with operations.

The underlying problems here are different depending on whether it is an innovation project or procurement project. For innovation projects, according to Otterlei, Andresen and Noddeland, it is largely a question of money, i.e. the labour costs connected to having clinicians work on something other than patient treatment. However, for the exact reason that the development of ICT solutions is put up against treatment that potentially saves life, this is hard to do. Noddeland

stated that there were strong budget constraints, with a short-term perspective making it hard to justify return in the longer term. Therefore they were highly dependent on the resources made available by Innovation Norway. Andersen too saw this short-term perspective in many hospitals, which were busy firefighting. According to him, they first had to balance their budgets, and then take on a long term perspective, where some of the budget is allocated for innovation. This would also raise the commitment he argued.

For procurement projects, Skage found that the most important point was to get middle management in the different clinical departments to understand that procurement was in fact an important part of the clinical work. If procurement is delayed or stopped even, that will eventually have consequences for clinical work. Establishing product councils after the model of the South-Eastern Norway RHA could help on this.

It can appear that, while participating in cross-functional teams was given less priority both in innovation and procurement projects, the problem for innovation projects was to convince hospitals that they should spend their own money on it at all, as it had no short-term benefit, while the necessity for the procurement projects was more visible, and not such much a question of money as finding the right resources for the right time. One way to address the first problem could be to incorporate innovation projects into the procurement process of the regional health authorities, as suggested in 5.2. This might make the link to commercial procurement and value for the hospitals in the region clearer, and might also justify the allocation of resources from the regional health authority.

Also related to our discussion on processes in 5.2 is the question where the integration of operations takes place, and where operations meet the supplier. As we found from both Istad and Skage, the increasing focus on dialogue with the market prior to and in the tendering process also included new contact points with the supplier before the contract was signed, such as supplier conferences where clinicians would participate. Andresen said that such contact with operations was valuable, as it gave them as suppliers the possibility to find out what was actually needed, and not just communicated through the procurement function. However, in his opinion it was even better to be invited to the hospitals, where suppliers could observe the work flow, and make up their own suggestions on what was needed. Both cases illustrate that integration is not only important between the procurement function and operations, but also between the supplier and operations, as illustrated in Figure 30.

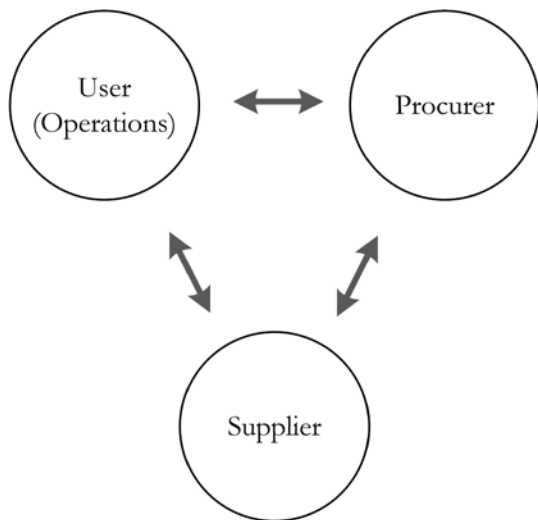


Figure 30: Points of integration

In summary, we find that the lack of cross-functional organisation is a barrier to public procurement for innovation in the specialised health services, despite the fact that projects are organised in cross-functional teams. The Achilles' heel is the access to the right clinicians, which in part can be primarily attributed to a short-term focus that does not give room for innovation that provides long-term benefits.

## 5.6 Lack of centralised purchasing

In the theoretical chapter, we formulated the following proposition:

P6: The lack of centralised purchasing is a barrier for public procurement for innovation.

The presence of a local, regional and national layer in public procurement in the specialised health services in Norway adds to the complexity of public procurement for innovation. At the same time it gives us the possibility to discuss if it is better to have a centralised or decentralised structure for public procurement for innovation. In the theoretical chapter we proposed that centralised procurement was preferable, where the positive effect from aggregating demand on public procurement for innovation was emphasised (see 3.1.3 and 3.3.5).

Among the interviewees, there were exclusively positive views on the centralisation that had taken place on procurement in both in the South-Eastern and Central Norway health regions. The predominant view was that procurement had been too decentralised, and this had been an impediment in conducting professional, strategic procurement. While scale was brought up as a reason for centralising procurement, by the logic that it required less resources to purchase products that were needed in all health trusts regionally, perhaps the strongest argument made for centralisation was the need to build competence.

It is interesting to note that the effect aggregating demand could have on supplier's willingness to innovate was not mentioned by the interviewees. One reason for this could simply be that most of the procurement projects that involved innovation, including those we looked at, had been sufficiently large to spark the interest of the suppliers. As such, one could argue that, from the argument of scaling up and aggregating demand, the requirement for further centralisation is not that strong.

Rather, focus should be on the need for competence building. This leads to the question as to which competence is important for public procurement for innovation. As the average procurement project involving innovation would be more complex than that of regular procurement, it would certainly require more in procurement skills. In addition, the importance of customer sophistication 3.1.3 shows that the competence of operations is valuable, which also follows from the discussion on cross-functional organisation. As such, efforts to centralise need to be accompanied by measures to ensure that operations are still included. The product councils in the South-Eastern Norway health region are a good example of such a measure.

