CHALMERS

Public clients' experiences of industrialised housing

The SABO Kombohus framework agreement

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

ANNIE HALLMAN
JOSEFINE HÄLL

Department of Technology Management and Economics
Division of Service Management
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden 2014
Master's Thesis E2014:060

MASTER'S THESIS E2014:060

Public clients' experiences of industrialised housing

The SABO Kombohus framework agreement

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

ANNIE HALLMAN

JOSEFINE HÄLL

Department of Technology Management and Economics
Division of Service Management
CHALMERS UNIVERSITY OF TECHNOLOGY

Göteborg, Sweden 2014

Public clients' experiences of industrialised housing – The SABO Kombohus framework agreement
Master of Science Thesis in the Master's Programme Design and Construction Project Management
ANNIE HALLMAN
JOSEFINE HÄLL

Examensarbete/Institutionen för Teknikens ekonomi och organisation,
Chalmers tekniska högskola E2014:060

Department of Technology Management and Economics
Division of Service Management
Chalmers University of Technology
SE-412 96 Göteborg
Sweden
Telephone: + 46 (0)31-772 1000

Chalmers Reproservice/Department of Technology Management and Economics, Göteborg, Sweden 2014

Acknowledgements

This study has been performed at the Department of Technology Management and Economics, at Chalmers University of Technology. The study was first initiated by Petter Jurdell, Head of Property Development at SABO, and has been financed by SABO.

First and foremost we would like to thank our supervisor Associate Professor Anna Kadefors at Chalmers University of Technology, who have been engaged in our work and contributed with knowledge and thoughts. We would also like to thank our supervisor Petter Jurdell at SABO who has been a good support throughout our work.

We are also grateful and would like to thank all representatives from the public housing companies: Bjuvsbostäder, Båstadhem, Hebygårdar, HFAB, Håbohus, Karlshamnsbostäder, LKF, Trelleborgshem, Uppsalahem and Strömstadsbyggen who have contributed with experiences and knowledge in this research.

Göteborg June 2014

Annie Hallman and Josefine Häll

Public clients' experiences of industrialised housing
The SABO Kombohus framework agreement
Master of Science Thesis in the Master's Programme Design and Construction Project Management

ANNIE HALLMAN
JOSEFINE HÄLL
Department of Technology Management and Economics
Division of Service Management
Chalmers University of Technology

ABSTRACT

The development of industrialised house building has foremost been led by contractors and manufactures and the building method has not reached a breakthrough in the house building industry. There is a great potential for clients to be an active participant and even lead the development of industrialised house building. However, the information and knowledge regarding client requirements in industrialised multi-family housing is limited. The main purpose of this study is to identify aspects that influence client value associated with a framework agreement for industrialised multi-family housing. An interview based case study has been carried out in order to investigate public client requirements and experiences in the first SABO Kombohus framework agreement. Findings show that the clients in general are satisfied with the industrialised concept which is based on a high level of standardisation. The two main reasons why the clients have chosen to use the framework agreement are, first, that it is considered to be an affordable product with good quality and, second, that the public procurement process was performed in advance by SABO. Further, findings show that larger and more experienced public clients who are used to building in central city locations have higher requirements on the quality of the product, especially regarding the technical equipment, but also on the process including the design phase and after-sales market. The larger clients would also like the product to have more design flexibility. In contrast, the smaller and not so experienced clients do not wish to have high freedom of choice since when accepting the product as it is, it simplifies the building process substantially. However, the results indicate that if increased flexibility results in increased costs, the larger clients as well prefer a lower cost to increased flexibility, as long as the product is of good quality. The larger clients may not need a simplified building process but the fast process due to standardised methods is still appreciated. In addition, the interviewed clients are dissatisfied with the final stage of the delivery process, when all remaining issues and errors are taken care of as well as the guarantee period. This because it has been taking too long time for the contractor to correct small deficiencies and the contact during this period has not been satisfactory. Therefore, in order to increase client value, more focus on this phase is needed. Moreover, the clients wish to have a building that is nationally approved since having a building permit review in each municipality is considered to be unnecessary. A general conclusion is that clients are not only interested in the properties of the product, but also in an uncomplicated and efficient process. By focusing more on the process in a future framework agreement for industrialised multi-family housing, the client value should increase even more.

Key words: client value, multi-family housing, industrialised house building, framework agreement

Allmännyttiga bostadsbolags erfarenheter av industrialiserat bostadsbyggande

Ramavtalet för SABO Kombohus

Examensarbete inom Design and Construction Project Management

ANNIE HALLMAN

JOSEFINE HÄLL

Institutionen för Teknikens ekonomi och organisation

Avdelningen för Service Management

Chalmers tekniska högskola

SAMMANFATTNING

Utvecklingen av industrialiserat bostadsbyggande har främst drivits av entreprenörer och tillverkare och byggmetoden har inte fått stort genomslag inom bostadsbyggandet. Det finns en stor potential för beställare att vara en aktiv deltagare i eller till och med leda utvecklingen av industrialiserade bostadskoncept. Informationen och kunskapen om beställarnas krav är dock begränsad. Syftet med denna studie är att identifiera aspekter som påverkar beställarnas upplevda värde i samband med att de använder sig av ett ramavtal för ett industrialiserat koncepthus. En intervjubaserad fallstudie har genomförts för att undersöka beställares erfarenheter av det första ramavtalet för SABO Kombohus. Resultatet från studien visar att de intervjuade beställarna i allmänhet är nöjda med det industrialiserade koncepthuset i ramavtalet. De två främsta orsakerna till att beställarna har valt att nyttja ramavtalet är att produkten uppfattas vara prisvärd med bra kvalitet, samt att den offentliga upphandlingen redan var gjord i förväg av SABO. Vidare visar resultaten att större och mer erfarna beställare som är vana att bygga i innerstaden har högre krav på produkten, speciellt vad gäller kvaliteten på den tekniska utrustningen samt på processen, inklusive projektering och eftermarknad. Däremot föredrar de mindre och inte lika erfarna beställarna att ha mindre inflytande på produkten eftersom om produkten accepteras som den är, förenklas byggprocessen avsevärt. Dock tyder resultaten på att om en ökad flexibilitet medför en ökad kostnad, väljer även de större beställarna en lägre kostnad framför en ökad flexibilitet, så länge produkten är av god kvalitet. De intervjuade beställarna är framför allt missnöjda med hur överlämnandet av produkten har skett med alla återstående frågor och fel, samt med garantitiden. Enligt de intervjuade har det tagit alldeles för lång tid för entreprenören att åtgärda fel som upptäckts efter slutbesiktningen. Dessutom anser de att byggnaden borde kunna typgodkännas i hela landet, vilket skulle medföra att en bygglovsgransking i varje kommun skulle kunna undvikas. En generell slutsats av studien är att beställare inte bara är intresserade av produktens egenskaper, utan även av en enkel process. Genom att fokusera mer på hela byggprocessen i ett framtida ramavtal för industrialiserat koncepthus, borde kundvärdet öka ännu mer.

