



CHALMERS
UNIVERSITY OF TECHNOLOGY

A personalization approach for complex decision-making

The case of contract strategy selection at Akademiska Hus

Master's thesis in Design and Construction Project Management

MARTIN GRUNNESJÖ
NEDRICK GODFREY

MASTER'S THESIS E2016:078

A personalization approach for complex decision-making

The case of contract strategy selection at Akademiska Hus

Master's Thesis in the Master's Programme Design and Construction Project Management

MARTIN GRUNNESJÖ
NEDRICK GODFREY

*Department of Civil and Environmental Engineering
Division of Construction Management
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2016*

A personalization approach for complex decision-making: the case of contract strategy selection
at Akademiska Hus

*Master of Science Thesis in the Master's Programme Design and Construction Project
Management*

MARTIN GRUNNESJÖ
NEDRICK GODFREY

© MARTIN GRUNNESJÖ & NEDRICK GODFREY

Examensarbete E2016:078/Institutionen för Bygg- och miljöteknik, Chalmers tekniska högskola
2016

Department of Civil and Environmental Engineering
Division of Construction Management
CHALMERS UNIVERSITY OF TECHNOLOGY
SE-412 96 Göteborg
Sweden
Telephone: + 46 (0)31-772 1000

Chalmers Reproservice
Gothenburg, Sweden 2016

A personalization approach for complex decision-making: the case of contract strategy selection at Akademiska Hus

Master of Science Thesis in the Master's Programme Design and Construction Project Management

MARTIN GRUNNESJÖ
NEDRICK GODFREY
Department of Civil and Environmental Engineering
Division of Construction Management
CHALMERS UNIVERSITY OF TECHNOLOGY

ABSTRACT

In an industry characterized by uniqueness, organizations in construction are put under great pressure to have decision-makers that can deliver unique solutions, often without experience from previous efforts. This work was carried out in collaboration with Akademiska Hus, which is one of the biggest real-estate companies in Sweden. The work aims to find the influencing factors in the choice of a contract strategy. This report also aims to examine the similarities and differences in the process of selecting contract strategy in projects across regions at the Akademiska Hus. Another purpose is to explore how the in-house knowledge base is shared and moreover explore the potential for a personalization approach to facilitate the process. As empirical evidence, twelve interviews have been conducted with project managers across regions at Akademiska Hus. From the results, it can be seen that factors influencing the choice of a contract strategy falls under the three categories; client's objectives, projects characteristics and client comparative advantage. The results also show that Akademiska Hus does not have a standardized approach or models for deciding upon a contract strategy. In addition, the process of deciding on a contract strategy varies a lot between regions. There is a wide in-house knowledge base within the organization. However, Akademiska Hus lacks effective cross regional knowledge sharing mechanisms thus the knowledge base is not fully utilized in enhancing the contract strategy selection process. The thesis highlights a potential of a team-centered decision mechanism when deciding on a suitable contract strategy, enabling project managers from different regions to participate. Through a group-based decision-making mechanism, individuals would be able to share their knowledge and thereby increase awareness of the consequences of decisions. In this way, the organization's ability to select the contract strategy would be enhanced.

Användning av personalization för ett förbättrat beslutsfattande: en studie om val av upphandlingsstrategi inom Akademiska Hus

Examensarbete inom masterprogrammet Design and Construction Project Management

MARTIN GRUNNESJÖ
NEDRICK GODFREY
Institutionen för Bygg och miljöteknik
Avdelningen för Construction Management
Chalmers tekniska högskola

SAMMANFATTNING

I en bransch som kännetecknas av unika projektförutsättningar, är det för aktörer i byggbranschen nödvändigt att ha beslutsfattare som kan leverera unika lösningar, inte sällan utan erfarenhet från liknande projekt. Detta arbete har genomförts i samarbete med Akademiska Hus, som är ett av de största fastighetsbolagen i Sverige. Arbetet syftar till att ta reda på vilka faktorer som påverkar valet av upphandlingsstrategi. Denna rapport syftar också till att undersöka likheter och skillnader i processen med att välja upphandlingsstrategi i projekt mellan olika regioner på Akademiska Hus. Ytterligare ett syfte är att undersöka hur kunskapsöverföring sker inom organisationen samt att utreda möjligheten att underlätta valet av upphandlingsstrategi genom en gruppbaserad process. Tolv intervjuer genomfördes med projektledare från olika regioner inom Akademiska Hus. Resultaten visar att faktorer som påverkar valet av en upphandlingsstrategi faller under någon av följande tre kategorier; kundens mål, projektegenskaper och beställarens komparativa fördelar. Vidare framkommer även att Akademiska Hus inte använder sig av någon standardiserad modell i valet av upphandlingsstrategi. Dessutom varierar tillvägagångssättet när det gäller val av upphandlingsstrategi mellan regioner. Det finns en mycket bred kunskapsbas inom organisationen men effektiva mekanismer för kunskapsöverföring saknas. Därmed utnyttjas inte kunskaper inom organisationen till fullo i valet av upphandlingsstrategi. Resultatet pekar på att det finns potential för en mer gruppcentrerad beslutsmekanism med deltagande av projektledare från olika regioner när det gäller val av upphandlingsstrategi. Genom en gruppbaserad beslutsmekanism skulle individer kunna dela med sig av sina kunskaper och därigenom öka medvetenheten om konsekvenser av beslut. På så sätt skulle organisationens förmåga att välja upphandlingsstrategi stärkas.

Contents

ABSTRACT	i
SAMMANFATTNING	ii
CONTENTS	iii
PREFACE	v
1 INTRODUCTION	1
1.1 Background	1
1.2 Aim/ Objectives/ Purpose	2
1.3 Scope and limitations	2
1.4 Method	3
2 THEORETICAL FRAMEWORK	4
2.1 Construction Contract Strategy	4
2.1.1 Organizational Structure	4
Design Bid and Build (DBB)	5
Design and Build (DB)	5
Partnering	5
2.1.2 Contract type	6
Fixed price	6
Cost-plus	6
Target cost	7
2.2 Choice of Contract Strategy	7
2.2.1 Contract Selection Factors/Criteria	7
2.2.2 Contract Selection Method	9
2.2.2.1 Experienced v/s inexperienced clients	9
2.2.2.2 Tools and Techniques/ Models & Frameworks	10
2.2.2.3 Knowledge Need	10
2.3 Knowledge sharing	11
2.3.1 Tacit/Explicit knowledge	11
2.3.2 Personalization/Codification	12
2.3.3 Knowledge articulation	14
2.3.4 Shortcomings of IT-systems as the only approach to manage knowledge	14
2.3.5 Barriers to knowledge sharing	14
2.4 Knowledge sharing influencing the contract strategy decision	15

3	METHOD.....	18
3.1	Pre-study	18
3.2	Main study.....	19
3.2.1	Representation of qualitative interviewing.....	20
4	RESULTS AND ANALYSIS	21
4.1	Contract Strategy and Influencing Factors	21
4.2	Contract selection method/ process	24
4.2.1	Models / Frameworks	24
4.2.2	Guideline/governing document	25
4.3	In-house knowledge/knowledge base/	25
4.3.1	<i>Knowledge Sharing</i>	26
4.3.2	Barriers to knowledge sharing activities	27
5	DISCUSSION.....	30
5.1	Complexity.....	30
	Experience.....	31
	Tools and guidelines.....	31
5.2	Tacit knowledge	32
5.3	Personalization.....	32
5.4	Key concepts and relationships.....	34
6	CONCLUSION	36
7	References.....	37

Preface

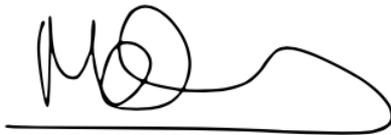
This thesis work was carried out during six intensive months in the spring of 2016 at the Division of Construction Management at Chalmers University of Technology, in collaboration with Akademiska Hus in region west.

It has been a very inspiring process to see how Akademiska Hus operates in different regions. We would therefore like to express our gratitude to the individuals who took time to participate in this report. Our supervisor from Akademiska Hus was Lena Himmelman, who has showed great interest and support in our work and we would therefore like to send a special thanks to her.

We would also like to send our gratitude our academic star, Martin Löwstedt who has guided us through the process and continuously been giving us feedback and opinions on how to navigate in the deep academic jungle.

Göteborg, June 2016

Martin Grunnesjö and Nedrick Godfrey



1 INTRODUCTION

This chapter will provide an overview of this master thesis and its related research context. The background introduces the reader to the initial aspects of the contract strategy selection process in the construction industry and the significance for an appropriate choice. The purpose and the objectives which this study aims to achieve will be presented. Finally a brief overview of the scope and limitations as well as the methodology used will be introduced.

1.1 Background

A construction undertaking passes through different phases from its inception to completion. Actual construction forms part of the overall process but prior to its commencement the client is faced with a series of decisions that are important for the success of a project. The choice of an appropriate contract strategy is one of those decisions (Wang et al. 1996; Bower 2003).

The significant impact a suitable contract strategy has in a project has been widely acknowledged. Gordon (1994) and Love et al. (2008) suggest that clients could expect an average project cost reduction of up to 5% if an appropriate contract strategy is selected. Bower (2003) argued that a contract strategy has a primary effect on project timescale and cost and Kumaraswamy & Dissanayaka (1998) noted that a wrong choice of a contract strategy could not only lead into time and cost overruns but also disputes and claims.

Despite its significance, choosing an appropriate contract strategy takes the form of an “ill-structured” decision-making process (Chua & Loh 2006). Having clearly defined client’s objectives in a project, project managers are expected to determine project specific problems, generate possible approaches, evaluate alternative solutions in light of the influencing factors and select the most viable strategy (Chua & Loh 2006). As Gordon (1994) observed, this is “far from exact science”. The complex interrelations among the client, project and external influencing factors make it hard and maybe impossible for this type of decision to be captured in a single straight forward frame (Chua & Loh 2006).

In an effort to assist clients when choosing a contract strategy, tools and techniques have been developed to exploit the use of computer based technology in the decision-making process (Wang et al. 1996; Kumaraswamy & Dissanayaka 2001; Chua & Loh 2006). However the complex interaction of the factors to be considered has impaired their practical implementation and ignoring a range of factors is one among the deficiencies of the models (Love et al. 2008). Thus the ultimate choice of a contract strategy depends mainly on the experience of the decision-maker (Chua & Loh 2006). Appropriateness of the choice relies on their subjective evaluation and qualitative judgment hence high level of expertise and knowledge is necessary (Wang et al. 1996; Lam et al. 2007; Love et al. 2008).

Wang et al. (1996) and Lam et al. (2007) noted that the knowledge required in the decision-making process when choosing a contract strategy is implicit and subjective, and indeed it is a kind of knowledge. One common feature of this knowledge is that it is accumulated through learning and experience and resides within the heads of the individuals in an organization (Chinowsky et al. 2007).

In order for employees to have the capacity to deliver unique solutions, often without experience from previous effort, a great pressure is put on organizations within the construction industry in how efficiently they manage and utilize its knowledge base (Chinowsky et al. 2007). Therefore, a vital factor is to recognize and integrate localized knowledge and transform it to productive knowledge which creates value for the organization (Robinson et al. 2005). Since projects within

the construction industry often have a high level of uniqueness, it is most relevant for individuals within the organizations to enhance the relevant knowledge in the decision-making process in order to deliver unique solutions (Chinowsky et al. 2007).

1.2 Aim/ Objectives/ Purpose

This thesis will focus on the process of selecting and deciding what type of contract strategy to be used in different projects across regions at Akademiska Hus. The report aims to explore the applicability of knowledge sharing in enhancing the process of choosing a contract strategy at AH. The aim will be:

- to find out the factors/criteria which influence the choice of a contract strategy at Akademiska Hus
- observe the existence of similar or different approaches in the process of selecting a contract strategy across regions
- to explore how the in-house knowledge at Akademiska Hus is shared and used to facilitate the process of choosing a contract strategy
- explore the potential for the use of knowledge sharing/transfer through personalization for an improved contract strategy selection process

1.3 Scope and limitations

Akademiska Hus is one of the largest real estate companies in Sweden, with a property portfolio with market value of 66.3 billion SEK (Akademiska Hus 2015). The government owned company has around 300 000 people studying, doing research and working in their buildings across Sweden on a daily basis. The organization is geographically divided in six regions; south, west, east, Uppsala, Stockholm and north.

The initiator of this thesis work was Akademiska Hus in region west, initially requesting an evaluation of the business models that are used in the different regions within the organization. Through discussions and meetings the subject were narrowed down to more concise objective and problem statement, as described more thorough in section 3.1. Since the aim was to investigate how Akademiska Hus as an experienced client choose a suitable contract strategy for its projects, no other actors e.g. consultants or contractors were involved.

With a total of 17.5 billion SEK planned and decided to be spent in various construction projects (Akademiska Hus 2016) The organization seeks to ensure that appropriate contracting methods are used across its regions. As construction projects become more complex with a number of stakeholders involved in the execution, alternative contracting methods have evolved to manage the interrelations between the actors for a successful delivery.

The work will examine the process of selecting contract strategy at an organizational level. Four regions west, Stockholm, north and south were evaluated. Key employees with the primary focus on project managers were interviewed and the data was therefore seen as representative for the organization in that region. The reason for the organizational perspective is to get a general view of the process of selecting a contract strategy at Akademiska Hus and observe differences across regions instead of comparing individual projects.