In summary, the question as to whether public procurement for innovation benefits from a centralised or decentralised procurement strategy is hard to answer. The need for a certain volume to attract suppliers seems less important here, than the necessity of pooling competence. As such, we can say that a certain amount of centralisation probably would be beneficial for public procurement for innovation, but it is hard to conclude on the degree of centralisation. Here other factors in the discussion of centralisation versus decentralisation will probably be more important than that of innovation.



## 6 Conclusion and recommendations

In this chapter, we will conclude our findings by returning to the two research questions we started with. Furthermore, we will attempt to give some concrete recommendation that can be used by practitioners. Lastly, we will share some thoughts on how our findings can affect further research in the field of public procurement for innovation.

### 6.1 RQ1: What are the barriers to public procurement for innovation?

Through our theoretical review we formulated six potential barriers to public procurement for innovation. Through empirical data collection and subsequent analysis, we tried to evaluate if these would hold true. Our conclusion is that all of them do, with the exception of lack of centralisation, which we were not able to substantiate sufficiently.

The lack of strategic procurement is in our opinion a fundamental barrier, one which essentially has an effect on the others. Although we to deal with them separately in our analysis tried, making procurement more strategic also means enabling collaborative relationships and stronger integration with other functions in the organisation. In the end, the reason that strategic procurement is so important for public procurement for innovation is that it very often *is* strategic. Procurement for innovation can have a significant impact on the organisation, as is illustrated by the organisational change that comes alongside the digitalisation of the health services. It also requires a long-term perspective, as the benefits will not materialise immediately and there will be failures. As such, public procurement for innovation, which is exploratory in nature, will be different from procurement focusing on exploitation (see distinction made in 3.1.1). This will be a challenge for public organisations that focus on short-term efficiency and exploitation.

The lack of integration of the innovation process in procurement for innovation is also a problem. It is not possible to view external innovation as a normal order, where the supplier innovates according to a blueprint. Rather, there needs to be an understanding that the innovation happens in the intersection of supplier and customer, and that innovation is a part of managing external resources, which is what procurement is all about (see van Weele's definition of purchasing in 3.1.1). Procurement for innovation is hard to achieve without an innovation process, and one question should be whether this takes place as part of the commercial procurement process, or as a separate pre-commercial procurement. The latter would arguably be more resource intensive, but could especially make sense in cases of radical innovation, i.e. developmental PPI.

The lack of collaborative relationship is in our opinion a central barrier to public procurement for innovation, but involves more than merely increased dialogue throughout a tendering process. Essentially it is a different type of mindset than for a regular procurement. Again,

instead of taking the approach that the role of suppliers is to deliver to specification, it should be that supplier and customer go together to solve the problem of the customer. It means that the customer cannot and should not fully control the supplier through contract, but instead needs to trust the supplier. For this to happen it is important to have a culture that allows for trust-based relationships to take place.

The lack of culture for innovation is another barrier to public procurement for innovation, and refers to the problem that arises when the procurer is risk adverse and driven by efficiency. By nature, innovation involves accepting that failures will occur, but in the long-term there will be a return on pursuing new solutions to both old and new demand. A challenge with culture is that it commonly requires time to change, and it often does not pertain to separate departments, but rather the organisation as a whole.

The lack of cross-functional organisation is in our opinion a barrier that has received little attention. This is important for any larger procurement project, but especially when innovation is involved, as innovation ultimately is about change in the operational units. As such, one could view public procurement for innovation simultaneously as change management projects. Involvement of operational personnel is important for many reasons, as the source of demand in determining the specifications (whether communicated through explicit knowledge or observed tacitly), source of expertise throughout development, or recipient of the solution during implementation. However, their involvement should not only be restricted to the procurement function, but they should also be in direct contact with the supplier on the different process phases.

The lack of centralisation as a barrier to public procurement for innovation proved hard to validate. While we saw that a certain degree of centralisation allowed procurement to become more strategic and better manage procurement competence, it was in the end on the local level that innovation projects took place. In general centralisation may seem a necessity to be able to make public procurement for innovation, but it also appears to amplify another barrier, namely that of organising projects across operations (local) and procurement (regional). One way to look at it is that centralisation should not take place without at the same time ensuring good integration with operations (such as through product councils) and that there furthermore can be limits to how far such centralisation should go.

## **6.2 RQ2: How can barriers to public procurement for innovation be managed?**

In order to answer the second research question, we will follow up on the description of the barriers above, which already implies certain actions. In simple terms, once barriers have been identified, the general response should be to remove the barriers, e.g. lack of collaboration calls for more collaboration and lack of cross-functional organisation calls for more integration across



functions. However, the description of the barriers also reveals a certain complexity, and adding to this complexity is interdependency. Therefore, in order to answer the second research question, we need to look at how the barriers relate to each other, something we only have pointed to sporadically up until now. Here we present a model for public procurement for innovation as shown in Figure 31.