Nyckelord: kundvärde, koncept, flerbostadshus, industrialiserat bostadsbyggande, ramavtal

Contents

Glossary

English – Swedish

Application for review	Ansökan om överprövning
Award a contract based on a framework agreement	Avropa
Construction cost	Byggkostnad
Construction of new buildings/New construction	Nyproduktion
Cooperative rental dwelling	Kooperativ hyresrätt
Dwelling/Housing	Bostad
Exhaust and supply air ventilation with heat recovery	FTX-system
Framework agreement	Ramavtal
Local Building Committee	Byggnadsnämnd
Local Planning Authority	Stadsbyggnadskontor
Municipal special regulations	Kommunala särkrav
National Building Regulations	Boverkets Byggregler
Optional addition	Option/Tillval
Production cost	Produktionskostnad
Proprietorship	Äganderätt
Renewed tender	Förnyad konkurrensutsättning
Rental dwelling	Hyresrätt
Tenant-owned flat	Bostadsrätt
Tender	Anbud
Tenderer	Anbudsgivare
Tenure	Upplåtelseform
Value added tax, VAT	Mervärdesskatt

1 Introduction

In this chapter a background is presented, followed by the purpose of the master thesis, its limitations and thesis outline.

1.1 Background

The Swedish construction industry is a sector that, according to several investigations, needs to be developed in order to increase quality and productivity, as well as to reduce costs and construction errors (Josephson and Saukkoriipi, 2007; SOU, 2002:115). The criticism for high production costs for housing as well as quality deficiencies has caused construction companies to respond and put effort in order to improve their performance (Byggkostnadsforum, 2006). During the 1990s the construction of new residential dwellings was at a historically and internationally low level (Hedman, 2008). The production costs and prices increased radically in that time period and almost doubled for a dwelling in the cities (Byggkostnadsforum, 2006). At present, weak competition in the Swedish construction industry is seen as one of the main reasons for high prices of dwellings (Konkurrensverket, 2013). Partly due to the low level of new construction the demand for dwellings is currently high, especially rental dwellings (Boverket, 2013).

High production costs are generally seen as the main barrier to an increased construction of new buildings, especially in smaller and rural municipalities (Boverket, 2013). Other barriers, more common in urban growth areas, are lack of access to land with a detailed development plan and applications for review of detailed development plans (Boverket, 2011).

Industrialised house building has been frequently seen as a solution to achieve lower costs and higher quality in the construction industry (Svensson, 2014; Höök, 2008; Lind, 2007; Hamrebjörk, 2005). Historically, industrialised house building was technically focused with important dimensions such as mass production, standardisation and prefabrication resulting in buildings with similar appearances (Lessing, 2006). Modern industrialised house building does not imply that all buildings have the same design and functionality; instead the focus is on repetitive techniques and processes where the client and end users' preferences are taken into account (Svensson, 2014).

In Sweden, the development of industrialised multi-family housing concepts during the last decade has been challenging where several concepts have been unsuccessful and therefore were closed down (Malmgren, 2014). However, currently several Swedish industrialised multi-family housing concepts exist which are based on different degrees of flexibility, prefabrication and integration of supply chains (Svensson, 2014). The different degrees result in a variation of the customer's possibility to influence the product (Olofsson et al., 2012).

Olofsson et al. (2012) states that multi-family housing concepts can be more complex to build in metropolitan regions than rural regions due to that the detailed development plans in central locations have more requirements regarding the design, such as floor plans and technical solutions. According to Svensson (2014), requirements and regulations should be the same in the entire country and municipal special regulations should not be accepted, in order for all municipalities to be able to build industrialised concepts. In addition, the Swedish Government has come up with

a proposal of removing the municipal special regulations that are considered to increase the building costs (Tollesson, 2013).

An industrialised multi-family housing concept that has received much attention from politicians and in media is SABO Kombohus (SABO, 2013). In 2011 the Swedish Association of Public Housing Companies, SABO, presented a framework agreement for multi-family housing units (SABO, 2014b). The ambitions of the framework agreement were to increase the public housing companies', members of SABO, ability to build more rental dwellings, expose the local construction market to competition, increase the opportunity for price comparisons and decrease the cost for producing rental dwellings. Moreover, the framework agreement was developed to facilitate and simplify public procurement of smaller rental flats and to shorten the building process. The SABO Kombohus concept is a framework agreement with three contractors where the number one contractor is John Svensson Byggnadsfirma AB, JSB, with their product Trygga Boendet (SABO, 2011). The product is based on an industrialised process and standardisation. Through the use of a standardised product where the clients, in this case the public housing companies, hardly have any optional additions to choose between costs may be kept down. The idea of this product is to, through repetition, minimise or completely omit errors that occur in the design phase as well as the production phase.

Currently, approximately 2000 flats are being built with Trygga Boendet. This suggests that this concept together with the SABO Kombohus framework agreement represents a successful combination that meets the demands of many clients. Today another framework agreement developed by SABO, called SABO Kombohus Plus, with a renewed tender is also used and further another framework agreement is being developed, called SABO Kombohus Mini, which will be applicable in April 2015. However, this study focuses on the first framework agreement SABO Kombohus.

1.2 Purpose

The development of industrialised house building has foremost been led by contractors and manufactures and has not reached a breakthrough as an ordinary building method (Malmgren, 2014). According to Malmgren (2014) there is a great potential for clients to be an active participant and lead the development of industrialised house building. However, the research regarding client requirements in industrialised multi-family housing is limited.

The purpose of this study is to identify aspects that influence the client value associated with a framework agreement for industrialised multi-family housing. By investigating the clients' requirements and experiences from using the SABO Kombohus framework agreement, we may understand which aspects are important to improve in order to increase the demand for industrialised multi-family housing concepts.

To fulfil the purpose of this master thesis, the following research questions are addressed:

RQ 1) Which are the most important drivers and obstacles for clients to use a framework agreement for industrialised multi-family housing?

RQ 2) How do clients experience an industrialised multi-family housing concept?

RQ 3) Which aspects are important to consider when developing a framework agreement for industrialised housing?

1.3 Limitations

The focus of this master thesis is on industrialised house building of new rental flats, limited to SABO Kombohus which consists of the product Trygga Boendet. The empirical material in this thesis is based on ten interviews with public housing companies who are in the process of using SABO Kombohus framework agreement. The interviews result in an evaluation of the experiences from the use of SABO Kombohus framework agreement and provide relevant information in order to adjust and improve the concept. Focus is not on technical details. Furthermore, no interviews with the end users have been performed. The framework agreement is limited to clients who are members of SABO where the clients are public housing companies in Sweden who own and are responsible for building, operating and maintaining rental housing.