This study did not focus on the general perspective of learning and knowledge sharing but rather how it could be used to enhance the decision-making process when choosing a contract strategy at Akademiska Hus.

1.4 Method

The thesis work was divided into two parallel processes, see Figure 1. Firstly, the thesis work started with a literature review, which was carried out throughout the thesis work. Secondly, an interview study was conducted in addition to the literature review. Twelve people were interviewed in the interview study, which was divided into a pre-study and a main interview study. The two parallel processes were closely related and influenced each other along the thesis work. A more thorough description of the pre-study study and the main interview is described in chapter 3.

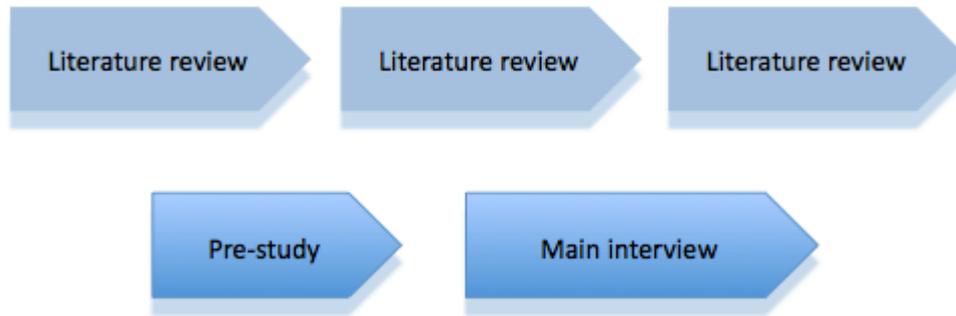


Figure 1: Literature and data collection process

A literature review was conducted all along the thesis work and was carried out through scientific databases such as Google Scholar, Summon etc. accessed through Chalmers University of Technology. Key words as *procurement strategy*, *contract strategy*, *procurement models*, *knowledge management*, *personalization*, *tacit knowledge* and *learning* were used in order to find relevant literature. Although the keywords often were a useful tool to find relevant articles, the abstract and conclusions were examined to evaluate the article's relevance for the thesis work. Relevant literature was also found by investigating sources in the articles found from the scientific databases described above.

2 THEORETICAL FRAMEWORK

This chapter presents key findings from literature review which provided this study with relevant information and inputs from the previous work done by practitioners in the academia. The first section gives the general overview of the term contract strategy in relation to the construction industry, its four sub-strategies, factors influencing their choices and selection methods/approaches. Lastly, the need for relevant experience and knowledge in the selection process will be highlighted and personalization as an effective mechanism for enhancing the selection process will be discussed.

2.1 Construction Contract Strategy

In construction, the term contract strategy in its broad meaning defines a range of decisions associated with the policies chosen for execution of a project. It entails the process of deciding the organizational and contractual forms that will govern a specific construction project. According to Gordon (1994) a contract strategy is defined as “having four parts: scope, organization, contract and award”. Wang et al. (1996) share a similar understanding suggesting that a contract strategy is an endeavor which seeks to define the “work packages, the organization of the roles of the parties and their boundaries, the choice of contract type and the selection of a contractor”.

In this study the four parts namely ‘work packaging,’ ‘organizational structure,’ ‘contract type,’ and ‘award method’ similar to that of Gordon (1994) and Wang et al. (1996) as further clarified by Chua & Loh (2006) are regarded as the four sub strategies making up a contract strategy.

Work packaging refers to the choice of whether to divide a project into smaller phases of construction or packages of structural components eg. substructures and superstructures. Award method is concerned with the method used to select the contracting organizations in a project such as through negotiation or competitive bidding.

Functional grouping/organizational structure is a result of how the project team is organized with clearly stated roles, boundaries and interrelations of the actors when performing their functional roles in the design, construction and managerial project phases (eg. the traditional organizational structure is when the client enters into two independent contracts for design and construction works). Contract type depends on the payment mechanism that will be used to remunerate the contractor for the work performed such as lump sum or cost plus contract (Chua & Loh 2006).

When formulating a contract strategy the client has to choose an award method, organizational structure and contract type and combine them into an appropriate contract method for a particular project. For the purpose of this study, this report will mainly focus on the two latter sub strategies of a contract strategy i.e organizational structure and contract type.

2.1.1 Organizational Structure

To clearly define the roles of the actors and their interrelations in a construction project one of the earliest steps in the selection of a contract strategy is choosing an appropriate organization (Gordon 1994). A range of organizational structures are available and mainly connected with different contract types (Bower 2003) however under this section different forms of organizational structures will be discussed separately from their interrelations with different contract types.

Design Bid and Build (DBB)

The most common contracting method is the design–bid–build approach, which is often referred to as the traditional method. One defining feature of this method is the absolute separation of design phase from the construction phase whereby a project is carried out linearly with the bidding and design phases preceding the actual construction (Gordon 1994). In this method the client is responsible for the design and takes all design related risks, therefore the client may appoint a consulting engineer to do the design and the contractor is appointed to carry out the works as per completed designs.

The traditional approach gives the client complete control over the design and a known total price before actual construction work starts (Gordon 1994). However, changes in design during construction, which is considered almost inevitable in construction projects, may lead to cost overruns and adversarial relations between the contractor and client (Bower 2003). On the other hand, involvement of the contractor at a later stage is deemed to be disadvantageous since the client will not be able to utilize contractors experience earlier in the design phase (Bower 2003). Contractors' influence in the design stage would avoid build ability problems during execution of the works.

This method is preferred for projects which can clearly be defined, completely designed with little or no expectation for changes and early completion of the construction than the required time for the standard process is not a necessity (Gordon 1994).

Design and Build (DB)

In contrast to the traditional method, design and build organizational structure combines both the design and construction phases. The client procures the contractor and the contractor “takes on single-point responsibility” to carry out the entire design and construction works (Bower 2003). While the client might still be responsible for establishing what type of end product is supposed to be constructed and the desired functional requirements, the contractor is in charge of the design and construction (Nystrom et al. 2016).

A design and build method is regarded to outperform the traditional method with respect to project duration (Nystrom et al. 2016). With regard to total cost Nystrom et al. (2016) argue that the high risk taken by the contractor and more work for the preparation of the design implies that a DB contract is more likely to cost more than a DBB if all other things are the same.

Bower (2003) suggest that this method is usually used for more straight forward projects and preferred by the client organizations that neither have the expertise nor resources to carry out a construction project. Supposedly, a DB contract is also a good driver for innovation due to a higher degree of freedom afforded to the contractor to influence both the design and construction methods (Nystrom et al. 2016).

Partnering

It is scholarly criticized that the traditional contracting method and the construction industry as a whole is mainly characterized with adversarial relationships due to lack of trust among the actors/its stakeholders, lack of communication, insufficient cooperation and integration and a win-lose working environment (Gordon 1994; Bower 2003; Chan et al. 2004; Hartman & Bresnen 2011; Dewulf & Kadefors 2012). As a result, construction projects have been affected by cost overruns and delays, with much time and resources spent on arbitration processes seeking to overcome conflicts (Chan et al. 2004). In an effort to increase efficiency in the construction

industry many clients are embracing partnering/alliance contracts to improve cooperation and integration with contractors (Dewulf & Kadefors 2012).

The definition of partnering has been widely discussed, there exist a number of meanings and this is due the on-going development of the concept in the construction industry (Li et al. 2000; Chan et al. 2003 and Nystrom 2005). Regardless of the form it takes, Bower (2003) defined partnering as “a managerial approach used by two or more organizations to achieve specific business objectives by maximizing the effectiveness of each participant’s resources”. This definition is based on three key features of “mutual objectives, agreed method of problem resolution and striving for continuous measurable improvement” (Bower 2003). And as Li et al. (2000); Chan et al. (2003) and Nystrom (2005) suggest, partnering can be defined when its fundamentals namely; trust, long term commitment, respect, communication and common/shared goals are used to align all parties interest in a project. However the main focus under this section is not on what partnering means but rather what it brings to a construction project as one of the organizational structure the clients have to decide upon in their projects.

The adversarial nature of construction projects is however not the only reason which prompted the need for new contracting approaches. As the industry matures, projects are becoming more complex with high uncertainties and very long process for getting the approvals/building permits (Gordon 1994). Consequently projects need time saving approaches with cost effective and innovative practices (Gordon 1994) and partnering is among the new contracting approaches that have gained popularity to solve these problems (Chan et al. 2004). Due to enhanced joint time and cost control throughout the project, partnering avoids delays and cost overrun risks and presence of trust and open communication brings about the opportunity for improved constructability, innovation and added value (Chan et al. 2003).

2.1.2 Contract type

It is so often that the type of a contract strategy is specified by its payment mechanism (Bower 2003). The choice of a contract type is an important strategic decision because it tells how the contractor will be compensated as a result of the risk allocation between the client and contractor (Wang et al. 1996). As classified by Bower (2003) contract types can basically be defined by their payment mechanisms depending on whether it is price or cost based in any of the following three forms;

Fixed price

Fixed price contracts entail one single tendered price for the entire project. It is therefore of essence that a well-developed design is available for contractors to be able to properly estimate costs of carrying out the expected work. In this case there is little to none responsibility with the client, all responsibility is usually transferred to the contractor in a fixed price contract. There are several reasons to why this form of contract is utilized, it is taking workload off the clients administrative resources, the client takes no cost risks and the total cost for the project is certain in an early phase. (Bower, 2003)

Cost-plus

On the contrary, a cost plus contract entails one part of the payment that is profit based and the other part that is continuously for the actual project costs for the contractor. In this contract form the risk allocation is almost all towards the client. The contractor is carrying little to no risk in this case due to the fact that they are getting paid for their actual works, while the client has to pay based on the efficiency and competence of the contractor. The cost-plus is commonly used

when there are considered to be a high level of unforeseen circumstances and/or major risks with the contract, hence it is too difficult to predict the total costs of the project. (Bower, 2003)

Target cost

The target cost is the expected project cost determined in the early phase of the project based on an estimate of the end cost. As the design and construction works proceed, the target cost is adjusted depending on eventual changes and unforeseen circumstances. This concept goes with a pain/gain share formula where the total end difference between actual cost and target cost is distributed according to contractual agreements, where 50/50 pain/gain-share is considered as the most common found approach (Bower, 2003; Kadefors & Eriksson 2014). The sharing ratio is according to Badenfelt (2008) believed to be connected with a reduced end costs. The contractor's attitude towards the collaboration and towards bearing risks may influence the pain/gain share arrangement and the set target cost. There is a balance that has to be considered between the risk allocation and the target fee for the contractor. Badenfelt (2008) brings about that previous cooperation between a client and a contractor might be of advantage due to knowledge about each other's goals, attitude and expectations, hence the level of trust is likely to be higher than in a newly initiated relationship.

2.2 Choice of Contract Strategy

The choice/formulation of an appropriate contract strategy is one of the most important decisions for a responsible project manager taking on a new project (Wang et al. 1996). While an appropriate choice of a contract strategy is likely to have a positive impact on the outcomes of a project (Wang et al. 1996; Chua & Loh 2006) the method to arrive at a suitable choice is "far from exact science" (Gordon 1994).

According to Gordon (1994) there is no any formula which will give an output of the suitable contract strategy for a particular project with the owners and project variables as inputs. Furthermore Gordon (1994) and Love et al. (2008) suggest that in many cases, there are a number of appropriate methods rather than one single best alternative and exclusion of the inappropriate ones is mainly followed by the choice of an eventual method among the reasonable alternatives remaining.

Chua & Loh (2006) observed the difficulty in having the selection process of a contract strategy modeled in a simple and automated way sighting the complex interrelationships among the variables governing the choices. Consequently, as suggested by the authors, the choice of a contract strategy is mainly carried out by the decision makers using their own managerial expertise. However, some decision-makers may face problems in establishing the suitability of various contracting methods. This is because contract strategy formulation involves the ability to find the best fit of the available contracting methods with the project characteristics, client characteristics and external conditions through their own experiences (Love et al. 2008; Ruparathna et al. 2015).

2.2.1 Contract Selection Factors/Criteria

As per Gordon (1994), before clients can start the process to choose a contracting method it is important to first gain initial understanding of the project. This is mainly because deciding a contracting method according to the project specific characteristics has always been a challenge to project management team (Ruparathna et al. 2015). However, Gordon (1994) further suggested that compatibility of available contracting methods with the owner's specific needs/objectives, project characteristics and external environment/market conditions should govern the selection process.

Hence, in his study Gordon (1994) used the three characteristics of project, owner and market as the drivers to be assessed in the selection process. Love et al (2008) share the same view as client characteristics, project characteristics and external environment were termed as the factors influencing the choice of a contracting method by clients. A similar understanding can be seen in Chua & Loh (2006) work in which the factors affecting the contract decision were classified into three categories: (1) clients objectives (2) project characteristics and (3) client comparative advantages.