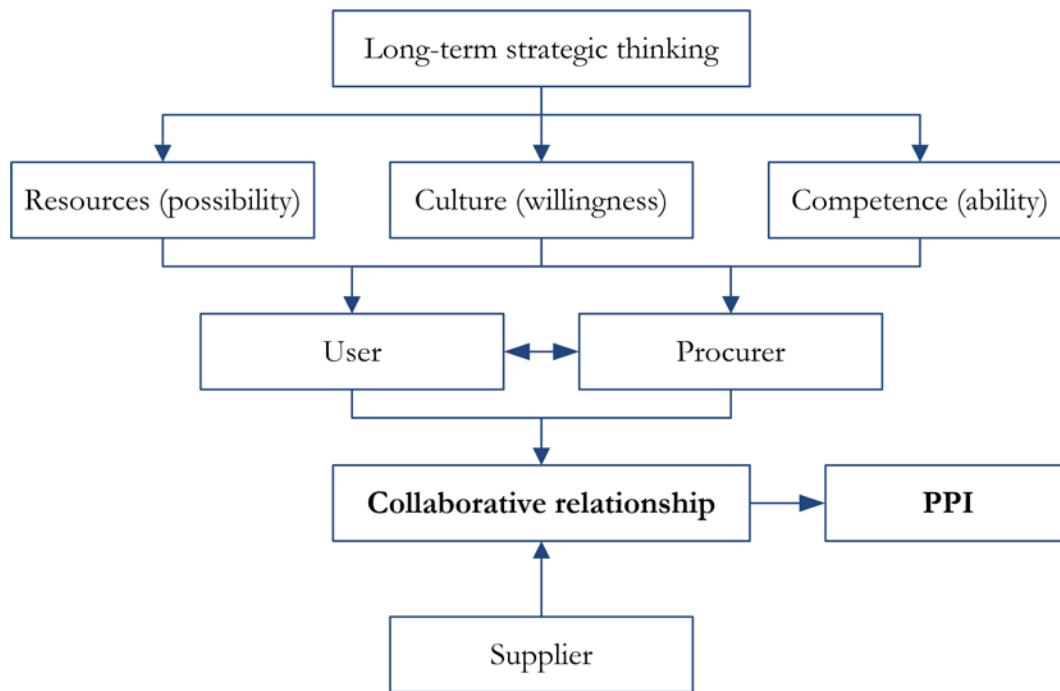


Figure 31: Model for public procurement for innovation

At the core of our model is a collaborative relationship. It is the single most important aspect driving public procurement for innovation, as frequently iterated by scholars and practitioners alike, and we find that all the other elements lead up to this. It refers to all the interaction that takes place from the demand or idea is generated through the specification, development, piloting and full-scale delivery, including the process required to select the supplier(s). Here it is important to have a good dialogue in the early phases, but also to ensure interaction through the development and piloting phase that come later. This can be ensured in two ways. If development and piloting is a part of the commercial procurement process, it is important to design a contract that does not constrain the development through too technical specifications, but instead relies on functional requirements. This approach opens up the possibility for supplier and customer to develop the product jointly in a trust-based relationship, rather than having the supplier deliver to specifications in a contractual relationship. A second possibility is to move development and piloting before the commercial procurement, i.e. divide procurement into two stages: pre-commercial and commercial procurement. This will give the procurer more freedom in terms of interaction with the supplier, which could especially be useful for developmental PPI. However, it would still be necessary to select the supplier(s) on a certain set of criteria, which

would not so much depend on the product solution (which does not yet exist) as on the capabilities of the supplier (such as the ability to innovate).

There are three groups that are central in a cross-functional collaborative relationship: the users (operations), the procurers and the suppliers. As we have in this study only looked at the customer side, we will not go further into detail on the supplier, other than to say that we expect there to be barriers connected to the supplier as well. For both the users and suppliers, there are essential three factors that are decisive for a good collaborative relationship: the willingness, ability and possibility. We will look at these three factors, first for the procurers and then for operations.

Willingness refers back to culture, where the most important measure would be to create an incentive structure that rewards procurers who explore new possibilities and not only exploits existing solutions. Ability essentially refers to competence development, in which centralisation may play an important role. A procurer would require a specific set of skills, such as relationship management skills, strategic thinking, cross-functional working and communication skills<sup>5</sup>. Lastly, procurers need to have the necessary resources that make it possible to engage in a collaborative relationship, which generally is more resource-intensive than an arm-length relationship.

For operations, such as in our case for clinicians, perhaps the most important aspect is that of resources, i.e. making the right people available. In a hospital where time not only means money, but also saving lives, this can be a challenge. However, also here the willingness is important, as clinicians need to be convinced that it makes sense that they work on something else than their operational tasks. Lastly, competence is relevant. It is not only important to make clinicians available, it is also important to ensure that they are the right clinicians, i.e. have knowledge that will benefit the project. While centralising operations, which by nature is decentralised, would be a poor idea, other ways of organising, such as the network organisation in the South-Eastern Norway RHA is useful in order to coordinate knowledge across the local entities (e.g. health trusts).