1.4 Thesis outline

The thesis consists of seven chapters. The first chapter consists of an introduction to the thesis, while the second and third chapter provide a frame of reference which covers previous research within the areas of the Swedish housing situation and industrialised house building. The fourth chapter describes the methodology which has been used in the master thesis. The fifth chapter consists of the results from the interviews and forms the basis of the discussion which is presented in chapter six. The last chapter concludes the master thesis and presents recommendations for SABO.

2 The Swedish housing situation

In this chapter the housing market in Sweden is presented followed by cost and rent, the role of public housing companies, the Public Procurement Act and lastly the Planning and Building Act.

2.1 The housing market

The housing market in Sweden constitutes of dwellings with different tenures: rental dwellings, tenant-owned flats, proprietorship, and cooperative rental dwellings (Boverket, 2014). In order to have a well-functioning housing market, the supply of dwellings needs to be in accordance with consumers' demand for different tenures (SOU 2012:88). According to Boverket (2013) a shortage of dwellings develops when there is a continuous demand for dwellings. Factors which influence the housing shortage are for instance whether it is a small town or large city, what sort of dwellings that exists and what types of customer there are. In larger cities, urbanisation is a common cause of shortage of dwellings while in smaller cities the cause can be that the existing dwellings are not suited for the demand, for instance an aging population which needs flats that meet accessibility regulations. Therefore, a shortage of dwellings does not necessarily indicate a need for new construction and due to that the demand of dwellings differs there can be both excess and shortage of dwellings at the same time.

Among the Swedish municipalities 43 percent report that there is a shortage of dwellings in the local housing market (Boverket, 2013). Of the municipalities who have reported a balance in the housing market, more than 54 percent have a shortage of dwellings in the city centre. In addition, the amount of municipalities that has indicated a shortage of rental dwellings has increased the last years and by now constitutes almost 85 percent of all municipalities in Sweden, see Figure 1. That amount also includes the municipalities which have a balance in the total amount of dwellings but still have a shortage in rental dwellings. In the municipalities where there is a shortage of rental dwellings, 95 percent have plans for construction of new buildings. Still, the majority estimate that the need is greater than the amount of construction planned for. According to the municipalities, small flats such as studio flats and one-bedroom flats represent the highest shortage of rental dwellings. An increase has also been noticed in the shortage of two-bedroom flats.

According to 80 percent of the municipalities, the primary reason to why not more dwellings are being built is the high production costs, while 27 percent consider applications for review of detailed development plans as a barrier (Boverket, 2013). Moreover, smaller municipalities claim that there are problems for clients to receive housing finance. Other barriers are the lack of access to land with a detailed development plan and the legislation regarding detailed development plans (Dymén et al., 2012).

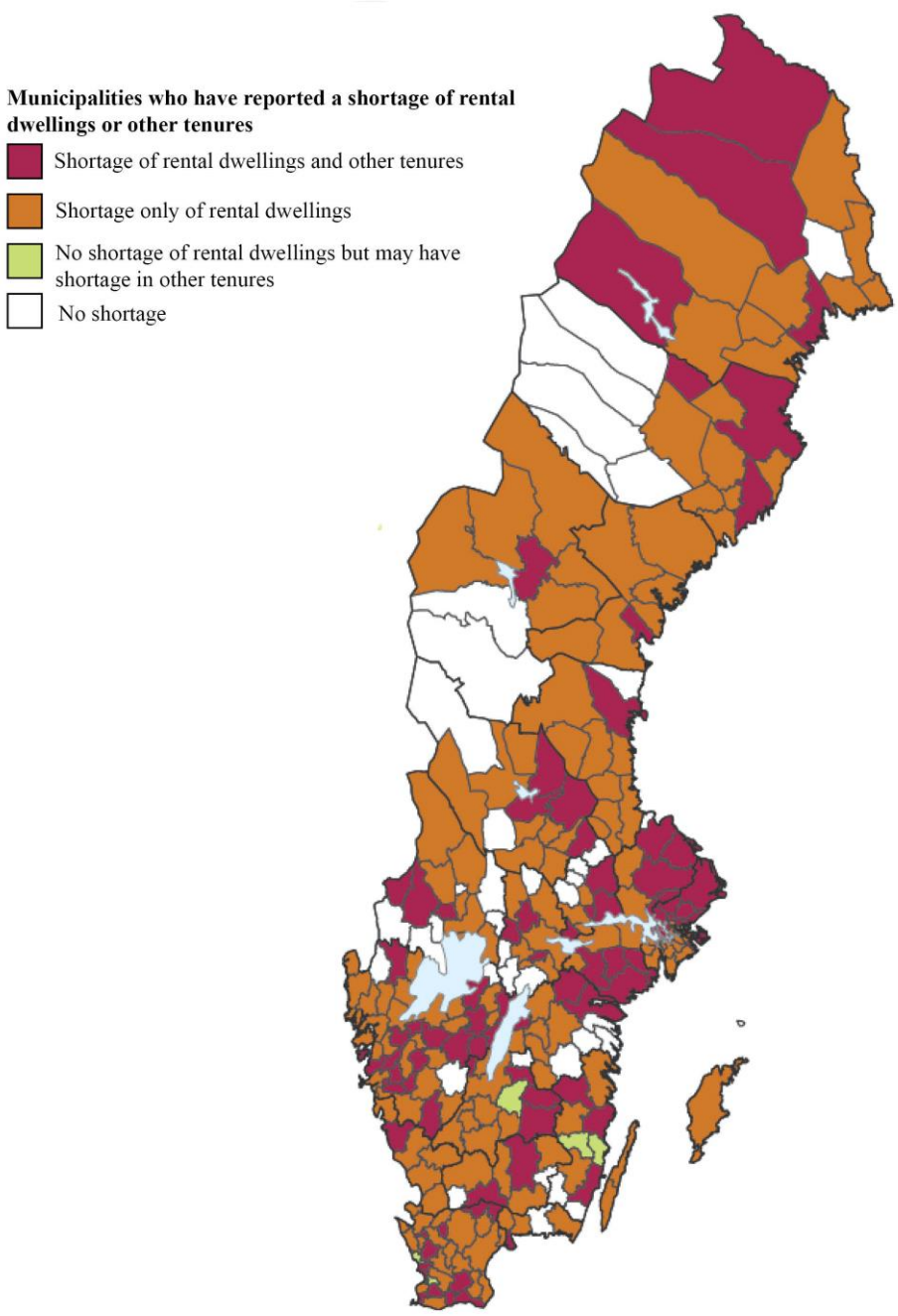

Figure 1: The housing shortage in Swedish municipalities (Boverket, 2014).

In order to manage an active housing policy the municipalities can through land allocation agreements steer the residential building in a desired direction (Boverket, 2013). For instance they have a high influence regarding what form of tenure that should be used and what size the dwellings should have. In addition, the municipalities can use their public housing companies as a tool for affecting the

housing market. In 2013, the public housing companies owned 55 percent of all rental dwellings in Sweden and in Stockholm approximately 90 percent of all rental dwellings are owned by the public housing companies. The number of municipalities who perceive that more dwellings need to be built in addition to what is being built today has increased by 50 percent during the last ten years. 80 percent of the municipalities argue that the primary reason why not more dwellings are being built is the high production costs, while 27 percent consider applications for review of detailed development plans as a barrier.