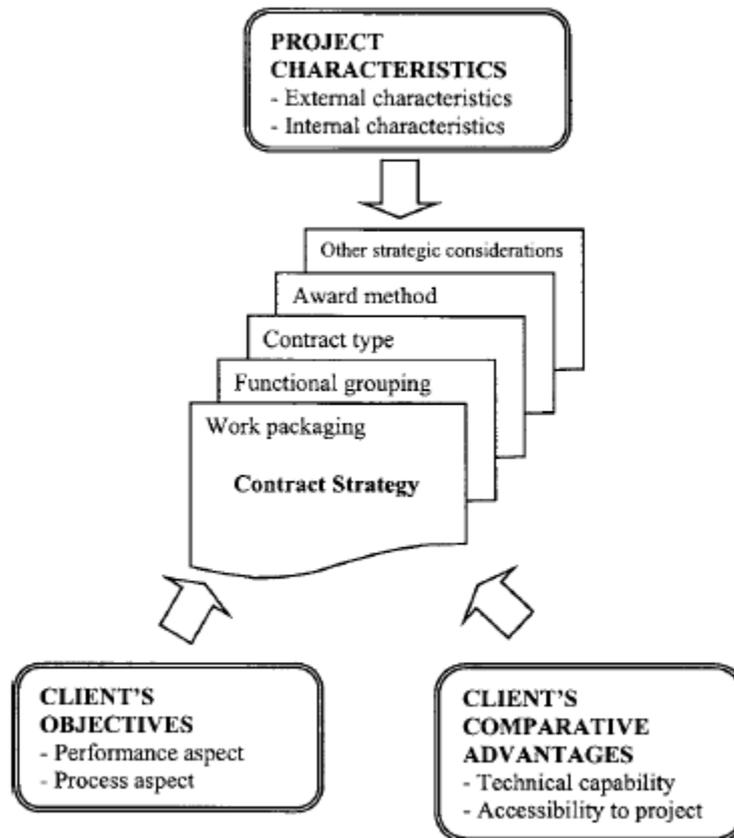


Figure 2: Three categories of factors considered for contract strategy (Chua & Loh 2006)

Client's objectives refer to the client's desired project outcomes with regard to performance and the project delivery process (Chua & Loh, 2006). Principally, clients want certainty of performance in all three key criteria of time, cost and quality (Alhazmi & McCaffer 2000). While reviewing previous studies on clients characteristics and needs in a project Masterman & Gameson (1994) also noted that clients need to be actively informed and involved in the implementation processes with flexibility to allow changes in design during construction being identified in almost all reviewed studies. Hence, the desired extent of involvement in the process and ability to incorporate change by the clients may also influence their choice of a contracting method.

According to Chua & Loh (2006), project characteristics combine both the external variables surrounding a project such as market, economic and political conditions and project specific internal criteria such as project complexity, type and size. A good understanding and judgment of the market condition at the project time may enable clients to gain the most out of it (Gordon 1994). For example depending on how competitive the market is, clients can decide the best timing to invite contractors for bids if competitive bidding is used in the contractors selection

process and there are no time constraints. Also the availability of appropriate contractors may dictate which form of contracting method would work best in the location of the project due to reluctance of contractors to work in contract arrangements they are not familiar with (Gordon 1994).

Client’s comparative advantage category entails the competences clients have in-house that if effectively utilized could enhance owner’s chances of achieving the desired project goals (Chua & Loh 2006). When choosing a contract strategy, clients should be able to determine the required resources in handling a project, clearly ascertain the skills and experience available in-house and to what extent that know-how will have to be obtained elsewhere (Gordon 1994). The consulting team or construction manager hired to coordinate and manage the project on the client’s behalf can also be considered as part of client’s in-house competence (Chua & Loh 2006). Figure 2 above presents the three categories of criteria mainly considered for contract strategy formulation and table 1 below provides a list of the criteria found in each category.

<p>Client’s objectives</p> <ol style="list-style-type: none"> 1. Time economy 2. Time certainty 3. Cost economy 4. Cost certainty 5. Desired design quality 6. Desired construction quality 7. Design changes flexibility 8. Client-consultants interaction 9. Design-construction intergration 10. Checks and balances 11. Appetite for conflict 12. Risk avoidance 	<p>Client’s comparative advantages</p> <ol style="list-style-type: none"> 1. Budget talent 2. Design talent 3. Team-building talent 4. Monitoring talent 5. Labor 6. Materials 7. Equipment 8. Fund resources 	<p>Project Characteristics</p> <ol style="list-style-type: none"> 1. Likelihood of political instability during project duration 2. Likelihood of exchange rate fluctuation during project duration 3. Efficiency and maturity of regulatory framework 4. Integrity and transparency of system 5. Site location (local/overseas) 6. Availability of appropriate contractor 7. Expected market competition among contractors 8. Project type 9. Complexity 10. Project size (construction cost)^a
---	--	---

Table 1: Criteria/factors influencing the choice of contract strategy (Chua & Loh 2006)

It should be noted that the three categories have been studied by different authors (Gordon 1994; Wang et al. 1996; Alhazmi et al. 2000; Kumaraswamy & Dissanayaka 2001; Chua & Loh 2006; Ruaparathna et al. 2015) and the criteria in each category are more or less the same depending on the approach used by the authors to present their understanding that best fit their studies.

2.2.2 Contract Selection Method

2.2.2.1 Experienced v/s inexperienced clients

Selection of a contracting method is mainly organized as per owner’s preference and experienced clients seem to prefer choosing a contracting method that had previously worked successful for them as they tend to avoid uncertainty connected with new methods (Rameezdeen & Jayasena 2013). The uncertainty avoidance tendency when formulating a contract strategy has also been observed in the construction industry as a whole and (Ruparathna et al. 2015) noted that this may result into great opportunities for cost saving, reduced risks and added value presented by other contracting methods end up being unnoticed.

On the other hand, inexperienced clients may need to look for professional advice to assist them over the process (Love et al. 2008). However in some cases a combined team of in-house and external personnel is formed to manage a project even by experienced clients (Ruparathna et al.

2015). Generally, client's attitude to risk and their prioritized objectives appear to govern their selection process (Love et al. 2008).

2.2.2.2 Tools and Techniques/ Models & Frameworks

To assist the clients choose the most appropriate contract strategy various selection procedures and techniques/models have been developed (Gordon 1994; Wang et al. 1996; Alhazmi et al. 2000; Kumaraswamy & Dissanayaka 2001; Chua & Loh 2006; Ruaparathna et al. 2015). The approaches range from simple to highly complex (Love et al. 2008) with the simple ones taking the form of guidelines which highlight how the diverse factors of client, project and market characteristics can be used to help in the selection process. On the other hand, complex models seek to deploy computer-based approaches in the selection process despite acknowledging the difficulty in developing a fully automated system (Chua & Loh, 2006).

In the study "*CB-contract: case-based reasoning approach to construction contract strategy formulation*" Chua & Loh (2006) exploited the application of computer technology to review similar cases for a given project information to provide clients with possible solutions. However, the authors concede that the system can only be used as a support tool with the final decision-making still at the hands of the users of the system. This is due to the complexity nature of construction projects which exposes clients into context specific problems (Kumaraswamy & Dissanayaka 1998) hence lack of exact rules for decision-making when selecting a contract strategy (Chua & Loh 2006). And as Wang et al. (1996) noted in their study "*Contract type selector (CTS): a knowledge based system for training young engineers*" the main challenge with automated systems is how uncertainty in human knowledge clouding their decision-making process can be modeled.

On the other hand, the following deficiencies were also observed in many of developed systems for contract/procurement selection as Love et al. (2008) summarized that they;

- ignore a range of factors (e.g., market related);
- available options are limited (i.e. a few alternatives are considered);
- have not been tried and their practical applicability tested and
- not user friendly and usually not applicable

2.2.2.3 Knowledge Need

As discussed in the previous sections, contract strategy formulation is a complex task and decisions are made upon careful consideration and interaction of a variety of criteria. This complexity becomes evident as clients seek to align their project objectives with project specific characteristics under the external market, economic and political conditions surrounding construction projects.

Although different models and frameworks have been proposed to assist clients in the selection process, difficulty of the models to cater for inaccuracy and variability of the decision-making criteria (Chua & Loh 2006) imply that human factor still dictate the process. Also deficiencies in the developed models have been highlighted which render their total reliance (Love et al. 2008). Therefore the ultimate choice of an appropriate contract relies on the competency, experience and judgment of those making such decisions in an organization (Wang et al. 1996).

Chua & Loh (2006) argue that one setback of qualitative judgment in this decision-making process is "human fallibility" with some factors left unconsidered being one possible consequence. On the other hand Lam et al. (2007) suggested that the expertise and knowledge

required in this complex decision-making process is implicit and subjective which is mainly derived from practical experience.

Therefore, when formulating a contract strategy the need for a knowledgeable decision-maker who is likely to successfully apply knowledge in unique and complex scenario cannot be overlooked. Also the experienced acquired by project managers for many years as a valuable resource may be lost if they leave and “that would mean the loss of contract strategy expertise in an organization” (Chua & Loh 2006).

2.3 Knowledge sharing

In construction organizations, knowledge could be described as a hidden asset that needs to be shared and utilized for a continuously improving organization (Robinson et al. 2005). The transfer of knowledge as an asset for organizational use is also relevant for innovation and for an organization to be competitive in the long-term. Moreover, Robinson et al. (2005) argue that, although the employee’s individual knowledge is a necessary requirement, the firm’s ability to utilize and integrate the knowledge base within the organization is of greater importance. The need for a knowledge sharing strategy within the company, in order for employees’ to utilize the organizations knowledge base, is therefore of great importance for a competitive organization in today’s construction industry (Robinson et al. 2005).

Different geographical regions also puts pressure on how we the organization manages knowledge (Chinowsky et al. 2007). If the local knowledge isn’t available, the organization must be able to manage the knowledge base in a way that makes it available to the rest of the organization in order to improve the solution process.

2.3.1 Tacit/Explicit knowledge

The following section will explain different dimensions of the term knowledge and how it can be divided into tacit and explicit knowledge. Moreover, it will highlight how these different dimensions of knowledge correspond to different approaches in managing knowledge in the construction industry.

A commonly used separation within the term knowledge (Kamara et al. 2002; Prencipe & Tell 2001; Chinowsky et al. 2007; Robinson 2005) is the two categories tacit and explicit knowledge described by Nonaka and Takeuchi (1995). The authors describe the characteristics of tacit knowledge as personal and context-specific and obtained through experience. Tacit knowledge is subjective and is connected to values, beliefs perceptions, insights and assumptions of the individual (Smith 2001). Knowing more than we can tell or the ability to perform something without thinking about it could also describe tacit knowledge, for example riding a bike (Smith 2001).

Several authors highlights the difficulties with sharing and acquire tacit knowledge (Hamel 1991, Holste & Fields 2010, Yang & Farn, 2009) and according to Koskinen et. al (2003) this is due to the general skepticism towards the communicability of this type of knowledge. Further, Koskinen et al (2003) argue that difficulties with communicating tacit knowledge is due to the close connection between tacit knowledge and history and context of the individual. Although tacit knowledge is closely connected with the individual’s situationality, Koskinen et al. (2003) point out that it is not impossible to transfer tacit knowledge. A way to overcome the difficulties with tacit knowledge sharing is through social interaction, enabling individuals to share experiences and discuss relevant matters with each others (Smith 2001, Brockmann & Anthony 2002). Using

social interaction as a tool for sharing tacit knowledge will be highlighted and discussed further under 2.3.2.

Explicit knowledge is described as knowledge in manuals and information systems and can easily be stored in formats as papers or drawings (Robinson et al. 2005). This type of knowledge is comprised of technical information that requires some level of knowledge or formal education but can easily be shared. Explicit knowledge can, unlike tacit knowledge, easily be codified and be put into databases etc. and be used throughout the organization (Smith 2001).

2.3.2 Personalization/Codification

How should then organizations approach transfer of tacit and explicit knowledge? In the article *“What’s your strategy for managing knowledge”* by Hansen et al. (1988) the author highlights two different approaches to the transfer of tacit and explicit knowledge. The authors argue that a personalization approach corresponds to transfer of tacit knowledge and a codification approach corresponds to the transfer of explicit knowledge. Furthermore, Hansen et al. (1998) suggest that the type of approach for managing knowledge within the organization should be dependent on what type of product it delivers.

A personalization approach focuses heavily on face-to-face interactions and informal encounters between the employees which enables them to share and discuss problems and solutions (McMahon et al. 2004). Useful tools in a personalization approach could be brainstorming, videoconferencing, storytelling etc., see table 2 below, and the approach responds to companies that provide highly customized solutions to unique problems (McMahon et al. 2004). The knowledge in a personalization strategy is closely connected with the person who developed it and the main objective is to use computer systems to communicate and not to store the actual knowledge. The personalization approach would respond to an organization with primarily tacit knowledge (McMahon et al. 2004).

Boh (2007) highlights advantages for individuals to share tacit knowledge through personalization when performing their actual work. It is argued that in the process of “doing” or performing, the individual generate knowledge that can be transmitted through conversations and discussions and could further generate new knowledge. Likewise, Koskinen et al. (2003) argue that teamwork reinforces tacit knowledge sharing, when face-to-face meetings occurs among group members. Further, the authors argue that enabling individuals to participate in project activities is the key to sharing tacit knowledge through exchanging ideas and interpretations in the specific context.

Koskinen et al. (2003) point out that face-to-face interaction is the most efficient form of tacit knowledge sharing because it includes body language, facial expression, voice-tone and is personally tailored to the recipient. Face to face interaction is also said to be a highly relevant tool for sharing tacit knowledge because the communication form is the most suitable for enabling an understanding for each other's subjectivity and reduces the risk for misinterpretations (Koskinen et al. 2003).