Underlying the three aspects of willingness, ability and possibility is what we have called long-term strategic thinking. In order to create an incentive structure that rewards exploration that may first pay off in the long term, or to use more resources to engage in collaborative relationships, it is essential to have an organisation that does not only aim to become highly efficient in the short-term, but that also assumes a long-term perspective. If it is true that public organisations in general are focused on efficiency, a statement we do not know if we fully agree

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<sup>5</sup> These examples are taken from Cousins (2008, p. 117) on supply competencies on strategic products.

with, then that may be the most fundamental and serious barrier to public procurement for innovation of them all.

To summarise, managing barriers to public procurement for innovation is essentially about providing conditions for collaborative relationships to take place. This means that procurers and clinicians are given the right incentives and resources, as well as having the right competence. Underlying this is the need for strategic long-term approach, which makes it possible to engage in the exploratory nature of public procurement for innovation.

### **6.3 Implications for practitioners**

In the following, we will build on the conclusion of the second research question above, which already gives a good view of the implications for practitioners. Here we will try to make it clearer who needs to do what, primarily addressed to the specialised health services in Norway.

**Implications for procurers:** For procurers, at least those who are likely to lead procurement for innovation projects, certain decisions have to be taken. First, the procurer has to assess if this should be considered a procurement for innovation, or if it is a regular procurement. This may not always be that easy to know up front, and at this point it is already important to have contact both with operations (where the demand comes from) and with the market. If it is considered to be a procurement for innovation project, the next step is to outline the process. An important decision here is whether the procurement should be conducted in two stages, i.e. first pre-commercial procurement and then commercial procurement, or if it is sufficient to have the development stages as a part of the commercial procurement.

In the case of the first, if the supplier came with the idea, the pre-commercial phase would take place with this supplier. If not, a supplier selection stage would be required, where focus should be on the capabilities of the supplier, as the final solution will not yet exist. The other approach, to have development as part of the commercial procurement, would require a procurement process where the specification phase is done in conjunction with operations and the suppliers. A supplier conference, with clinicians present, would be a good start for this. Furthermore, it would be recommended to use procurement procedures which make it possible for suppliers to outline their solution design, such as competitive dialogue or the negotiated procedure. Lastly, it would be important not to make a too detailed contract, but instead rely on functional requirements that open for interaction in the ensuing development stage. In short, the procurer has to make decisions that enable customer-supplier interaction in all stages.

**Implications for managers in the procurement department:** Managers for procurement need to give procurers the right conditions for public procurement for innovation. They have to make it possible for procurers to spend time on it, which may require the recruitment of more

personnel. Furthermore, they have to give the right incentives, which create a culture where procurers seek to explore new possibilities and are not afraid of making mistakes. Lastly, they have to work on competence development, which would require training of the procurers.

**Implications for managers in the operational departments:** Managers in operations need to realise that both procurement and innovation is an important part of their work, as both may improve the services they provide in the long term. This means that some of the labour resources should be allocated to these projects. Furthermore, in the cases that external innovation projects take place in these departments, the procurement department should be included, so as to make it part of a pre-commercial scheme upon which a commercial procurement will follow. Without this connection, there is likely to be a gap between the end of the innovation project and the planned large-volume procurement.

**Implications for top management:** While middle management will have the freedom to take certain measures, much of the above-mentioned actions would have to go through top management. In essence, they are the main strategic layer in an organisation, and as such, they are decisive in matters such as resource allocation and whether the organisation should focus on efficiency or take a more long-term perspective. In the end, it boils down to management commitment, and if it is not possible to get the support from top management, the measures outlined will be less effective. There should be a clear plan for how the whole organisation deals with external innovation.

#### **6.4 Implications for research**

In this part, we will first discuss the need for replicating our study in order to strengthen or supplement our findings. Next we will go through three concrete implications we think our study can have for research. At this point we will include a small discussion on why we think pre-commercial procurement should be treated as a part of public procurement for innovation. At the end, we will share some thoughts on the direction we think research on public procurement for innovation should take.

First, to strengthen our findings, the study should be replicated to other contexts, to see what is generalisable and what is restricted to ICT solutions in the specialised health services in Norway. While we think ICT solutions is a significant area for external innovation in the public sector, there are other potential products, which may have different characteristics. For one, we have noticed that ICT projects not only bring with them novelty, but also complexity. While it is in the nature of innovative products to bring about change, probably not all require complete new work processes. We have tried to separate uncertainty from complexity in our study, but there might be more subtle causes that we have not picked up. It is also expected that other public sector entities will be different than the specialised health services, such as municipalities or

agencies managing the public infrastructure. One example is that the health services have a strong research tradition, which may be less the case for other public entities. Lastly, we can expect differences in other countries, where regulations outside the EU/EEA zone would only be one of many aspects to consider.

For the findings of our study, we in particular want to draw the attention to the model presented in Figure 31 above. We think that this can be a good starting point for researchers in the field of public procurement for innovation. Moreover, we want to focus on three aspects:

1) In our opinion, one important contribution is how we have incorporated the innovation process in the procurement process, and shown how public procurement for innovation can either take place as part of the commercial procurement or in two stages, where a pre-commercial procurement precedes the commercial procurement. More research would be required to learn which process suits which procurement. At the heart of this is the notion that external innovation is a matter of procurement, even if it may not originate in the procurement department.