2.2 Cost and rent

High production costs for housing is a hot topic in the political discussion in Sweden approximately every fifteen years (Lind, 2007). Total production cost is the sum of construction costs, client costs and value added tax (VAT) where the client costs includes for instance land costs, administrative fees and consultancy costs (Brendinger et al., 2010). An example of the allocations of costs in a rental flat is illustrated in Figure 2 where the production cost only represents the capital costs in the left bar. The total production cost can vary depending on the location, ranging from smaller regions to metropolitan regions (Warsame, 2006). Land costs may reach half of the total production cost in the centre of Stockholm, while in smaller municipalities the amount is much less (Häggroth, 2011).

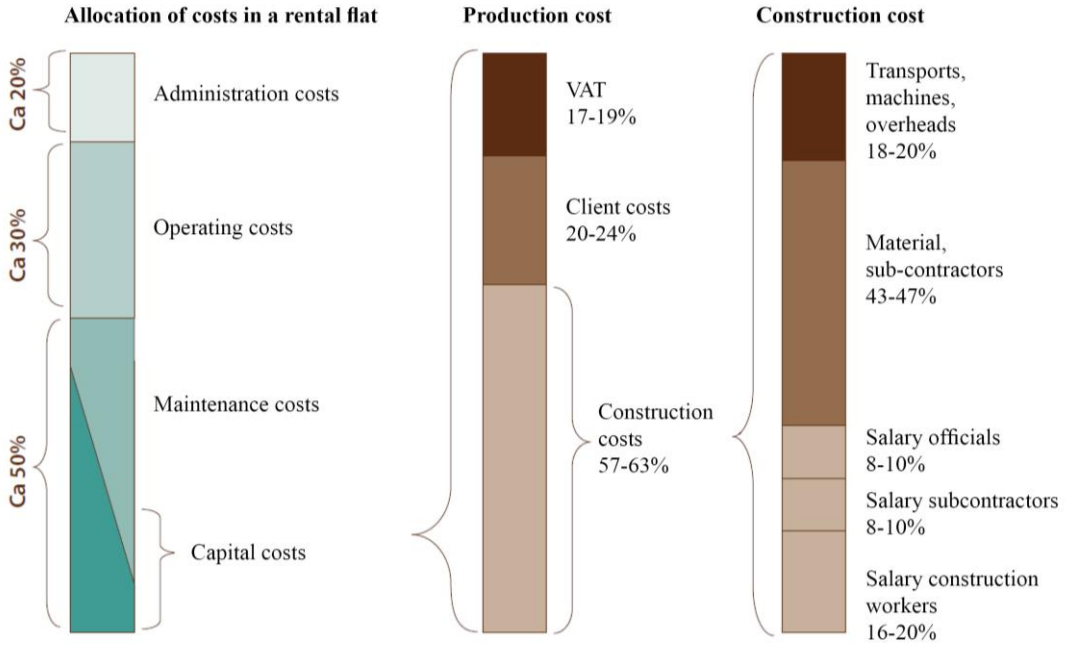

Figure 2: Cost allocation in a rental flat (based on Brendinger et al., 2010).

When comparing costs between different projects, it is not the production cost that is measured and compared, rather the price that the customer actually pays for the product (Boverket, 2011:19). This price includes not only the costs but also the profit margins of the different contractors. Therefore, it is important to make a distinction between the price and the cost. The price reflects the supply and demand, and is determined by the construction cost and the contractor's profit margins (Lind, 2007).

High prices are often associated with lack of competition while high costs for the contractor often relate to low efficiency (Nybyggarkommissionen, 2014). Eurostat, the statistical authority of the European Union, EU, indicates that the construction prices in Sweden are high in relation to the average in the EU (Eurostat, 2011). However, it is important to consider that the building codes differ between the members of EU resulting in different costs in each country that are hard to compare (Nybyggarkommissionen, 2014). SABO is concerned about the construction prices being much higher in Sweden compared to Finland where the amount of dwellings being built is almost twice as many per thousand residents (Eliasson, 2012). However, in Finland the competition in construction is higher due to the proximity to the eastern European countries, indicating that higher competition results in lower prices.

In a report, recently published by the Swedish Competition Authority, it is concluded that the low volume of construction of new housing together with low competition have resulted in an extremely quick increase of production costs (Konkurrensverket, 2013). However, the reasons for increased production costs are several and complex (Capano and Karshenas, 2003). Findings show that labour equipment, market conditions, taxes and government action affect the production cost. Further, the production cost depends on a cluster of factors which are related to the project and project team as well as to the market conditions (Chan and Park, 2005). Warsame (2006) claims that factors which affect the construction cost (notice that the land cost is not included), which in turn affects the total production cost, can be divided into four groups; project-specific, client-contractor relationship, competition and market conditions, and macroeconomic and political, see Table 1.

Table 1: Four groups of factors influencing construction costs (Warsame, 2006).

1. Project-specific factors	- Project size - Project complexity - Quality
2. Client and contractor-related factors	- Contractor type * - Client type ** - Procurement method - Contractor-client relationship
3. Competition and Market conditions	- Level of competition - Level of construction activity
4. Macroeconomic and political factors	- Inflation and interest rate - General labour market rules and other government regulations

* Large, medium or small
** For example public or private

Further, Lind (2007) asserts that higher standard and improved quality in housing could be the cause of higher construction costs and can be connected to the project-specific group which is presented in the table above. Higher accessibility requirements or technical systems could be other causes for higher construction costs in recent years. Further, Warsame (2006) claims that inflation and interest rate have

an impact on construction costs though the impact is national and not related to a specific region.

The connection between production costs and rental costs is often taken for granted (Lind, 2007). However, the connection is complex and according to Bejrum et al. (2004) no unequivocal link exists when the rent is based on a non-profit principle. A public housing company may set the rent based on non-profit principle consisting of capital costs, operating costs and maintenance costs (Lind, 2007). If the quality of the product is low due to a low production cost the effect may be high operating and maintenance costs and thereby higher rent, which implies that low production costs do not necessary equal low rent. Generally, companies who base the rent on non-profit principles can have different rents even though they have the same production cost. This is because several factors influence the rent, ranging from required return on the investment and depreciation time. Therefore, Lind (2007) further emphasises that the production cost only represents one part of setting the rent, see Figure 2.

2.3 The role of public housing companies

The public housing companies in Sweden were established by municipalities in the 1940s with the aim to satisfy the need for housing for families with many children (SOU 2008:38). The companies have, since the origin, been an important part of the Swedish welfare society with the mission to provide rental housing for everyone, regardless of income, background, age and family situation, at affordable cost (Borg and Lind, 2006). Sweden has been unique in Europe, since the public housing companies have built housing for everyone and not only for the less fortunate inhabitants, in other countries called social housing (SOU, 2008:38). However, the role of the public housing companies in Sweden changed when the new Public Housing Act (SFS 2010:879) replaced the earlier Act (SFS 2002:102). The public housing companies shall now combine their social responsibility with a commercial and business-like approach in order to equate the competition between private and public housing companies.