A codification strategy to knowledge sharing focuses on a “people-to-document” approach and the knowledge can therefore be extracted from the person who developed it (McMahon et al. 2004). The organization can therefore be less dependent on individual knowledge and use the codified knowledge for various purposes. The codified knowledge could in this approach be easily re-used by others without taking personal contact with the actual person who developed it. An organization providing a relatively standardized product should therefore mainly have a

codification approach focusing on sharing explicit knowledge (McMahon et al. 2004). The table below shows the distinction between a personalization versus codification approach in more detail.

Task	Explicit knowledge / Codification	Tacit knowledge / Personalization
Work process	<i>organized tasks, routine, orchestrated, assumes a predictable environment, linear, reuse codified knowledge, create knowledge objects</i>	<i>Spontaneous, improvised, web-like, responds to a changing, unpredictable environment, channels individual expertise, creates knowledge</i>
Learn	<i>on the job, trial-and-error, self-directed in areas of greatest expertise, meet work goals and objectives set by organization</i>	<i>Supervisor or team leader facilitates and reinforces openness and trust to increase sharing of knowledge and business judgment</i>
Teach	<i>trainer designed using syllabus, uses formats selected by organization, based on goals and needs of the organization, may be outsourced</i>	<i>One-on-one, mentoring, internships, coach, on-the-job training, apprenticeships, competency based, brainstorm, people to people</i>
Type of thinking	<i>logical, based on facts, use proven methods, primarily convergent thinking</i>	<i>Creative, flexible, unchartered, leads to divergent thinking, develop insights</i>
Share knowledge	<i>extract knowledge from person, code, store and reuse as needed for customers, e-mail, electronic discussions, forums</i>	<i>Altruistic sharing, networking, face-to-face contact, videoconferencing, chatting, storytelling, personalize knowledge</i>
Motivation	<i>often based on need to perform to meet specific goals</i>	<i>Inspire through leadership, vision and frequent personal contact with employees</i>
Reward	<i>tied to business goals, competitive within workplace, compete for scarce rewards, may not be rewarded for information sharing</i>	<i>Incorporate intrinsic or non-monetary motivators and reward for sharing information directly, recognize creativity and innovation</i>
Relationships	<i>may be top-down from supervisor to subordinate or team leader to team members</i>	<i>Open, friendly, unstructured, based on open, spontaneous sharing of knowledge</i>
Technology	<i>Related to job, based on availability and cost, invest heavily in IT to develop professional library with hierarchy of databases using existing knowledge</i>	<i>Tool to select personalized information, facilitate conversations, exchange tacit knowledge, invest moderately in the framework of IT, enable people to find one another</i>
Evaluation	<i>Based on tangible work accomplishments, not necessarily on creativity and knowledge sharing</i>	<i>Based on demonstrated performance, ongoing, spontaneous evaluation</i>

Table 2: Differences codification vs. personalization (Smith 2001)

2.3.3 Knowledge articulation

An important aspect of learning is the deliberate process when individuals together discuss what works and what doesn't in the execution of an organizational task (Zollo & Winter 2002). By this collective thinking, individuals can share their perceptions and beliefs and get challenged by others viewpoints. When individuals become more aware of the consequences of their decisions it improves their level of understanding and articulation is therefore an important tool to the cognitive dimension of the organizational learning process. It is therefore important to enable employees to have collective discussions, debriefing sessions and evaluation processes in order to improve the collective competence. Even though articulation require high levels commitment and effort from the individuals, it is argued by Zollo & Winter (2002) that it betters the understanding about decisions and consequences and should therefore be prioritized in organizations.

2.3.4 Shortcomings of IT-systems as the only approach to manage knowledge

Within the construction industry, the research highlights several difficulties with implementing an IT-based codification system to share and transfer knowledge throughout an organization. Carrillo & Chinowsky (2006) and Kamara et al. (2002) argue that due to the difficulties with codifying the vital tacit knowledge expertise, an IT system alone can't solve knowledge transfer within the organization. Likewise, Robinson et al. (2005) is arguing that most knowledge within organizations is in people's heads and in processes, which make it impossible for an IT-system to include tacit knowledge.

Moreover, large construction companies tend to exaggerate the benefits of technological solutions in managing knowledge, which make them likely to fail (Carrillo & Chinowsky 2006). Despite the challenges with an IT-system for managing knowledge, Robinson et al. (2005) argue that an organization should have a combination of IT and non-IT tools. Prencipe & Tell (2001) argues that 80-20% split is efficient and by this avoiding that the organization is failing on both approaches.

Another issue in sharing knowledge on informational portals and intranets is trust (McMahon et al. 2004). If the employees don't trust the system it is unlikely that the employee will spend time on making documents and information available at these portals. If people in the organization don't trust the system it also makes them more reliant on personal collection and don't enable others to take part in their documentation (McMahon et al. 2004).

2.3.5 Barriers to knowledge sharing

As mentioned in section 2.3, there are a number of positive outcomes of knowledge sharing within organizations, stimulating innovation, long-term competitiveness, ability to utilize the organizations knowledge base etc., which intuitively leads to the question; why don't all organizations manage knowledge in an efficient way?

One of the main barriers to knowledge sharing within organizations is argued to be lack of time (Carrillo et al. 2004; Shokri-Ghasabeh & Chileshe 2013; Carrillo & Chinowsky 2006). Employees are often engaged in several projects and it's therefore hard to coordinate learning sessions in form of debriefing sessions etc. (Shokri-Ghasabeh & Chileshe 2013). Even if employees are willing to share information, it is often problematic to make efforts and invest in learning activities because the main focus is on the actual project. Another important factor as barrier to knowledge sharing is lack of management support in knowledge sharing (Shokri-Ghasabeh & Chileshe 2013). Senior management support has a positive effect on employee's perceptions and willingness in sharing knowledge and nurture a knowledge sharing culture.

Moreover, (Shokri-Ghasabeh & Chileshe 2013) argue that senior management is a crucial condition for a company to be effective in managing knowledge. A lack of structured work processes is argued by Carrillo et al. (2004) to be a major barrier. By not having sufficient operating procedures, such as post-project reviews and project documentation, implemented in the organization, it is challenging for the organization to manage knowledge in an efficient way (Carrillo et al. 2004).

2.4 Knowledge sharing influencing the contract strategy decision

The decision of a contract strategy is, as mentioned in section 2.2, one of the most important choices a project manager is facing in a new project, with a likely positive impact on the outcomes of the project if the most suitable contract strategy is chosen. With this argument in mind; how does the knowledge sharing correspond to the selection process of deciding a suitable contract strategy?

Before embarking on discussing the relationship between knowledge sharing and complex decision-making process, it is important to further examine what the term '*complex*' means as related to the selection process of a contract strategy. This can be explained most briefly by Snowden and Boone (2007) and Nicholas (2016) who discussed the four contexts; simple, complicated, complex and chaotic in which a decision-making process can potentially take place or be practiced.

According to Snowden and Boone (2007), in simple contexts, cause and effect relationship between the criteria for consideration is clear and obvious to everyone. The correct or right decision is evident and decision-making process can easily be carried out by following a set of procedures or established best practices. On the total contrary, in a chaotic context, cause and effect relationship between variables is impossible to be determined due to lack of coherence. No underlying patterns can be observed or mapped out and as authors suggest, searching for the correct decision or answer in a chaotic context is meaningless. In such a context, a decision-maker immediate job is to act on the matter rather than searching to discover the underlying patterns.

Complicated and complex contexts are however of important relevance to this study. Nicholas (2016) suggest that when discussing these two contexts it is necessary to first draw out the clear distinction between them since the two terms are often used with a similar implication in everyday language but in literature about the four contexts they have different meanings. According to Nicholas (2016) complicated contexts are much more like simple contexts in that the cause and effect relationships can completely be assessed and accurately be established. At least one right decision/answer exists in complicated context but the difference is that this has to be done between a large number of variables (Snowden & Bonne 2007). To further clarify the distinction between a complicated context and a complex one, Uhl-Bien & Marion 2009) suggest that, if a complete description of the individual variables of a system can be given regardless of a huge number of the variables, the system is merely a complicated rather than a complex one.

On the other hand, in complex contexts, cause and effect relationships cannot be completely and precisely assessed by the decision-maker (Nicholas 2016). The large number of variables to be considered, their interrelations and dynamics cannot be fully analyzed and explicitly explained (Snowden & Bonne 2007; Uhl-Bien & Marion 2009). Snowden & Bonne (2007) suggested that in complex context right answers cannot be easily singled out and Nicholas (2016) argues that in such contexts decision-makers are mainly unable to predict with certainty the outcome of their decisions and high level of expertise and knowledge is required.

An article that highlights the link between knowledge and complex decision-making processes is the article “*Knowledge management impacts on the decision-making process*” by Nicholas (2006). To be able to coordinate its problem solving activities, the author argues that organizations are put under great pressure to manage complexity and uncertainty in the decision-making process. It is argued that in today's business environment, managers aren't necessarily able to manage and process the large amount of information and parameters. To solve these complex situations, the organization must be able to mobilize the relevant type of knowledge needed in the specific situation.

One of the key findings is argued by the author to be the link between complexity and knowledge tacit which is presented in figure 3 below. As seen in the figure, the more complex characteristics of a situation facing a person, the more tacit knowledge is required to solve the issue. In line with Prencipe & Tell (2001) and Robinson et al (2005), as discussed in 2.3.4, Nicholas (2006) also highlights a mixture of tacit and explicit knowledge as a key in knowledge sharing. However, Nicholas (2006) argue that when a person is confronting a decision in a complex situation, the individual are unable to process all the information and parameters, and therefore need to base their judgement on experiences and on higher tacit knowledge, corresponding to the up-right corner of the diagram below.

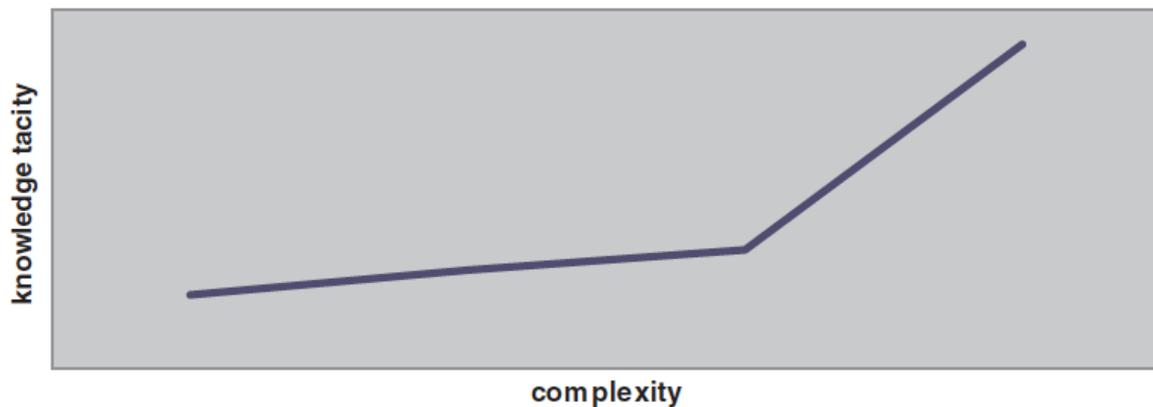


Figure 3: The relationship between knowledge tacit and complexity (Nicholas 2006)

As highlighted under section 2.3.1 above, tacit knowledge is primarily transferred through face-to-face meetings, conversations, discussions etc., enabling people to share ideas and question each other's perceptions (Smith 2001, McMahon et al. 2004 etc). Hence, a knowledge sharing approach for managing complex situations should therefore be focused on sharing tacit knowledge.

It is argued by Nicholas (2006) that personalization is a powerful tool for gathering collective intelligence in the decision-making process and is further creating a collective intuition and shared cognition. As a tool for collective intelligence in the decision-making process, personalization is argued to be a beneficial way to share knowledge. Gathering a group of people early in the decision-making process to share ideas and experiences, is argued to also create a collective rational dimension allowing individuals to choose the right solution among many.

This link between decision-making and knowledge tacit could also corresponds to the argument presented by Hansen et al. (1988) about aligning the knowledge sharing approach with the core business of the organization. Since projects within the construction industry is considered to characterized by a high level of uniqueness and complexity (Chinowsky et al. 2007), the core

business could be considered to be projects with high complexity corresponding to tacit knowledge.

Moreover, Nicholas (2006) argues that project managers in decentralized organization can promote learning and knowledge sharing even without involvement of top management. It is stated that by sharing experiences in the middle-management section, new initiatives and opportunities can be created which allows the organization to be more responsive to a fast changing environment.

3 METHOD

The thesis work started with a literature review which is described in section 1.5. The following section will describe how the pre-study and main study was carried out and will further highlight what method approach was used. Last but not least, a short section will highlight the representation of qualitative interviewing and how narrative analysis can be used to gain valuable insights from individual perceptions.

3.1 Pre-study

To ensure viability of the planned research topic before embarking on the main study a pre-study was carried out. The goal of the study was to gain an understanding of how Akademiska Hus works within the subject area, explore possible focus areas and to be able to formulate the objective for the thesis. Moreover, the pre-study made it possible to be more precise in the literature review by narrowing down the keywords in scientific databases.