2) Furthermore, we have shown that it is quite possible to have a relatively strong degree of collaborative relationship in the public sector. We do not dismiss the particularities of the public sector, where the regulations are one impediment, but the whole picture is that it is possible. It may, however, take a different form than the private sector.

3) Perhaps more importantly, we have looked at what other factors need to be in place for public procurement for innovation to work, as depicted in Figure 31. At the heart of this, we argue, is the need for long term strategic thinking, because focus on efficiency will not allow for the exploration required to uncover new possibilities. We hope that others will build on this, so that a clearer picture emerges as to what the drivers of public procurement for innovation are.

As we imply in our first point above, and a realisation we had relatively early in our study, is the point that pre-commercial procurement should be viewed as a part of public procurement for innovation. The view that external innovation is a part of procurement is in our opinion important, and why we disagree with Edquist and Zabala-Iturriagoitia, who claim that pre-commercial procurement (PCP) should not be considered procurement<sup>6</sup>. As this goes against a prominent researcher in the field, we would like to elaborate on this in the next two paragraphs.

Firstly, Edquist and Zabala-Iturriagoitia (2012a, p. 3) state that “no actual product development and no buyer of such a product are involved in PCP”. As the stages of pre-

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<sup>6</sup> They have in fact written a paper called “Why pre-commercial procurement is not innovation procurement” (2012b), where they argue that it should be called pre-competitive R&D.

commercial procurement, as presented by the European Commission, are product idea, solution design, prototype and first test-products (see European Commission, 2008), we find it peculiar to conclude that there is no product development. It might be that Edquist and Zabala-Iturriagoitia refer to the lack of commercialisation, i.e. that they consider procurement to take place only in this stage, while preceding stages are development. This would go against our, and van Weele's, definition (see 3.1.1), where procurement is the management of external resources.

Secondly, Edquist and Zabala-Iturriagoitia argue that pre-commercial procurement is a matter of public R&D funding, and conclude that this excludes it from being a demand-side innovation policy instrument. We disagree with this reasoning, and argue that an innovation project driven by the demand of the customer should be considered demand-side. The type of financing is not the defining factor. Furthermore, pre-commercial procurement can be financed in part or completely by the procuring organisation. So as long as pre-commercial procurement involves external innovation driven by the demand of the customer, we would consider it a part of public procurement for innovation.

Lastly, for the general direction of research on public procurement for innovation, we think that it needs to incorporate more of the vast amount of purchasing literature that exists. This is not to say that this is not done at all, but it is still our opinion that research on public procurement in general, and on public procurement for innovation specifically, appears more as a separated part of purchasing literature than an integral part of it. Part of this is perhaps due to the fact that many of the articles in the field look at the broader picture for the public as a whole, without going into the specific organisations, as we have tried to do in our study. There certainly are differences between private purchasing and public procurement, but all in all they are very much alike. As such, it is a pity that they are separated by more than just terminology.







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## 8 Appendices

### Appendix 1: Literature review

Author	Year	Journal	Citations	Title	Research method	Key takeaways	Intended use
<b>Public procurement</b>							
Bryntse	1996	European Journal of Purchasing & Supply Management	25	The purchasing of public services	Mixed-methods with both empirical case studies and analytical conceptual	<ul style="list-style-type: none"> <li>- The characteristics of services and the public purchasing process</li> <li>- Addresses critical issues in purchasing public services</li> </ul>	- Barriers in the form of unrecognized issues
Uyarra, Flanagan	2010	European Planning Studies	26	Understanding the innovation impacts of public procurement	Analytical conceptual	<ul style="list-style-type: none"> <li>- Public procurement is a multi-objective policy</li> <li>- A one-size-fits-all model is unlikely to work across all procurement contexts</li> <li>- Policy-makers should focus on promoting innovation-friendly practices across all types of procurement at all levels of governance</li> <li>- Yet all types of procurement are likely to have impacts upon innovation by shaping the demand environment in which suppliers innovate and compete</li> </ul>	- A typology of public procurement for innovation
<b>Private versus public purchasing</b>							
Lian, Laing	2004	Journal of Purchasing & Supply Management	24	Public sector purchasing of health services: A comparison with private sector purchasing	Analytical conceptual	- Argues that the public sector to a larger degree engages in transactional purchasing than the private sector, where relational purchasing becomes more important	- Illustrate the differences between private and public purchasing
Arbjørn, Freytag	2011	International Journal of Public Sector Management	0	Public procurement vs private purchasing: Is there any foundation for comparing and learning across the sectors?	Analytical conceptual	<ul style="list-style-type: none"> <li>- Different conditions for public procurement and private purchasing</li> <li>- Relationship forms differ</li> <li>- Public procurement is regulated</li> </ul>	- Discussing public procurement in contrast to private purchasing
Telgen et al.	2007	Book (chapter of Public procurement: international cases and commentary, published by Routledge)	19	Public procurement in perspective	Analytical conceptual	- The demands on public procurement are greater and more highly varied than those on private sector procurement	- Additional demands on public procurement