Each municipality has a responsibility to create conditions so that all citizens can have the possibility to live in an acceptable housing (SKL and SABO, 2011). Many municipalities assume their responsibility by owning public housing companies. Therefore, it is vital for the municipality to clearly present what requirements and expectations it has on the public housing company, which is done in the owner directives. Due to the new Public Housing Act several old owner directives will have to be changed and adapted to current conditions. The public housing companies shall procure according to the Swedish Public Procurement Act (SFS 2007:1091), further described in the next section.

2.4 The Public Procurement Act

Directives from the European Union regulate how public procurement is performed within the member countries (Konkurrensverket, 2012). Sweden has as a consequence ratified the Public Procurement Act (SFS 2007:1091), which is mainly based on EU directive 2004/18/EG. The purpose of the Public Procurement Act is that the procuring public authorities should be able to use resources as efficient as possible (Konkurrensverket, 2012). The public authority needs to follow the minimum time

limits for submission of tenders which are described in the Public Procurement Act (SFS 2007:1091). The Public Procurement Act (SFS 2007:1091) further includes instructions of how to perform a tender evaluation. There are two alternative grounds for the award of contracts when public authorities procure products, services or works. The contracting authority should either select the tender which is the most economically advantageous, or the tender that has the lowest price. When basing the evaluation on the most economically advantageous tender, the authority shall take into account only criteria that are related the contract. The criteria can include price, environmental aspects, time, quality, and aesthetic appearance.

When evaluating the contract based on the lowest price, the contracting authority must specify compulsory requirements that each of the tenderer has to fulfil in order to be included in the process for awarding the contract. The public authority should already in the contract documents decide which evaluation approach and criteria that will be applied. According to 16 chap. 6 § in the Public Procurement Act (SFS 2007:1091), a supplier can apply for review in the Administrative court during an on-going procurement if the supplier considers that the contracting authority has violated the law, and this has simultaneously resulted or may result in harm for the supplier. If the Administrative court discovers that a violation of the Public Procurement Act has occurred, they can decide that the public procurement should be corrected or be performed once again.

According to the Public Procurement Act (SFS 2007:1091), a framework agreement is an agreement between one or several contracting authorities and one or several suppliers, where terms in the agreement have been established in order to facilitate for the client to award a contract based on the framework agreement during a given time period (Konkurrensverket, 2014). A framework agreement can comprise products, services or public works and be valid for a maximum of four years. The framework agreement may run for more than four years only if there are special reasons.

A framework agreement can be established with a single supplier or with several suppliers. When the framework agreement is with a single supplier, the conditions of a contract should be in accordance with the established terms. A framework agreement with several suppliers, at least three, can either be without renewed invitation to submit tenders or with a renewed invitation to submit tenders, depending on if all the terms are stated in the framework agreement. If all the terms are stated in the framework agreement, the contract should be awarded to the supplier with the best tender, on the basis of the conditions in the framework agreement. If this supplier is not willing to undertake the contract, the next supplier in the ranking order may be awarded the contract. If all the terms are not stated in the framework agreement, all suppliers should be invited to a renewed tender once again corresponding to the conditions in the framework agreement.

2.5 The Planning and Building Act

The Swedish Planning and Building Act contains provisions on the planning of land, water areas and built environment (SFS 2010:900). Each municipality must have a comprehensive plan which comprises plans for the entire municipality and detailed development plans which regulates the use of land in limited parts of the municipality (Boverket, 2006). The aim of a detailed development plan is to specify how the land within a specific area, ranging from districts to detached properties, should be used

and also to some requirements for how buildings should be designed. These requirements may go further than the Swedish Building Regulations. When proposals for detailed development plans are prepared the municipality shall consult with different stakeholders. The purpose is to gather information and opinions regarding the particular area and provide a possibility for the involved stakeholders to affect the plans. The stakeholders can for instance be authorities, property owners, interest groups and residents. The consultation should be initiated early in the planning process before the proposal is too fixed.

The content in the comprehensive plan cannot be applied for review since it is not legally binding. However, according to 10 chap. 1 § in the Local Government Act (SFS 1991:900) all citizens have the possibility to apply for review of the decision to adopt or change the comprehensive plan. A municipality's decision to adopt a detailed development plan can be applied for review by someone who is affected by the plan and has earlier during the exhibitions period of the detailed development submitted written comments which have not been taken into account (SFS, 2010:900).

According to the Swedish Planning and Building Act, a building permit is needed for construction of new buildings and refurbishment of existing buildings (SFS 2010:900). When a client applies for the building permit in the municipality where they will build, the local Building Committee investigates if the project fulfils the requirements in the detailed development plan and the Swedish Building Regulations. A building permit may be granted for measures involving minor deviations from the detailed development plan or comprehensive plan as long as the deviations are consistent with the aim of the plan (Boverket, 2006). Still, clients prefer to avoid deviations due to that it often results in applications for review among external stakeholders, which in turn will extend the process and thereby will be expensive for the client (Olofsson et al., 2012).

Application for review of detailed development plans, lack of access to land with a detailed development plan and high production costs are seen as the main barriers to why not more dwellings are being built (Boverket, 2013). The legislation regarding the detailed development plan is further seen as a barrier where the time seems to affect the high costs (Dymén et al., 2012). However, several factors influence the high productions costs. To be able to cut the costs and produce more dwellings, industrialised house building has been discussed as a solution.

3 Industrialised house building

In this chapter the frame of reference within the field of industrialised house building is presented. This chapter is divided into six sub chapters, elements of industrialised house building, historical background, industrialised process, models of different degrees of customer involvement, research on drivers and expectations and lastly implications for this thesis.

3.1 Elements of industrialised house building

There are many definitions of the building method industrialised house building. One that is used in several Swedish reports is ”Industrialised house building is a thoroughly developed building process with a well-suited organization for efficient management, preparation and control of the included activities, flows and results for which highly developed components are used in order to create maximum customer value” (Lessing, 2006).

For many years three main elements have characterised industrialised house building: standardisation, prefabrication and system building (Gann, 1996). Standardisation can be described as using technical systems and components that are standardised which together form a unique product (Gibb, 1999). Also processes and working methods can be standardised. Prefabrication means that components are produced in a factory and assembled on site with the aim to reduce costs and to improve quality (Gann, 1996). System building was introduced in the middle of the twentieth century and involved prefabricated components to a more extensive use than earlier and included systematisation of processes and closer relations with manufactures. According to Gann (1996), the end user or client had hardly any possibilities to influence the design, floor plan or materials of the houses.