The pre-study involved a series of meetings with both the university and industry supervisors and two interviews with Akademiska Hus project managers with different roles and experiences. Prior to the interviews two joint discussions with the industry supervisor and experienced project managers at Akademiska Hus were conducted which also forms part of the pre-study. The participants in the joint discussion and pre-study interviews were mainly recommended by the industry supervisor based on their experience and interest in the study.

The meetings with the university and industry supervisors facilitated the process of aligning the industry specific interests with the main study and ensuring that the chosen study will also meet the academic requirements. Useful opinions and concerns that led us towards a defined topic for the main study were also obtained from the joint discussions and interviews held with the project managers at Akademiska Hus.

Position	Organization	Region	Date interviewed
Meetings			
Supervisor	Chalmers University	Gothenburg	Continuously
Industry supervisor	Akademiska Hus	West	Continuously
Joint Discussions			
Industry supervisor	Akademiska Hus	West	05/09.02.2016
Project manager	Akademiska Hus	West	05.02.2016
Project manager	Akademiska Hus	West	09.02.2016
Interviews			
Project manager	Akademiska Hus	West	12.02.2016
Project manager	Akademiska Hus	West	15.02.2016

Table 3: Participants in the pre-study

3.2 Main study

The main study consisted of eleven interviews focused on employees involved in the contract strategy choice within Akademiska Hus. The interviews were carried out with employees from four regions; west, south, north and Stockholm, and the participants were project managers, procurement coordinator or regional managers (see table 4 below).

Position	Organization	Region	Date interviewed
Project manager	Akademiska Hus	A	22.03.2016
Procurement coordinator	Akademiska Hus	B	22.03.2016
Project manager	Akademiska Hus	B	22.03.2016
Project manager / CEO	AH/ Strategia Projektledning AB	B	21.03.2016
Project manager	Akademiska Hus	C	31.04.2016
Project manager	Akademiska Hus	C	01.04.2016
Procurement coordinator	Akademiska Hus	C	31.04.2016
Regional manager	Akademiska Hus	D	15.03.2016
Project manager	Akademiska Hus	D	15.03.2016
Project manager	Akademiska Hus	D	31.03.2016
Chief Procurement Officer	Akademiska Hus	B	16.05.2016

Table 4: Participants in the main study

Each participant in the main study was interviewed once and the interviews covered one hour each. An interview guide was formulated as a supporting tool for the interviewers to ensure that relevant areas were covered. All interviews were conducted in Swedish to ensure comprehensibility and to enable the interviewees to speak freely (Bryman 2004). The major areas discussed were; commonly used contract strategies within concerned region, parameters influencing the contract strategy choice, knowledge sharing etc.

The interviews could be considered as semi-structured with the possibility for the interviewer to vary the order of the question and ask follow up questions. A semi-structured interview gives the interviewee the freedom to speak openly and also bring up topics of their own interest (Bryman 2004), which was considered as an advantage for the thesis work. The semi-structured form is also argued to understand how the interviewee views concerned events, patterns and behavior (Bryman 2004).

Since the semi-structured interview enabled the interviewee to speak openly about the subject, new issues were highlighted. Even if these issues initially were outside the scope of the thesis, the need to take the study further became evident. This led to further exploration of some of the highlighted issues and therefore more literature studies were carried out in relation to the main topic. The research can therefore be seen as iterative, weaving back and forth from data collection to literature study (Bryman & Bell 2011).

All interviews were recorded, in order for the interviewers to ask relevant follow up questions and ensure that relevant areas were covered. One advantage with recording interviews is that it

enables the interviewers to also observe the way the interviewee speaks about a certain aspect (Bryman 2004). Later, the recordings were transcribed and summarized to key points.

The interviewees were selected through discussions with the supervisor and participants in the feasibility study. Key people in respective regions were identified with the aim to try to get a view of how respective regions decide on a contract strategy within Akademiska Hus. Although the interviews were carried out to obtain the interviewees' perspective on the contract strategy formulation process in their respective region it is important to acknowledge that there might be personal opinions which might not reflect the regional view.

3.2.1 Representation of qualitative interviewing

Bryman (2012) highlights the aim to understand the social world seen from the interviewees' perspective as central in qualitative research, focusing on words rather than numbers. Further, essential in qualitative research is to have face-to-face interaction and also participate through seeing the social world from the eyes of the participant and thereby undertake an epistemological position. Moreover, to understand the social world qualitative research highlights the importance of seeing occurring events as a consequence of interactions of people in it rather than random events (Bryman 2012).

Within the qualitative research, a narrative approach has been selected for this master thesis. In narrative analysis, the focus is not mainly on *what actually happened* in a particular situation but rather on *effects* and *how people make sense of what happened* (Bryman 2012). The use of a narrative approach when studying various organizational aspects has also been claimed to enable observation of conflicting trends or patterns both between the individuals in an organization and researchers studying the organizations (Löwstedt & Räisänen 2012). The authors also suggest that a narrative approach helps to understand the link between the micro and macro levels in an organization and this might be useful when trying to understand the holistic perspective of an organization.

Central in a narrative approach is storytelling, which enable individuals in an organisation to share experiences, responding to both cognitive and emotional mechanisms (James & Minnis 2004). Storytelling enables individuals formulate abstract ideas, judgements, attitudes and can enable insights in how the firm is perceived by the individual (James & Minnis 2004). This is one of the reasons for the chosen semi-structured interview form which provided the opportunity for the participants to bring up topics of their own interest, as discussed under section 3.2.

Rather understanding more objective facts, this approach is chosen for this thesis work to be more explorative and trying to understand the bigger picture and patterns. Further, the narrative approach in this thesis aim to get insights of *why* and *what's the effects* in a certain choice of contract strategy.

4 RESULTS AND ANALYSIS

This section of the research report consists of summarized implications taken from the conducted interviews during the main study. The first section will highlight different forms of contract strategies used at Akademiska Hus and their influencing factors. The following section will point out differences and similarities in the contract strategy selection process across regions. Further, this chapter will illustrate what mechanisms are in place for sharing knowledge within the organization and barriers to knowledge sharing activities will be pointed out. Parallels from the results will be drawn to theory, but a more thorough discussion on the relevant matters will be presented in discussion.

4.1 Contract Strategy and Influencing Factors

When examining the factors which influence the choice of a contract strategy at Akademiska Hus, it was observed that the responses from most of the interviewed project managers across regions involuntarily merge/fit together. Most issues were repeated, although not in the same context but the implications were comparatively the same.

It is widely known that together with other factors the three triple constraints of time, cost and quality generally represent client's objectives in construction projects and the desired certainty and/or economy of the three governs their choices of a contract strategy. This is the case at Akademiska Hus as most interviewed project managers suggest that the time afforded to them to carry out a project, budget constraints and high level of the desired design and construction qualities influence their choices. One project manager interviewed uses a triangle model of time, cost and quality and suggested that *"the three are at least the most important parameters"* governing the choices of contracting method.

One foremost observation made upon the responses from the interviews across the four regions is that when choosing a contract strategy Akademiska Hus seeks to have control over the outcome of the projects. It became evident that the client requires high involvement in their projects to ensure that the expected design and construction qualities are met. Since Akademiska Hus leading strategy is to constantly meet its customers' requirements at the highest possible level (Akademiska Hus 2015) a contracting method that will ensure the client has control over the outcomes influences its common use.

Consequently, the traditional DBB on a fixed price is still the most common form of contract strategy used at Akademiska Hus with regard to the number of projects. Also a mutual understanding shared by project managers across regions is that all projects can be delivered under this method. During the interviews responses like *"every project could be done on a fixed price DBB"* and *"I think all projects could be run successfully on a traditional DBB"* were common. The response below shared by one interviewed project manager clarifies and stresses more on the observed desire for control by the client in their projects;

"Traditional DBB is the most common because we want to have control about how the buildings are going to look. So we have a very clear view of how the finished product will look and how the building should look. We also have a good view of what our customers want"

Project manager, region D

As observed, control can be termed as the prime factor influencing the common use of DBB with fixed price at AH. Although assurance to meet the expected project outcomes was the main reason stated by the interviewees, tendencies of avoiding uncertainties and stick to contracting

methods that had previously worked for them were observed. Across all regions it was evident that most project managers had previous experience of working with the traditional DBB contracts although some had the experience in other contracting methods as well. This was observed at individual level but also at organizational level with most of the interviewed project managers across all regions repeatedly stating that *“Akademiska Hus is so experienced in running a traditional DBB contract”*.

It can be argued that in a subjective decision-making process as it is when choosing a contract strategy, decision-makers with vast past experience in a particular contracting method are most likely to prefer the same method rather than taking the risks of other unfamiliar methods. Under these circumstances anything different appears to threaten the certainty of the outcomes offered by the traditional method. When faced with a new project under the current complex and variety of interrelated variables to be considered project managers would probably still avoid ambiguities and opt for a traditional DBB.

On the other hand, it was established that the current tendency in the construction industry exposed Akademiska Hus into the need of implementing new contracting methods. However, the need for the new approaches to provide room for client involvement throughout the process was still vital to Akademiska Hus. One shared understanding across regions at Akademiska Hus is that projects are nowadays more complex with a number of actors involved and long processes for getting the approvals/permits. Thus time saving contracting methods with effective approaches in managing the complex interrelations between actors became a necessity.

Often DBB with fixed price is preferred when the client early in the project phase knows exactly what product is desired with little or no possibilities for changes or timeframe pressure. *“It is the same thing here since in such a situation it is easy to ask the market for a price”* suggested one of the interviewee. However, this is not always the case since the choice of a contract strategy is also influenced by the market condition as it will be observed in other sections. In simple and standard projects where functional requirements can easily be stipulated DB contracts are used at Akademiska Hus although the method can also be used even in complex projects under tight timeframes.

Innovation is one advantage of a DB contracting method but that can only be achieved at the expense of limited control and involvement by the client which clarifies its rendered use at Akademiska Hus. Difficulty in defining the functional requirements was generally mentioned as the reason for rare use of DB however the need for high involvement in the projects could also be argued to be the underlying factor.

As a result, most interviewed project managers at Akademiska Hus see partnering as the suitable contract strategy in complex projects although the approach can also be used in simple projects. In large, complex and unique projects partnering approach brings about the opportunity of having different experience from different actors early in the process which the interviewees deem advantageous and that *“the more complexity the better with partnering”* stated most interviewed project managers. In contrast to pure DB contracts, in partnering arrangement the client is fully involved in all construction phases. To Akademiska Hus, this offers the opportunity to control the project outcomes and provide the flexibility for changes at a reasonable and jointly agreed cost due to the high likelihood of changes in tenants requirements or needs late in the process. Therefore it was observed that, in recent years Akademiska Hus has adopted more use of partnering as a way of organizing projects.

However project managers across regions at Akademiska Hus have different understanding of the partnering concept. Most of the interviewed project managers understand that the concept is all about getting the contractor's experiences earlier in the project. Some suggested that partnering is implemented with the aim of reducing extra works in projects. Meanwhile others view partnering as a way of aligning all actors objectives in a project and effectively utilizing each other's resources towards the achievement of a common goal.

Furthermore, differences were also observed across regions in the way Akademiska Hus works with partnering, especially in the way contractors are remunerated. In some regions the client takes all the risks in case the contractor goes beyond the targeted price. The reason is to have no risk for the contractor and have them work with incentives for lowering the actual costs. Also in these regions the client is of the understanding that all incurred project costs are connected to the finished project and the only risk taken is the possibility of contractor's inefficiency which can effectively be managed in a collaborative setting that partnering approach offers.

Meanwhile, in other regions agreed pain and gain share incentivization method is used. Both the client and contractor share the risks of the possible pain or gain if the actual project cost goes beyond or below the target cost respectively. Regardless of the form it takes, incentives are meant to motivate the contractors and have influence on productivity. While the topic is beyond the scope of this study, it should be noted that there are a number of incentive methods used and the client's choice should be influenced by the comparative advantage of one method against the other and their applicability in a specific project.

Although partnering has recently gained popularity in the construction industry, the concept requires more than just the preference it gets. One interviewed project manager suggested that *“partnering does not fit everyone and it requires a lot of work from the client”*. Team building activities, interactive design processes and continuous joint monitoring requires client personnel with such talents and it is important for client to ensure that they have the right people with the right knowledge in partnering projects. One interviewed project manager with vast experience in partnering projects suggested that;

“The amount and knowledge of the resources from the client is important, for example samverkan requires a lot of work from the client. It's easier to sit in the 'back seat' if you have a DBB on fixed price”

Project manager, region A

Furthermore, it requires the client's ability to ensure that the contractor's organization provides the right people for a partnering setting and this can be attributed to the experience in working with partnering projects. One experienced project manager suggested;

“Also in the organization of the contractor, when I see some people in an organization tendering for a partnering project, they will not get the job”

(Project manager, region B)

On the other hand, most interviewed project managers suggested that market condition is also an important factor to consider when choosing a contracting method. One project manager argued that in *“good times in the economy”* it is easier to find contractors tendering for a partnering project and harder to get the contractors carry out intensive calculations before tendering for a pure DBB or they at least tend to be more expensive. Additionally, most interviewed project

managers suggest that it is always important to have the right contractors tendering for a project and on a hot market it is harder to find appropriate contractors.

4.2 Contract selection method/ process

With the aim of evaluating the process and methods used by the client organization when deciding an appropriate contract strategy for a project, guiding questions were formulated and asked in the main study. Differences and similarities were observed across regions.