Public innovation							
Albury	2005	Public Money & Management	107	Fostering innovation in public services	Analytical conceptual	- Explains the rationale of public innovation based on 'personalized' public services - A framework for replication the private sector pressures of market competition and survival	- Barriers in the form of 'pitfalls' when fostering innovation through the framework - Also explicit barriers
Hartley	2005	Public Money & Management	171	Innovation in governance and public services: past and present	Analytical conceptual	- Investigates the different contexts of public innovation based on three paradigms: traditional public administration, new public management, and networked governance	- Outlining public context
More, Hartley	2008	Public Management Review	67	Innovations in governance	Mixed-methods with both empirical case studies and analytical conceptual	- Five inter-related characteristics distinguish public sector innovations in governance from private sector product and process innovations - The focus is on innovation in governance (above organizational level)	- How to relate innovation in governance to innovations in products, services and production processes
Borins	2001	Journal of Intellectual Capital	110	Encouraging innovation in the public sector	Analytical conceptual	- There are asymmetric incentives for innovations in the public sector, unlike the private sector - Innovative ideas emerge from all levels of an organization	- Conditions or challenges that lead to innovations
Bartlett, Dibben	2010	Local Government Studies	49	Public sector innovation and entrepreneurship: case studies from local government	Empirical case study	- Public innovation may be enabled by public champions, empowered champions, and a sponsor	Drivers in the form of suitable conditions
Potts and Kastle	2010	Innovation: Management, Policy & Practice	15	Public sector innovation research: what's next?	Analytical conceptual	- Public sector innovation as a response to efficiency - Public innovation suffers from asymmetric incentives	- Asymmetric incentives
Public procurement and innovation							
Edler, Georgiou	2007	Research policy	189	Public procurement and innovation - resurrecting the demand side	Analytical conceptual	- The rationales, potential and necessary framework conditions for the use of public procurement as one type of innovation policy measure - Strategic public procurement is about selecting whole market areas in terms of their importance in the economy and their apparent ripeness for innovation (i.e not picking winners)	- A taxonomy of innovation policy tools

Hommen, Rolfstam	2009	Journal of Public Procurement	17	Public procurement and innovation: towards a taxonomy	Analytical conceptual and exploratory empirical case studies	<ul style="list-style-type: none"> <li>- Building on Edquist and Hommen (2000)</li> <li>- Modes of interaction: direct, co-operative, catalytic</li> <li>- Phases of evolution: early, middle, late</li> </ul>	- A typology for public procurement for innovation
Edquist and Zabala-Iturriagoitia	2012	Research policy	0	Public procurement for innovation as mission-oriented innovation policy	Multiple empirical case studies from three countries	<ul style="list-style-type: none"> <li>- A taxonomy of different phenomena that are, or should be, labeled PPI- First dimension: direct PPI, catalytic PPI- Second dimension: PCP, adaptive PPI, developmental PPI- Interactive learning and regulation: cooperation vs competition- Using PPI is to a large extent a matter of identifying and human needs and societal problems</li> </ul>	- A taxonomy-Defining public procurement
Apostol	2012	Public procurement law review	2	Pre-commercial procurement in support of innovation	Analytical conceptual	<ul style="list-style-type: none"> <li>- Pre-commercial procurement as a means to reduce risk perception when procuring R&amp;D</li> <li>- Explains the shortcomings of PCP as a procedure</li> </ul>	- The adoption of PCP has been poor
Dalpe	1994	Technology in Society	36	Effects on government procurement on industrial innovation	Empirical case studies	<ul style="list-style-type: none"> <li>- The best way for governments to promote innovation is to take on new projects or improve services that will in turn force both government buyers and suppliers to surpass their respective levels of technical competence</li> <li>- Demand-side instruments cannot be isolated from supply-side policies</li> <li>- Factors that explain the role of government procurement in innovation</li> </ul>	<ul style="list-style-type: none"> <li>- Strategic actions</li> <li>- Objectives of public procurement for innovation</li> </ul>
Aschhoff, Sofka	2009	Research policy	41	Innovation on demand - can public procurement drive market success of innovations?	Mixed methods	<ul style="list-style-type: none"> <li>- Public procurement and knowledge spillovers from universities propel innovation success equally</li> <li>- The benefits of university knowledge apply uniformly to all firms</li> <li>- Public procurement is especially effective for smaller firms in regions under economic stress and in distributive technological services</li> </ul>	- Strategic actions to stimulate innovation through public procurement