Currently, clients are no longer satisfied with the mass production principles and instead require a high degree of choice in housing design (Veenstra et al., 2006). This has led to an interest in industrialised house building for finding a balance between standardisation and a variation in products (Gibb, 1999), by taking the advantages of mass production volumes and the single-unit adjustments options, called mass customisation (Gerth, 2008). Mass customisation is a strategy based on mass production principles, through producing products that meet the particular customer’s requirements by using modules (Barlow et al., 2003).

A module means that standardised components together form a unique composition (Lessing, 2006). By assembling several modules a complete and unique product can be formed. Jansson et al. (2013) further states that the use of platforms is a central element of industrialised house building in order to achieve shorter lead times, product variety, high quality delivery and to respond to market needs. A product platform is described by Meyer and Lehnerd (1997) as “a set of common components, modules, or parts from which a stream of derivative products can be efficiently developed and launched”.

Industrialised house building has been described as consisting of eight interdependent areas (Lessing, 2006):

- Planning and control of the processes
- Developed technical systems

- Off-site manufacture of building parts
- Long-term relations between participants
- Logistics integrated in the building process
- Customer focus
- Use of information and communication technology
- Systematic performance measurement and re-use of experience

The eight areas form the basis of industrialised house building and are intended to represent a comprehensive description (Lessing, 2006). The contemporary idea of industrialised house building is that continuous development of processes and technology should be in focus instead of uniqueness in each project. Moreover, to guarantee that the right products are manufactured to right quality and price, a customer focus is important in industrialised house building.

3.2 Historical background

Industrialised house building is inspired by ideas from the manufacturing industry, producing buildings in factories (Barlow et al., 2003; Gann, 1996). The idea to produce buildings in factories has attracted the interest of many construction companies ever since Henry Ford developed the standard production line (Gann, 1996). The main advantages with producing buildings in a factory in comparison with on-site are according to Gann (1996) economies of scale, technical opportunities to develop capital equipment and moreover the possibility to control the processes. Economies of scale is when greater volumes are produced, so called mass production, resulting in a lower cost per unit. However, Gibb (1999) states that "houses are not cars; maximum standardization is not always the answer" and according to Winch (2003) mass production is not, and never was, suitable for house building. Still, lessons can be learned from history, for instance that many clients are interested in value for money and in the end product but hardly ever interested in the process (Gibb, 1999).

In Japan, industrialised house building has been successful inspired by ideas from the Toyota car production (Björnfot, 2006). Production strategies like Lean, Agile and mass customisation are used in order to increase efficiency (Barlow et al., 2003; Gann, 1996). British researchers have investigated the production strategies in Japan with the aim to gain knowledge and thereby be able to use them to increase the efficiency in the United Kingdom (Barlow et al., 2003). Further, prefabricated building systems have been important in Hong Kong, especially for the public housing companies (Jaillon and Poon, 2009).

In Sweden, industrialised house building was first introduced in the beginning of the 1960s when the Swedish Government introduced a system for housing finance, aiming to work as an incentive especially for the public housing companies (Olofsson et al., 2012). The programme, in Sweden called Miljonprogrammet (the Million Homes Programme), was initiated to increase the volume of multi-family housing with an aim to build 100 000 flats per year during a ten years period (Adler, 2005). Industrialised house building was characterised by mass production with large series, standardisation, and limited optional additions for the client as well as the end user (Lessing, 2006).

The fast, large-scale, and technical rationalised construction has been criticised for monotonous design and technical defects (Hedman, 2008). Moreover, many neighbourhoods from the programme have been associated with social problems (Blomé, 2011). Thus, what should be done with the Million Homes Programme has often been discussed, with opinions ranging from extensive refurbishment to demolishing the buildings (Forskningsrådet, 2012). The criticism of the Million Homes Programme has affected the general view of industrialised house building which is currently often associated with prefabrication of concrete elements and monotonous design where deviations are almost impossible (Johnsson, 2012; Olofsson et al., 2012). To compare the Million Homes Programme with current industrialised house building is according to Brendinger et al. (2010) however hardly feasible since the customers are much more in focus today.

During the last 50 years, several manufactures of detached houses have been successful in producing, so called "Catalogue Houses" (Lind, 2011). These houses are based on industrialised processes with elements or modules with a high degree of prefabrication. When it comes to large multi-family house building concepts, the success rate has been more variable. Several Swedish models have been developed in recent years but two of the most important ones have been closed down (Malmgren, 2014). For instance, a large scale project, called NCC Komplett closed after just one year in production (Wallin, 2008). NCC Komplett was an industrialised multi-family housing concept based on large elements in steel and concrete produced in a large factory. Another similar, slightly more flexible, large-scale project which failed was Open House. According to Lind (2011) an explanation to the failures can be that the large-scale projects were developed during a short time period without a direct contact with the customer.

However, several other industrialised concepts have been successful. One of them is developed by Lindbäcks Bygg, a company that builds two to six storeys multi-family housing, based on a building system with components of wood (Lindbäcks, 2014). The production takes place in a factory and constitute of volume elements with a high degree of prefabrication. Moreover, other successful industrialised concepts are Skanska and Ikea's collaboration Bo Klok, and NCC's building system P303 (Svensson, 2014). These concepts are based on standardisation where the client has a low degree of influence on the end product (Olofsson et al., 2012). Factors which may have influenced the success of several of the concepts are the gradual development of the concepts over many years, as well as the small scale (Dahlquist, 2010).

In Denmark, a public client organisation called KAB has developed a series of framework agreements for industrialised low cost housing for rent (Kadefors et al., 2013). The series is named AlmenBolig+ and the purpose is to offer housing, in the Copenhagen area, at a low cost for middle-income families. To be able to cut the costs and reduce the rents in the framework agreement, three methods have been used. First, industrialised house building with prefabricated elements were used. Second, the technical maintenance in building was done by the tenants. Third, the flats contained the essential functions, such as one bathroom, one kitchen and balcony or terraces. So far, four framework agreements exist and the scale is about 2000 flats. Through the use of the four framework agreements, client experiences and requirements have lately achieved more focus and attention where the architecture has been valued as an important aspect.

3.3 Industrialised processes

The traditional house building process is characterised by uniqueness where each project is planned, designed and manufactured individually (Olofsson et al., 2012; Lessing, 2006; Winch, 2003). To carry out the planning and design process for each project, even if the projects are similar, requires extensive resources (Svanerudh, 1998). In contrast, the industrialised house building process is based on continuity and is developed in a way where experiences, knowledge and technical solutions from projects can be re-used (Lessing, 2006). Instead of focusing on each project, the emphasis is on processes which are continuously evaluated and improved (Malmgren, 2014). The process for industrialised house building, with the interaction between development of general platforms and building projects, is illustrated in Figure 3. The technical systems are developed in a separate technical development platform in order to establish an effective process with limited defects (Lessing, 2006). Modules from the technical platforms can be used when designing unique buildings. Experiences and solutions from the design and production can be stored in the platforms and reused later on in other projects (Jansson et al., 2013). A process platform can contain tools for structured design, customer information and logistic (Lessing, 2006).