In region B, all interviewed project managers suggested that the standard approach in the region takes the form of brainstorming meetings. According to the interviewees, the meetings are used as a platform for evaluating the suitability of different contract strategies in relation to clients objectives, project characteristics and other factors. Different parameters are mapped out and the pros and cons for each contracting method are discussed before arriving at the final decision. The meetings are mainly composed of three to four project managers with the procurer (the project manager assigned the task of managing the project) responsible for scheduling these meetings. Higher bosses are seldom involved and one interviewee stated that;

“Higher bosses aren't really involved in the choice of a procurement strategy; they are mostly interested in the money issue. As long as you as a Project Manager can describe and motivate why you have chosen the specific strategy, you are good to go”

Project manager, region B

Varying responses were observed in region C with some interviewee suggesting that the choice of a contract strategy is personal based with no standard approach and it is up to the project manager to decide. However, another interviewee argued that ‘start meetings’ are carried out initially to have the views of other project managers and the responsible people for maintenance and management of the facilities although the procurer takes total responsibility in the process.

More involvement and influence of the regional manager could be observed in region D. The interviewees in the region suggest that although the process of choosing a contract strategy is done by the specific project manager for a project, it could also be done in a group discussion with other project managers. In most cases the regional manager is involved in the process especially in big projects and it is most likely that the suggested contract strategy by the regional manager is used. As one interviewee stated;

“In the real big projects the bosses might come with instructions, like ‘this is gonna be a partnering project’ and then you do a partnering as a project manager”

Project manager, region D

In region A, the interviewed project manager suggested that the choice of an appropriate contract strategy for a project *“is up to the project manager but we have meetings where we discuss procurement strategy. The bosses can also be involved but it happens rarely”*.

4.2.1 Models / Frameworks

To assist clients in the selection process different tools and techniques have been developed. However the context specific nature of construction projects and a number of interrelated variables that has to be considered has rendered their use. Results showed that there are no models or standardised mechanisms in the choice of a contract strategy at Akademiska Hus. Several of the participants highlight the complex interrelations between an array of factors that

has to be considered when choosing a contract strategy as the main difficulty in using a standardized model. One of the interviewees suggested that;

“I think it would be hard to write a guide or a model like that. How do you define complexity for example: what levels of complexity? Every project is unique and it would be a risk that we only tick boxes in a document. I think it would be hard to have a model for this” (Project manager, region D)

Likewise, other interviewees pointed out that the process of choosing a contract strategy requires project managers to successfully apply knowledge in unique scenario and the use of models could be a hindrance rather than a support tool. One of the interviewed project managers stated that;

“Some think by having clear guidelines and models, do this, do that and the process automatically becomes better. Instead you should think about the situation and all available strategies. People are overconfident when working with standards and models but it stops you to think” (Project manager, region B)

Almost all interviewees across all regions share a common understanding that when choosing a contact strategy, subjective assessment and decision-making plays a big role. Evidently, most project managers across all regions suggest that *“two different project managers in an identical project could absolutely lead to two different contract strategies”* and that experience and sometimes gut-feeling could play a part as one interviewee stated;

“One example is a colleague is doing a DB where I wouldn't be brave enough to do it in that situation. In this particular project it is time issues that makes it 'forced' to be a DB” (Project manager, region D)

4.2.2 Guideline/governing document

There is one document, *“Riktlinjer för projektering” (2015)*, formulated to make the project process more similar across different regions and to assure the customer of similar procedure and quality in all regions at Akademiska Hus. The document is briefly highlighting advantages and disadvantages with different contract strategies and how these correspond to different project characteristics. However, several of the participants have not read the document content and some of these were even unaware of its existence. When asked about the document, one of the participants stated;

“No we don't have that, it might exist but I haven't seen it” (Project manager, region B)

However, two other participants refer to the document and express the aim of the document to primarily make the project process more similar. Although one of the interviewees points out that it only contains basic knowledge which is the reason for it not being used in the region.

Regardless of the quality and relevance of the document, it is evident that a significant number of the interviewed are not aware of the document or have not read it. In order to reach further in terms of knowledge sharing within the organization, it can be concluded that the ability to educate and spread central standards and document must increase at Akademiska Hus.

4.3 In-house knowledge/knowledge base/

To be able to manage uncertainty and the complex nature of the projects, as discussed in previous section 1.1, it can be argued from the main interview study that Akademiska Hus could benefit

from sharing tacit knowledge in the decision-making process. Referring to figure 3, the organization must be able to gather primarily tacit knowledge and have efficient mechanisms for mobilizing tacit knowledge in the choice of contract strategy process under complex circumstances. With this diagram relation in mind, the next section will describe what type of knowledge Akademiska Hus possesses and what processes and mechanisms currently exist for knowledge sharing. Further, barriers to knowledge sharing will be presented and willingness to share knowledge will also be highlighted.

The interview study showed that there is a wide in-house knowledge base within Akademiska Hus, with employees carrying knowledge from previous work experience as contractors, consultancies, real estate companies etc. This knowledge and experience can be concluded to be a mix of explicit and tacit knowledge. More specific, the technical knowledge within Akademiska Hus is considered to be high among the interviewees, and a majority argues that the will to control the project is a consequence of the experience and technical “know-how” within the organization. A reason for this is described by one of the project manager as due to the organization's historical focus on the technical aspect in projects. Moreover, the project manager argues that the company's historical focus on the technical “know-how” in projects also have resulted in the general view of management in projects as less important.

Likewise, another participant pointed out the high level of technical knowledge in project but also brings up leadership as a key area for improvements stating that;

“My opinion is that we possess a wide knowledge on the technical aspects in projects, one of our flaws and where we have potential to become better in our leadership. We need to create good leaders to better our processes in order to improve our organization” (Project manager, region B)

From the interview study it was also evident that there is a diversity of knowledge within the organization. In region D for example, one of the participant pointed out that partnering hasn't been as frequently used as in other regions. Further, the participant argued that some kind of guideline could be beneficial when working with partnering, stating that;

“When it comes to partnering, we all have different experiences across regions. What I could see a need for is a list of advantages and disadvantages and “important things to remember” with for example with partnering” (Project manager, region D)

4.3.1 Knowledge Sharing

The interview study showed that there is no formal knowledge sharing mechanisms for project managers to share knowledge throughout the organization. The main way to share knowledge is described by the interviewees as mainly within regions through physical encounters in meetings, discussions over lunch, coffee breaks etc. This could be seen as an informal personalization approach within the each region. The interview study showed that cross-regional sharing of knowledge seems to be more rare, with no formal mechanisms that frequently enable project managers across regions to share knowledge with each other. However, there are some formalized channels for knowledge sharing, and these will be described in the section below.

There is a “project manager's day” described by the interviewees as a way for all project managers within Akademiska Hus to gather once a year and discuss relevant matters regarding project management issues, sharing experiences etc. In addition, a few interviewees also argue

that there is some cross regional groups working with development and innovation that enable people from different regions to meet and share experiences.

Another format for sharing knowledge is the electronic database “AKA-projekt” used for documentation within projects. It is a platform where project managers should store important document regarding their projects and also to enable documents available for other project managers. However, the extent to which project managers are storing document on AKA-projekt seem to vary a lot between different project managers. One participant points out that very little documentation is stored on AKA-projekt, sometimes not even key numbers from projects. Further, the interviewee pointed out that this issue makes it very difficult for other project managers to take part in and compare projects. Another participant argued for that there had been an evaluation of the data in AKA-project, showing that only one out of nine projects had sufficient data that could be used for internal benchmarking etc.

However, two of the participants highlight that Akademiska Hus is implementing a new version of AKA-project, which is more responding to the guideline “*Riktlinjer för projektering*” (2015). One participant describes that the system to be designed around activities, and provide a similar document templates used for documentation across regions in the organization. Moreover, it showed that the participant had high expectation on the new version and believed it will be more user friendly and also improve the knowledge sharing between project managers.

As seen in section 2.3.4, Carrillo & Chinowsky (2006) highlight an overemphasis in IT-solutions to solve knowledge sharing within companies is frequent among individuals in the construction industry. It is naturally problematic to argue about the effects of the new version of AKA-project due to the fact that the system has not been implemented yet. However, seen to the argument presented by Carrillo & Chinowsky (2006) it can be suggested that the benefits of the new version will be relatively small. It could be seen as a complement to an approach focusing on sharing tacit knowledge, but it could be argued that it will not solve the knowledge sharing towards bettering the process of choosing a suitable contract strategy.

4.3.2 Barriers to knowledge sharing activities

The interview study showed that Akademiska Hus possess a wide knowledge base and a high level of diversity of knowledge across regions. However, the interview study showed that there is a lack of formal knowledge sharing mechanisms in enhancing the knowledge base across regions to better the contract strategy decision in projects.

The study showed that the responsibility to document lessons learned, perform evaluation meetings etc. is to a high extent up to the individual project manager. Almost all interviewees agree that insufficient knowledge sharing is a problem within Akademiska Hus with several interviewees arguing for the time issue as the main barrier. One project manager described it as a big shortcoming of the organization that it lacks formal knowledge sharing mechanisms. Similarly, another participant stated that;

“Knowledge sharing is of course very important, but it is something we aren't good at in our organisation. We have been discussing this for years but nothing has really happened” (Project manager, region B)

Time were described as the main barrier to knowledge sharing activities and the several participants pointed out that a documentation for knowledge sharing purposes consumes time that could have used in projects instead. One participant argued that the role as a project manager

does not allow you to spend time on documentation. The project manager expresses that the role hinders you to;

“Write page after page and put a document in a document bank somewhere, you don't have that time and opportunity” (Project manager, region C).

The interview study also observed unwillingness towards spending time on documentation. One interviewee expressed unwillingness towards documentation since it doesn't bring any positive effects and therefore has no purpose, except consuming time from key activities in projects. The participants simply stated that;

“I am not a proponent of documentation; I have done enough of that” (Project manager, region D).

It can be seen as a pattern in the interview study that most of the participants view knowledge sharing as closely connected to spending time on documentation. Even if the main barrier to knowledge sharing activities is highlighted by a majority of the interviewees as time, it could be argued the well spread unwillingness to spend time on documentation is a result of project managers not taking the time to engage themselves in documentation activities.

Despite insufficient knowledge sharing, one project manager clarified that there is a will to share knowledge but because of time constraints it is rarely done. The participant further expressed that it is very instructive and enjoyable to verbally share experiences and motivate why a certain decision was made. Moreover, several interviewees agreed on this issue and described a high willingness to share their own experiences within the organization but pointed out the time issue and lack of formal mechanism as a barrier to more knowledge sharing. Another participant highlighted the open environment as a strength within the organization and further stated that;

“We are pretty good to talk to each other within regions, also when we meet other regions but these discussions is very rarely documented, no numbers or anything like that” (Project Manager, region D)

Another barrier to knowledge sharing that can be noted from the interview study is that knowledge is mostly shared within regions. Different ways of choosing contract strategy, as discussed under section 4.2, was evident although it seems like a natural consequence of having verbal conversation within regions as the primarily source to knowledge sharing. One example of this was expressed by a project manager highlighted that;

*“We have our ways in our region and share experiences among us”
(Project manager, region B)*

Similarly, a different interviewee pointed out that it should be standard evaluation meeting after projects but that it rarely happens. Even though evaluation meeting occurs rarely, one participant also highlighted a sometimes occurring “defending attitude” among project managers. The interviewee argued that because as a project manager you want to defend the chosen contract strategy, it is occurring that project managers try to only share positive outcomes of the decision. The true picture isn't therefore shared and valuable knowledge about negative impacts of a certain contract strategy can therefore not be shared. However, several other participants highlighted a will to share knowledge and discuss outcomes of a certain decision, as will be discussed further under 4.3.3, and do not agree with this statement.

Another issue pointed out by one participant was not believing in positive effects of knowledge sharing due to the complex nature of projects within the construction industry. The interviewee argued that unique characteristics of projects make it hard to find identical project settings (complexity, market condition etc.) to compare and learn from lessons learned. Moreover, the interviewee argued that uniqueness of projects in a way is a barrier to enhancing positive effects of knowledge sharing activities. Another participant highlighted the same issue and further highlighted the different tenant requirements as a problem for comparing projects and moreover share knowledge across projects (Project manager, region D).

However, one of the participants highlighted that even if every project is unique, there are distinct similarities in specific parts of the project. For example the participant argued for two different projects could have a lot of different characteristics but an almost identical structural frame and the interviewee argued that in such a scenario there could be benefits of sharing knowledge. Further, the participant argued that with the similarities in structural frames, knowledge sharing regarding suitable suppliers etc., could be very useful for the project manager and if this is done potentially influence and better the decision of choosing a suitable contract strategy.

5 DISCUSSION

The structure of the discussion will be centered around the key concepts; complexity, tacit and personalization. Firstly, each concept will be highlighted separately and results from the main study will be compared to theory and discussed in detail. Secondly, a summarizing part will highlight the key points in each concept and lastly a figure will be presented to illustrate the close relation between the key concepts.

5.1 Complexity

In section 2.2.1 Chua & Loh (2006) grouped a variety of factors that the client has to consider when choosing a contract strategy into three categories; client's objectives, projects characteristics and client comparative advantage. According to the authors, all factors influencing clients choice of a contract strategy for a proposed project falls within any of the three categories. It is in relation to these factors that various attributes of different contracting methods are weighed and ranked during the selection process.