Edquist	2000	Book (published by Pinter)	493	Systems of innovation: technologies, institutions and organizations	Mixed-methods analytical conceptual and multiple empirical case studies	- A systems approach to innovation - Technical change - Public technology procurement	- The nature of innovation and PPI
<b>Strategic purchasing</b>							
van Weele	2005	Book (published by		Purchasing and supply chain management: analysis, strategy, planning and practice	Analytical conceptual	- Concepts and strategy of purchasing - Purchasing start with a demand and ends with the fulfilment of the demand	- A model for purchasing process
van der Valk and Rozemeijer	2009	Journal of Services Marketing	29	Buying business services: towards a structured service purchasing process	Mixed-methods with analytical conceptual and empirical survey	- Developing a proper specification is an important prerequisite for purchasing services successfully - Therefore the traditional purchasing process must be expanded	- An alternation of van Weele's model
Cousins et al	2008	Book (published by	47	Strategic supply management: principles, theory and practice	Analytical conceptual	- Five decision areas make up a purchasing strategy - All elements are related, altering one element will affect the others	- A model for strategic supply management - The supply wheel
<b>Strategic purchasing and innovation</b>							
Castaldi et al.	2011	Technology Analysis & Strategic Management	3	Strategic purchasing and innovation: a relational view	Analytical conceptual	- Suggests that innovation through purchasing is closely linked to making purchasing strategic - Argues that relations leads to purchasing for innovation	- How strategic purchasing determine purchasing contribution to innovation
Mogee, Bean	1976	Industrial Marketing Management	6	The role of purchasing agent in industrial innovation	Analytical conceptual	- Purchasing agents appear to be a boundary group with access to important information (gatekeepers)	Higher status for purchasing may promote the integration of information into problem and/or opportunity identification leading to innovation
<b>Supplier innovation</b>							
Jean et al.	2012	Decision Sciences	0	Drivers and performance outcomes of supplier innovation generation in customer-supplier relationships: The role of power-dependence	Mixed-methods with empirical tests and analytical conceptual	Uses KBV to explain supplier innovation generation in customer-supplier relationships	- Importance of Knowledge and Learning - Contexts: organisational, technological, environmental
Henke Jr., Zhang	2010	MIT Sloan Management Review	6	Increasing supplier-driven innovation	Analytical conceptual	Argues trust and commitment as a foundation for innovation	Supplier collaboration for innovation

Schiele	2006	Industrial Marketing Management	80	How to distinguish innovative suppliers? Identifying innovative suppliers as new task for purchasing	Analytical conceptual	A framework of the supplier, buyer-seller relationships and enabling factors	Barriers in the form of missing characters of supplying firm/buyer-seller relationship or lacking enabling factors
<b>Innovation barriers</b>							
D'Este et al.	2011	Research Policy	2	What hampers innovation? Revealed barriers versus deterring barriers	Analytical conceptual	It is necessary to distinguish between two kinds of barriers: revealed and deterring. Both have accompanying implications	- Barriers: cost, knowledge, market, regulation
Loewe, Dominiqini	2006	Strategy & Leadership	65	Overcoming the barriers to effective innovation	Empirical survey	- Major obstacles to innovation: symptoms and root causes	- Four keys to a systematic innovation capability. - A model of innovation effectiveness
Schlegelmilch et al.	2003	Journal of Strategic Marketing	66	Strategic innovation: the construct, its drivers and its strategic outcomes	Analytical conceptual	Defines the term strategic innovation and suggests drivers such as culture, process, people, resources	- Barriers in the form of anti-drivers
<b>Purchasing barriers</b>							
Gadde, Håkansson	1994	European Journal of Purchasing and Supply Management	190	The changing role of purchasing: reconsidering three strategic issues	Analytical conceptual	- Discusses the impact of the new view in three dimensions of purchasing strategy: make-or-buy, supply-base structure, and customer-supplier relationship - Manufacturing companies are increasingly relying on competent suppliers	- SBR in order to exploit supplier resources in order to improve technological development - Innovations will be developed in the interaction between users and suppliers
<b>Other / unsorted</b>							
Grant	1996	Strategic Management Journal	8483	Toward a knowledge-based theory of the firm	Analytical conceptual	- Disseminating explicit and tacit knowledge in an organisation - human resource as the key resource of a firm	Use it as a basic theory for barriers that relate to knowledge and the role of the individual
Roy et al.	2004	Journal of the Academy of Marketing Science	169	Innovation generation in supply chain relationships: a conceptual model and research propositions	Analytical conceptual	- Innovation in supply chain relationships is a consequence of interactions between buyers and sellers - Innovation is the result of an interactive learning process	- Factors internal and external to the relationship affect innovation generation
Cooper	1990	Business Horizons	1990	Stage-gate systems: a new tool for managing new products	Analytical conceptual	- Firms rely too much on push rather than pull - The stage-gate model is a solution, creating a stronger market orientation	- Stage-gate model for new products



Araujo et al	1999	Industrial Marketing Management	284	Managing interfaces with suppliers	Mixed-methods with both empirical case studies and analytical conceptual	- A buyer needs a variety of interfaces - Interfaces are interdependent - The choice of interfaces must take dynamic features into account	- Four interface categories based on the level of interaction between the supplier and customer
March	1991	Organization science	10416	Exploration and exploitation in organizational learning	Mixed-methods with analytical conceptual and empirical simulation	- Two sets of organizational learning exploration and exploitation - There are limited resources which will be devoted to either exploring new possibilities or to exploiting existing ones	- To distinguish PPI from regular procurement
Petersen et al	2004	Journal of Operations Management	454	Supplier integration into new product development	Mixed-methods with both analytical conceptual and empirical survey	- Supplier involvement	- A model for supplier involvement dependent on supplier responsibility
Waluszewski, Wagrell	2013	IMP Journal	0	Public purchasing policy as innovation killer	Mixed-methods with both analytical conceptual and empirical survey	- Only restricted types of interactions are taken into account in the current EU policy principles - Thick interaction is hindered	- As long as the basic policy foundation is the belief that a supplier-public user interaction shall be as close to a traditional market as possible, the "thick" interaction, recognised as being critical for renewal of resources, will be seriously limited
Håkansson, Snehota	1995	Book (published by Routledge)	2776	Developing relationships in business networks	Analytical conceptual	- Characteristics of a relationship (continuity, complexity, symmetry, informality) - Characteristics of process (adaptations, cooperation and conflict, social interaction, routinisation)	- A framework used to described relationships, from arms-length to collaboration
Wagner	2012	Journal of Supply Chain Management	3	Tapping Supplier Innovation	Mixed methods with both analytical conceptual and empirical survey	Among other shows that integration of supplier in early NPD phase (fuzzy front end) has positive implications on NPD project performance	Discusses aspects of purchase, such as "absorptive capacity" (organisation) and "specific assets" (relationship)
Herzlinger	2006	Harvard Business Review	120	Why innovation in health care is so hard	Analytical conceptual	- Six drivers/barriers: players, funding, policy, technology, customers, accountability - Based on the American system, mechanisms in Norway will differ	- Explains the importance of innovation in health care and outlines specific innovation barriers