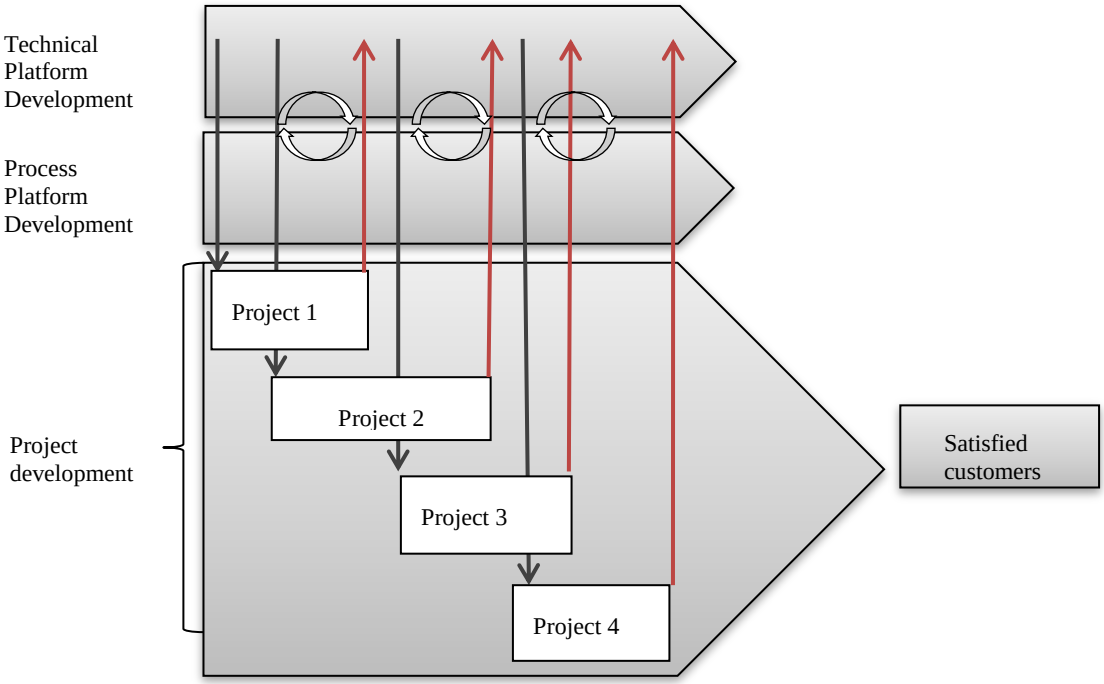

Figure 3: A model for an industrialised house building process where the platforms are continuously developed and connected to each project (based on Lessing 2006).

3.4 Models of different degrees of customer involvement

The production process may also be classified according to when the customer enters the process (Jansson et al., 2013). Winch (2003) has developed a model consisting of four strategies which are called Concept-to-Order, Design-to-Order, Make-to-Order and Make-to-Forecast, see Figure 4. These strategies are suitable for different

projects, from projects initiated with conceptual ideas from the client to products based on a forecasted demand.

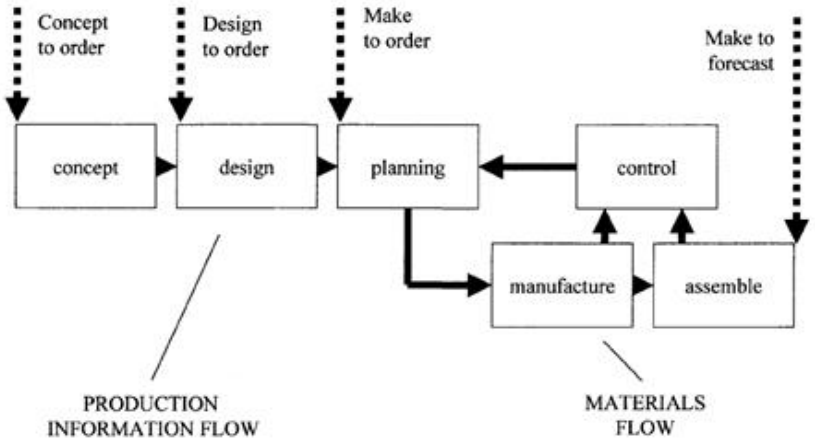

Figure 4: Production strategies (Winch, 2003).

The four strategies are characterised by:

Concept-to-Order

The customer enters the process at the start of the information flow with ideas that are translated into a conceptual design. The process is driven by specific customer orders.

Design-to-Order

The company has a basic product concept, but each product is still designed for the particular customer and the customer receives a large degree of choice. This enables the customer to customise the final product.

Make-to-Order

The company has a detailed design of the product or a product family and the process starts when the customer places the order. The product can be configured to suit the customer's requirements, within specific frameworks. This strategy is a critical enabler of mass customisation.

Make-to-Forecast

The company produces the product without having an agreement with a particular customer and the product is sold during or after the manufacturing. Customers can choose which alternative of the completed house they prefer based on price, location, design and size.

Winch (2003) claims that the traditional production of buildings is based on the strategy Concept-to-Order. The most suitable strategy for construction depends on the kind of product, for instance single-family houses or multi-family houses, but Winch (2003) further states that industrialised house building should move towards the Design-to-Order or Make-to-Order, offering modularised solutions, which can fulfil the customer's needs and requirements. Häkkinen et al. (2007) argues that industrialised products must be developed and configured in the Make-to-Order strategy. In addition, Barlow et al. (2003) stress that when the customer enters the process from start, as in Concept-to-Order there is no risk for stock obsolescence.

However, long lead times and high costs can be major disadvantages in comparison to when the customer enters the process later, as in Make-to-Order or Make-to-Forecast.

Olofsson et al. (2012) presents another model that contains four categories based on the degree of standardisation, see Figure 5. This model is similar to Winch's model since the categories are classified by the client involvement.

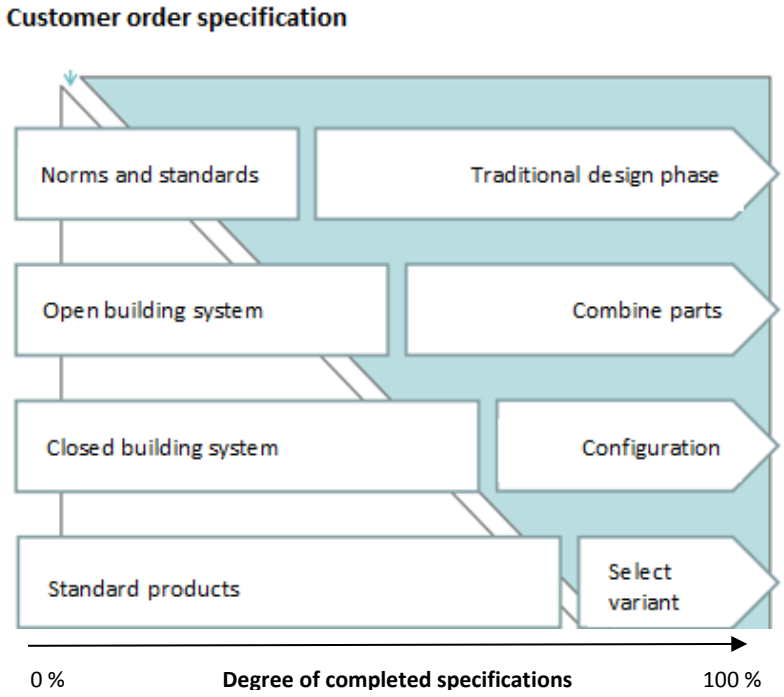

Figure 5: Five categories according to the standardisation (based on Olofsson et al., 2012).