As observed, project managers at Akademiska Hus knowingly or unknowingly base their choices of different contracting methods in accordance with Chua & Loh (2006) three categories. As it can be established from the results, influencing factors as such as certainty or economy of project outcomes in terms of cost, time and quality; desire for high involvement in projects; flexibility for change; project size, complexity and uniqueness; availability of appropriate contractors and the in-house expertise/knowledge span from the foremost Chua & Loh (2006) category of clients objectives to project characteristics and finally to the last category of clients comparative advantage.

However focus is not on whether project managers at Akademiska Hus are aware or unaware of which influencing factor falls into which category. Rather, the complexity nature of contract strategy selection process derived from a large number and variety of factors to be considered and the complex interrelations between them is of this study's main interest as the authors seek to enhance suitability of the ultimate choice.

As the theory suggests (Love et al. 2008; Ruparathna et al. 2015) finding compatibility of the available contracting methods with the wide range and variety of factors is a complex undertaking and has always been a challenge to project managers and clients. In many cases, as in the case of Akademiska Hus, the choice depends on the subjective evaluation and intuitive judgment of the decision-maker and is further highly characterized with uncertainties. Under this circumstance Chua & Loh (2008) suggest that human fallibility may affect the selection of the suitable choice. This is due to the possibility of negligence of some of the important variables to be considered.

It can be argued that brainstorming meetings approach used in some regions at Akademiska Hus might be effective in managing human fallibility in the decision-making process. However other regions do not have such meetings and still the decision is dependent upon an individual project manager. Therefore there is no any organizational standard approach and project managers in the regions have the freedom of deciding their own ways of selecting a contract strategy for a project. Even if brainstorming meetings presents the potential for effective reduction of human fallibility, the need for having the right people with the relevant knowledge and experience in such meetings cannot be disregarded.

As Lam et al. (2007) suggested the knowledge and expertise needed when formulating a contract strategy is subjective and mainly derived from practical experience. Therefore it is important for

Akademiska Hus to ensure that in these brainstorming meetings the right experience is gathered and effectively utilized for an appropriate choice. However one important question is whether the client has this necessary expertise in-house and if not should a consulting team be hired to coordinate/manage the process on behalf?

Experience

Akademiska Hus has abundant experience with traditional contracting method because of the past experience of using this method in almost all of their projects. Although clients with past experience in a particular contracting method are likely to prefer the same contracting methods (Rameezdeen & Jayasena 2013) results show that Akademiska Hus has currently embraced other alternative forms of contracts as well. Also results show that the client workforce possesses variety of experience and knowledge in other contracting methods as well although this is vivid in some regions. Therefore the main challenge faced by the client is on how the knowledge available in one region can effectively be utilized in enhancing contract strategy selection process in other regions and the organization as a whole.

Tools and guidelines

As reviewed in section 2.2, practitioners in the industry have developed a number of tools and techniques in an attempt to assist clients in the selection process and furthermore to reduce the human factor in the process. However there is no model or framework that has gained widespread use and acceptance as Love et al. (2008) highlighted their shortcomings in the referred theory section. Akademiska Hus does not use any tool or model in their selection process. As the theory suggests and cosigned with the results of this study, together with other shortcomings, complexity has been termed as the main reason for the impaired use of these tools. This complexity is related to a large number of interrelated variables/factors to be considered and models seem to ignore a range of factors (Love et al. 2008). Consequently, human factor still dictates the selection process and to enhance the decision-making when choosing a contract strategy emphasis on the relevant knowledge in those making decisions is important.

Although the applicability of models when selecting a contract strategy is almost impossible, it can also be argued that project managers at Akademiska Hus see the use of models or guidelines as a hindrance rather than a support tool. The aversion was evident whenever presented with the idea of working with a standardized contract strategy selection approach and a quick thought was on the use of models rather than the actual standardized approach in question. This explains in one way why only a significant number of project managers know about the existence of the “*Riktlinjer för projektering*” (2015) and only two out of all interviewees refer to it occasionally. In other way this explains Akademiska Hus weakness in ensuring that its standardized working tools or guidelines are effectively used in their contract selection processes. It can therefore be questioned whether any efforts in enhancing the selection process of a contracts strategy at Akademiska Hus in form of documentation would work.

One possible and effective way of enhancing the selection process of a contract strategy at Akademiska Hus appears to be the use of brainstorming meetings while effectively utilizing its diverse knowledge base as discussed earlier in this section. As Nicholas (2006) suggested, the higher the complexity of the decision-making process the more tacit knowledge is required and Chinowsky et al. (2007) argued that this knowledge resides within the heads of individuals and accumulated through learning and experience. Akademiska Hus possesses this knowledge and added value in the contract strategy selection would be attained if approaches for maximum utilization of its knowledge base across regions are put in place and implemented.

5.2 Tacit knowledge

In theory, it can be seen that it requires both tacit and explicit knowledge in order to share knowledge in an organization (Carrillo & Chinowsky 2006, Robinson et al. 2005, Prencipe & Tell 2001, Nicholas 2006). However, in the decision-making of complex circumstances, Nicholas (2006) argued for the relevance of mobilizing tacit knowledge in order to come up with the most suitable choice.

Even though some regions have standardized meetings initially in projects, it can be seen that the choice of contract strategy is to a high extent up to the individual project manager to make the decision, based on experience and “gut feeling” as shown in section 4.2.1. From a theory perspective, tacit knowledge is characterized as subjective, based on values, beliefs and is context-specific (Nonaka and Takeuchi 1995, Smith 2001) and it can therefore be argued that experience and “gut feeling” is corresponding to the tacit knowledge within decision-makers at Akademiska Hus.

In scenarios involving an experienced decision-maker, the individual could rely on experience in the choice of contract strategy, but what applies if the individual does not possess the experience? It could be argued that in such a scenario, Akademiska Hus does not have the sufficient formal mechanisms to enhance the wide experience and tacit knowledge that exist within the organization. The same would apply when individuals leave the organization or retire, as pointed out by Chua & Loh (2006), arguing that knowledge is within the individuals and if the formal mechanisms for sharing knowledge doesn't exist, it leads to a loss of valuable contract strategy expertise. Even though there exist informal knowledge sharing mechanisms within regions through physical encounters such as lunch, fika etc., it can be argued that Akademiska Hus lacks sufficient cross-regional knowledge sharing mechanisms. Therefore the current informal knowledge sharing mechanisms do not provide the opportunity for other regions to take part and gain from these activities.

However, IT-solutions for enhancing primarily explicit knowledge is also an important for knowledge sharing, as highlighted in theory (Robinson et al. 2005, Prencipe & Tell 2001 etc.). The new version of AKA-projekt, centered around key activities in project, could therefore be supported from the theory perspective, and due to the more user friendly focus it could potentially be more used than the current version.

However, theory also suggests (Prencipe & Tell) that IT-tools only should stand for 20 percent of the total knowledge sharing mechanisms within the construction industry. As highlighted in the result section 4.3, the positive outcomes of the new version can be argued to be relatively small, due to the common over-emphasis on IT-tools (Carrillo & Chinowsky 2006). Similarly, the theory (Prencipe & Tell 2001; Nicholas 2006) also suggest that, organizations operating under unique and complex situations, the focus should be on sharing tacit knowledge and therefore avoid overreliance on IT-solutions as the only knowledge sharing mechanism. From the thesis work, challenges can be seen in creating trust in the system, as highlighted by McMahon et al. (2004) in section 2.3.4 and an important factor will also be to make sure that project managers get the right education for the system create a routine based use of the IT-tool.

5.3 Personalization

From this thesis work, gathering a small group of project managers/procurement coordinators, preferably from different regions, initially in projects and brainstorm and discuss around different contract strategies could be seen as a helpful tool for Akademiska Hus. It would also enable

project managers to share knowledge “in the doing”, as pointed out in section 2.3.2 and thereby provide tools for individuals to share their perceptions and opinions in a working context.

As pointed out in section 2.4, complex decision-making situations as it is when choosing a contract strategy puts high pressure on the organizations ability to mobilize tacit knowledge in order to make the right decisions in an efficient way. Opening up the discussion and allow project managers to share and discuss different solutions is seen as a big potential for Akademiska Hus in enhancing its decision-making process. This is mainly because the organization possesses a wide in-house knowledge base, with individuals carrying experience from different areas within the construction industry together with broad experience as a client. In doing so, the knowledge that resides within the individuals is shared by actually performing the task in the doing and as the theory suggests, this is the best way for the transfer of tacit knowledge. This presents Akademiska Hus with the potential for improvement and it can be seen as an organizational failure if the knowledge base residing within the client is not fully utilized.

Seen from the positive perspective, fika and other face-to-face interaction provide an effective channel for knowledge sharing within regions at Akademiska Hus. The negative aspects come from overreliance on the AKA project and “project manager’s day” as the only available means for knowledge sharing across regions. As observed in the results, the two cross-regional knowledge sharing approaches can be argued to be inefficient. Out of nine projects only one has its relevant information updated in AKA project and this can be related to unwillingness of the project managers to spend time on documentation or post project reviews. On the other hand, project managers day is only carried out once in a year. Although the day provides a platform for project managers to share experiences of the encountered challenges and what worked well in their regions, the learning by doing content necessary for transfer of tacit knowledge is missed.

It is due to the above arguments that the authors of this study suggest that, the decision-making process when selecting a contract strategy at Akademiska Hus especially for complex and unique projects should involve different project managers from different regions with relevant experience and knowledge. Here, the diverse knowledge mostly the one residing in the heads of the individuals and hard to share through documentation or tangible platforms can effectively be transferred to other individuals across regions. New thoughts and insights derived from the variety of expertise and knowledge gathered will help to address complex decision-making process by actually doing the task. Furthermore, early involvement of project managers from different regions in a project executed in another region will develop their interest in these projects. This will make the yearly project managers day even more interesting and the sense of belonging in projects in different regions will further enhance the dialogue and discussion at an individual level. As pointed out by Zollo & Winter (2002) articulation would enable individuals have the opportunity to discuss what works and what does not in the execution of an organizational task and therefore better their awareness of the consequences’ of their decisions, responding to the cognitive dimensions in the learning process.

From the interview study a majority of the participants expressed a will to share information in the organization. Mobilizing tacit knowledge in a form of group discussions and brainstorming sessions in initially when choosing a suitable contract strategy, the project manager hasn't necessarily be forced to spend more time on documentation, since the knowledge sharing approach is highly based on face-to-face discussions. The negative attitudes to spend time on documentation, as mentioned in the result section, would not therefore have to be a hindrance for this new approach in the decision process of choosing of contract strategy.

Even if Akademiska Hus has a wide in-house knowledge, barrier to knowledge sharing activities can be seen. From the main study, organizational constraints to knowledge sharing were observed which Akademiska Hus has to overcome in order to increase knowledge sharing activities within the organization. The main study pointed out difficulties for project managers to set off time from project work for knowledge sharing activities. Also in theory, time is highlighted as a main barrier to knowledge sharing (Carrillo et al. 2004; Shokri-Ghasabeh & Chileshe 2013; Carrillo & Chinowsky 2006) and it is further argued that senior management support could be a part of solving the problem (Shokri-Ghasabeh & Chileshe 2013). A way to overcome this barrier would be to establish routines for knowledge sharing activities and make sure senior management supports the activities.

Another aspect pointed out in the main study, was that the uniqueness of project in the construction industry is a hindrance for knowledge sharing because of the difficulties with comparing one project to another. According to theory, Chinowsky et al. (2007) also highlights the unique characteristics of projects in the construction industry but instead argue that uniqueness puts more pressure on knowledge sharing activities in order for individuals to become knowledgeable decision-makers. From the thesis work, it can be argued that the unique characteristics in construction makes it more difficult for project managers to see the cause and effect relation of a decision, and therefore greater need to mobilize tacit knowledge. The negative attitudes towards sharing knowledge in construction because of the “one-off-nature” could be considered as the unwillingness to spend time on documentation. Hence, this thesis work would argue that knowledge sharing mechanisms is important in unique settings, thereby opposing the argument from the main study stating that uniqueness in projects is a hindrance for knowledge sharing.