## Appendix 2: Interview guide

### Kort om oppgaven

Fordypningsprosjekt

Ønsker for utbytte av samarbeidet

### Om intervjuobjektet

Navn

Stilling og ansvarsområde

Erfaring knyttet til innovasjon og/eller innkjøp

Om strukturen i helseforetaket

### Om innkjøp og innovasjon

Hvordan foregår en typisk innovasjonsprosess? Hvor oppstår behovet? Hvem deltar i ulike deler av prosessen? Hvordan håndteres dette fra ledelsen, er de engasjerte?

Knytter innovasjon seg til store forandringer? Er det disse store endringene som gir innovasjon eller er det også mindre forbedringer?

Har dere en egen innovasjonsavdeling? Under hvem er innovasjon underlagt?

Hvordan fungerer en typisk innkjøpsprosess? Hvem er involvert? Er det forskjeller mellom ulike typer innkjøp (eksempelvis rammeavtaler og innkjøpsnettverk innen helsesektoren)?

Hvor bevisst knyttes innovasjon til anskaffelser?

### Konkret om rammeverket

Strategisk betydning:

- Blir innkjøp sett på som en støttefunksjon? Er innkjøp strategisk viktig for helseforetaket?
- I hvor stor grad dominerer hensynet til kostnadsbesparelse innkjøpene? Går dette på bekostning av for eksempel innovasjon?
- Oppfatter du at innkjøp gjøres med et langsiktig perspektiv?

Kunnskap og organisasjon:

- Opplever du at ansatte har tilstrekkelig med kompetanse til å gjennomføre innovative innkjøp? Her er det snakk om både innkjøpsspesifikk og produktspesifikk kompetanse.
- Blir større innkjøp organisert i prosjekter som samler ulike typer kompetanse? Hvis ja, kan du fortelle litt om det? Hvis nei, hvorfor ikke?
- Tror du det er hensiktsmessig at flere innkjøp foregår på regionalt, eventuelt nasjonalt, nivå eller er det viktigere at helseforetakene har tilstrekkelig fleksibilitet i sine innkjøp? Med fleksibilitet mener vi at helseforetakene kan legge sine egen behov til grunn for innkjøpet og at innkjøpet knyttes tettere opp mot den reelle etterspørselen.

- Føler du at fordelingen av innkjøp på lokalt, regionalt og nasjonalt nivå er hensiktsmessig slik det er nå? Bør innkjøpene være mer lokalt eller nasjonalt? I hvilken retning bør trenden gå med tanke på å fremme innovasjon ved hjelp av anskaffelser?

#### Kultur og motivasjon:

- Opplever du at det er en kultur for innovasjon i helseforetaket? Hvis ja, kan du gi noen eksempler? Hvis nei, hva mener du er utfordringene knyttet til dette?
- Det pekes ofte på at ansatte i det offentlige vegrer seg mot å ta risiko. Er dette en karakteristikk du mener passer HEMIT/Helse Midt? Hvorfor tror du dette er tilfellet?

#### Leverandørrelasjoner og forskrifter:

- I hvor stor grad involverer dere leverandører i innkjøpene og innovasjonsprosjekter? Dersom det er liten grad av involvering, ser du på dette som et problem for å fremme innovative produkter? Hva er i så fall problemet?
- Ser du på lov om offentlige anskaffelser som en hindring i forhold til det å ha nødvendige relasjoner til leverandørene?

#### Ressurser

- Har det skjedd at innovasjonsprosjekt har blitt avsluttet på grunn av manglende ressurser?
- Tror du det er problematisk å få tilstrekkelige ressurser for å gjennomføre et større innkjøpsprosjekt? Ressurser relaterer seg i første rekke til penger, tid og ansatte.
- Hvordan stiller toppledelsen seg til innovative anskaffelser? Hva konkret gjør de for å fremme det? Frigir de ressurser, hvor involverte er de, etc.?

#### Oppsummering

Hva mener du er de største barrierene for å kunne fremme innovative offentlige anskaffelser?

Har dere noe konkrete prosjekter du tror er relevante for vårt videre arbeid?