5.4 Key concepts and relationships

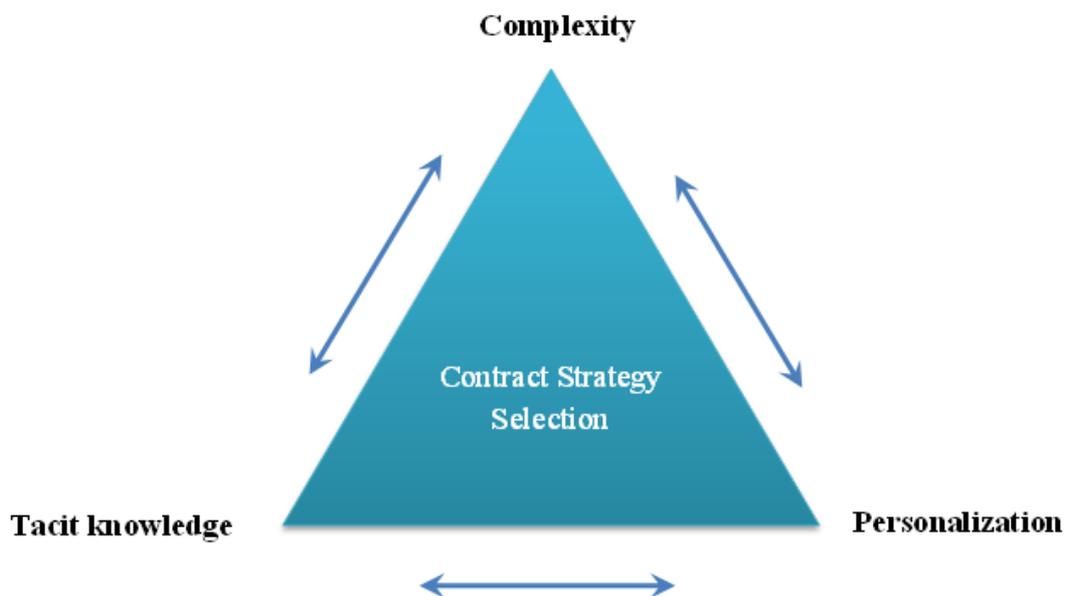


Figure 4: Complexity, tacit-knowledge and personalization triangle

The figure above highlights the relation between the key concepts presented in the discussion. As discussed, the selection of an appropriate contract strategy is a complex and challenging task encountered by the clients. The complexity is derived from a variety of interrelated factors that clients have to consider for a suitable choice. Although different models and tools have been developed to assist clients in the selection process, highlighted deficiencies in the use of models has impaired their use and general acceptance in the industry. Therefore human factor still

dictates the choice and the actual contract strategy selection process depends upon the experience and knowledge of the decision-makers whose subjective or intuitive judgement results into the ultimate choice.

The knowledge that is needed in a complex decision-making process has been widely discussed by practitioners. As referred in the theory as well as in the discussion parts, Nicholas (2006) observed the relationship between complexity and tacit knowledge and suggested that the more complexity the more tacit knowledge as shown in figure 3. However, one characteristic of tacit knowledge is that it resides within the heads of the individuals and cannot be shared through documentation or any explicit form and the best approach to have this knowledge articulated to other individuals in an organization is by doing. As observed, Akademiska Hus possesses a wide range of experience and knowledge within its workforce but has not fully utilized this valuable resource and exploit the potential it has for organizational improvement especially in the contract strategy selection process.

Personalization as a concept provides the opportunity for organizations to have tacit knowledge shared if appropriate/formalized mechanisms are put in place. Through face-to-face encounters, personalization is centered on getting people together to discuss relevant matters and aims to through articulation respond to the cognitive dimensions of the learning process. Personalization enable people to share thoughts and ideas give insights to how the individuals involved perceive a given situation. At Akademiska Hus patterns of personalization approach in contract strategy selection process were observed within regions although no thorough personalization approaches were observed across regions. As discussed, the potential for the same concept to be used in their process for cross regional learning and enhanced contract selection process could ultimately lead to a suitable choice.

In the light of the above it can be observed in the figure 4 above that the three key concepts are interrelated. The more complex the problem is the more tacit knowledge is needed to have it solved and the tacit knowledge possessed can effectively be shared through personalization. On the other hand, the more personalization approach an organization adopts to its learning and knowledge sharing mechanisms, the more tacit knowledge is developed and shared among its workforce and more capable is the organization workforce to positively react in complex situations. Hence the more complexity in its decision-making processes the more organizations should seek to embrace personalization approach and benefit from the potential tacit knowledge has in solving complex situations.

6 CONCLUSION

This final chapter will present conclusions of the thesis work and how these correspond to the objectives of the thesis. Lastly, recommendations for future research will be presented.

It can be seen from this thesis that the three categories; client's objectives, projects characteristics and client comparative advantage provided by Chua & Loh (2006) is in line with the results from the main interview. Influencing factors from the main study such as influencing factors as such as certainty or economy of project outcomes in terms of cost, time and quality; desire for high involvement in projects; flexibility for change; project size, complexity and uniqueness; availability of appropriate contractors and the in-house expertise/knowledge could all fall into one of the three categories provided in theory.

From the thesis work it can be concluded that there is a wide in-house knowledge base within Akademiska Hus. However, there is insufficient knowledge sharing mechanisms in place in order for the organization to mobilize tacit knowledge in enhancing the process of contract strategy selection. This issue was particularly evident in knowledge sharing across regions.

It can be concluded that Akademiska Hus has no organizational standard approach in the selection of a suitable contract strategy. In some regions brainstorming meeting are used initially in projects, and in others it seem to be more up to the specific project manager. In order to reduce the human falability factor and share knowledge across regions, this thesis suggest that a more standardized approach is implemented.

It can be seen a potential for using personalization as a knowledge sharing approach initially in projects, and by this enable people to share perceptions and questions each others view points, corresponding to primarily tacit knowledge sharing. However, this will require support from top management and also implement a routine for spending time on these activities. This thesis highlights that a more team-centered decision process would reduce the diversity of knowledge across regions as well as potentially create and interest between members in different projects and regions.

The thesis work was carried out in spring 2016, and due the limited time frame only one client was interviewed, Akademiska Hus. One suggestion for future research would therefore naturally be to do a more extensive study, involving more participants in the organization and perhaps compare with a real estate company from the private market. It would also be interesting to evaluate implementation of personalization and follow up on impacts on the decision process.

7 References

- Akademiska Hus (2016). Årsredovisning 2015. Stockholm: Akademiska Hus AB. http://www.akademiskahus.se/globalassets/dokument/ekonomi/arsredovisning_2015.pdf
- Alhazmi, T & McCaffer, R. 2000, "Project Procurement System Selection Model", *Journal of Construction Engineering and Management*, vol. 126, no. 3, pp. 176-184.
- Badenfelt, U. (2008). The selection of sharing ratios in target cost contracts. *Engineering, Construction and Architectural Management*, 15(1), 54-65.
- Boh, W.F., 2007. Mechanisms for sharing knowledge in project-based organizations. *Information and Organization*, 17(1), pp.27-58.
- Bower, D. 2010, Management of procurement, Paperback edn, Thomas Telford, London.
- Brockmann, E.N. and Anthony, W.P., 2002. Tacit knowledge and strategic decision-making. *Group & Organization Management*, 27(4), pp.436-455.
- Brown, J.S. and Duguid, P., 1991. Organizational learning and communities-of-practice: Toward a unified view of working, learning, and innovation. *Organization science*, 2(1), pp.40-57.
- Bryman, A. 2004, Social research methods, 2.th edn, Oxford University Press, Oxford.
- Bryman, A. and Bell, E. 2011, Business Research Methods, 3.th edn, Oxford University Press, Oxford.
- Carrillo, P. and Chinowsky, P., 2006. Exploiting knowledge management: The engineering and construction perspective. *Journal of Management in Engineering*, 22(1), pp.2-10.
- Carrillo, P., Robinson, H., Al-Ghassani, A. & Anumba, C. 2004, "Knowledge management in UK construction: strategies, resources and barriers", *Project Management Journal*, vol. 35, no. 1, pp. 46.
- Chan, A.P., Chan, D.W. and Ho, K.S., 2003. Partnering in construction: critical study of problems for implementation. *Journal of Management in Engineering*, 19(3), pp.126-135.
- Chan, A.P., Chan, D.W., Chiang, Y.H., Tang, B.S., Chan, E.H. and Ho, K.S., 2004. Exploring critical success factors for partnering in construction projects. *Journal of Construction Engineering and Management*, 130(2), pp.188-198.

- Chinowsky, P., Molenaar, K. and Realph, A., 2007. Learning organizations in construction. *Journal of Management in Engineering*, 23(1), pp.27-34.
- Chua, D.K. and Loh, P.K., 2006. CB-contract: Case-based reasoning approach to construction contract strategy formulation. *Journal of computing in civil engineering*, 20(5), pp.339-350.
- Dewulf, G. and Kadefors, A., 2012. Collaboration in public construction—contractual incentives, partnering schemes and trust. *Engineering project organization journal*, 2(4), pp.240-250.
- Gordon, C.M., 1994. Choosing appropriate construction contracting method. *Journal of Construction Engineering and Management*, 120(1), pp.196-210.
- Hamel, G., 1991. Competition for competence and interpartner learning within international strategic alliances. *Strategic management journal*, 12(S1), pp.83-103.
- Hansen, M.T., Nohria, N. and Tierney, T., 1999. What's your strategy for managing knowledge?. *The Knowledge Management Yearbook 2000–2001*.
- Hartmann, A. and Bresnen, M., 2011. The emergence of partnering in construction practice: an activity theory perspective. *The Engineering Project Organization Journal*, 1(1), pp.41-52.
- Holste, J.S. and Fields, D., 2010. Trust and tacit knowledge sharing and use. *Journal of knowledge management*, 14(1), pp.128-140.
- James, C.H. and Minnis, W.C., 2004. Organizational storytelling: It makes sense. *Business Horizons*, 47(4), pp.23-32.
- Kadefors, A., & Eriksson, P. E. (2014). Forsknings-sammanställning, Utökad samverkan/Partnering.
- Kamara, J.M., Augenbroe, G., Anumba, C.J. and Carrillo, P.M., 2002. Knowledge management in the architecture, engineering and construction industry. *Construction innovation*, 2(1), pp.53-67.
- Koskinen, K.U., Pihlanto, P. and Vanharanta, H., 2003. Tacit knowledge acquisition and sharing in a project work context. *International journal of project management*, 21(4), pp.281-290.
- Kumaraswamy, M.M. & Dissanayaka, S.M. 1998, "Linking procurement systems to project priorities", *Building Research & Information*, vol. 26, no. 4, pp. 223-238.

Kumaraswamy, M.M. & Dissanayaka, S.M. 2001, "Developing a decision support system for building project procurement", *Building and Environment*, vol. 36, no. 3, pp. 337-349.

Lam, K.C., Wang, D., Lee, P.T.K. & Tsang, Y.T. 2007, "Modelling risk allocation decision in construction contracts", *International Journal of Project Management*, vol. 25, no. 5, pp. 485-493.

Li, H., Cheng, E.W. and Love, P.E., 2000. Partnering research in construction. *Engineering, Construction and Architectural Management*, 7(1), pp.76-92.

Love, P.E., Davis, P.R., Edwards, D.J. and Baccarini, D., 2008. Uncertainty avoidance: public sector clients and procurement selection. *International Journal of Public Sector Management*, 21(7), pp.753-776.

Löwstedt, M, & Räisänen, C 2012, 'Playing back-spin balls': narrating organizational change in construction', *Construction Management & Economics*, 30, 9, pp. 795-806

Masterman, J.W.E. and Gameson, R.N., 1994. Client characteristics and needs in relation to their selection of building procurement systems. *East meets West*, pp.221-228.

McMahon, C., Lowe, A. and Culley, S., 2004. Knowledge management in engineering design: personalization and codification. *Journal of Engineering Design*, 15(4), pp.307-325.

Nonaka, I. and Takeuchi, H., 1995. The knowledge-creating company: How Japanese companies create the dynamics of innovation. *Oxford university press*.

Nyström, J., 2005. The definition of partnering as a Wittgenstein family-resemblance concept. *Construction Management and Economics*, 23(5), pp.473-481.

Nyström, J., Nilsson, J.E. and Lind, H., 2016. Degrees of freedom and innovations in construction contracts. *Transport Policy*, 47, pp.119-126.

Prencipe, A. and Tell, F., 2001. Inter-project learning: processes and outcomes of knowledge codification in project-based firms. *Research policy*, 30(9), pp.1373-1394.

Rameezdeen, R. & Jayasena, E. 2013, "Comparing The Procurement Selection Parameters of Private and Public Sector Clients", *International Journal of Construction Project Management*, vol. 5, no. 2, pp. 171.

Robinson, H.S., Carrillo, P.M., Anumba, C.J. and Al-Ghassani, A.M., 2005. Knowledge management practices in large construction organisations. *Engineering, Construction and Architectural Management*, 12(5), pp.431-445.

Ruparathna, R. & Hewage, K. 2015, "Review of Contemporary Construction Procurement Practices", *Journal of Management in Engineering*, vol. 31, no. 3, pp. 4014038.

Shokri-Ghasabeh, M. and Chileshe, N., 2013. Knowledge management: Barriers to capturing lessons learned from Australian construction contractors perspective. *Construction Innovation*, 14(1), pp.108-134.

Smith, E.A., 2001. The role of tacit and explicit knowledge in the workplace. *Journal of knowledge Management*, 5(4), pp.311-321.

Snowden, D.F. & Boone, M.E. 2007, A Leader's Framework for Decision-making, *Harvard Business Review*, Boston.

Uhl-Bien, M. & Marion, R. 2009, "Complexity leadership in bureaucratic forms of organizing: A meso model", *The Leadership Quarterly*, vol. 20, no. 4, pp. 631-650.

Wang, W., Hawwash, K. & Perry, J. 1996, "Contract type selector (CTS): a KBS for training young engineers", *International Journal of Project Management*, vol. 14, no. 2, pp. 95-102.

Yang, S.C. and Farn, C.K., 2009. Social capital, behavioural control, and tacit knowledge sharing—A multi-informant design. *International Journal of Information Management*, 29(3), pp.210-218.

Zollo, M. and Winter, S.G., 2002. Deliberate learning and the evolution of dynamic capabilities. *Organization science*, 13(3), pp.339-351.