In the paragraphs below the four categories are described according to Olofsson et al. (2012) and connected to Winch's four strategies.

Norms and standards

In a traditional project the product is fully adapted to the customer's requirements within the context of standards and norms from for instance the National Building Regulations and Eurocodes. In this category it is the customer who steers the design and type of contract form. This category can be related to Winch (2003) strategy Concept-to-Order since both of them are driven by specific customer orders.

Open building system

An open building system contains building parts and components which can be combined from independent producers and in accordance to customer preferences. This category is similar to the Design-to-Order strategy, where the customer still has a large degree of choice.

Closed building system

In a closed building system the customer has less influence over the product since the components are standardised to a high degree in modules. Hence, the category has

many similarities with the Make-to-Order strategy in the way that the product can be configured to customer requirements but only within specific frameworks.

Standard products

In a standardised product, few choices are offered to the customer. Instead the customer has to select what product variant they prefer to use. A product that is 100 per cent pre-developed needs to find its customers on the open market. The design phase is done in advance with all construction documents prepared. The different product variants can comprise number of floors, balcony and entrance position, type of foundation, and exterior and interior colour. Through the use of standardised products, defects can be avoided because the same product is used many times (Veenstra et al., 2006). Wallin (2008) further emphasises that the lowest price can be attained by choosing standardised products. Once the customer starts to add several options, which are not in the standard product, it usually becomes more expensive (Wallin, 2008). This category has some similarities with the Make-to-Forecast strategy in a way that the customer can choose which product variant that suits best. A difference may be that the products in this category are not produced without a particular customer, while in the Make-to-Forecast strategy a company can produce the product without an agreement with a customer.

3.5 Research on client drivers and expectations

Several researches have claimed that satisfying the client, by taking the client preferences into account, is important (Veenstra et al., 2006; Ozaki, 2002). In a production perspective it would be of advantage to focus on mass produced products with no respect to the client (Olofsson et al., 2012). However, in the house building industry the client demand for variation in design is increasing (Hofman et al., 2006). This demand has put pressure on many construction companies to offer products varieties which is in accordance with client expectations and requirements (Halman et al., 2008; Veenstra et al., 2006). To find a balance in housing design between flexibility and standardisation seems to be a challenge, but modularisation and platforms are useful for construction companies in order to achieve a more unique product (Johnsson et al., 2013).

Clients have different drivers for initiating projects and thereby different requirements (Gibb and Isack, 2001). One of the main drivers for clients in a project is value for money, although the term can have different meanings: Lowest whole-life cost, lowest cost at a given quality, satisfied end users, highest quality at a given cost and reliable quality. In a study, made by Gibb and Isack (2001), clients ranked lowest whole-life cost as the highest driver when initiating projects. However, some clients in the study emphasised that finishing on time is a more important driver than a lowest whole-life cost. In projects, where the building parts are pre-assembled off-site, the main drivers for clients are shorter project time, better quality and reduced total production cost (Gibb and Isack, 2003). Many clients also seem to be comfortable with pre-assembled buildings from standardised components as long as they can impact the housing design (Gibb, 1999).

According to Gibb and Isack (2001), many clients have identified benefits with using standardised processes, products and components. The perceived benefits from using standardised processes are particularly connected to costs. Standardised products and components on the other hand are linked to lower cost, dependable quality and

operational benefits since clients and end users know how to use the components and how the end product will look like (Gibb and Isack, 2001). All these benefits with standardisation can be related to the driver value for money.

Many clients who choose to use a standardised multi-family housing concept are starting to accept the limitations of influencing the product and realise that the choices regard for instance exterior colour (Wallin, 2008). Engström and Claeson-Jonsson (2005) emphasise that the house building industry must create concepts that are perceived as quality homes, including details, material and floor plans in order to have satisfied clients. The concepts must also fit into a specific context with the variation of detailed development plans, target group, and location with its surroundings. However, results from a study by Barlow and Ozaki (2003) showed that client satisfaction in the speculative house building sector are not only dependent on how much the client can influence the product and the product quality and price, but also the quality of the service provided by the contractor before and after the production phase has an important role. By good service, the client refers to the contractor's ability to correct defects, meet deadlines, be helpful, and moreover how the condition of the flat is in when moving-in.

The contractors' capacity to offer the client what they want by having a combination of standardised and customised elements in the product is also important in order to satisfy the client (Ozaki, 2002). Results from a study by Hofman et al. (2006) showed that buyers of single-family houses rated the interior design as the most important aspect of housing design. In addition attributes as type of kitchen, sanitary facilities, tiling, floor finish and interior walls were also considered to be of high importance (Hofman et al., 2006). Thus, to offer the client a range of choices in house types, floor plans, and exterior and interior materials seem to make new housing more attractive (Ozaki, 2002). However, despite that clients prefer to have the opportunity to choose between different choices, an increase in cost due to the flexibility is not perceived as acceptable (Hofman et al., 2006).

3.6 Implications for this thesis

Several authors claim that industrialised multi-family housing concepts are the solution for the housing shortage. However, several large-scale industrialised concepts in Sweden have failed, and this may partly be due to a lack of direct contact with the client. The client focus is, according to several authors, one of the most important elements to consider. The degrees of flexibility differ among the existing concepts and generally when a concept becomes more standardised the client's impact decreases. Several authors claim that by making a concept more standardised the cost generally decreases too. However, it is important to be aware of that in later years construction companies have developed industrialised concepts, based on platforms and modules, that can be used in order to create more unique products which are more adaptable to suit client requirements but still keep the costs down.

One of the main drivers for clients to initiate projects is to achieve value for money. The meaning of value for money differs among clients, but in a study the highest ranked meaning was a low whole-life cost for the product. However, literature regarding client drivers and expectations in multi-family housing for rent has been difficult to find, especially in other countries where it is most often called social housing and limited to households with special needs. Nevertheless, the client has an

important role in rental housing and will most likely consider value for money as a significant driver when initiating projects. Foreign studies have shown that private buyers of housing find not only quality and price to be important, but also the contractor's service before and after the production phase. When it comes to clients who build rental housing, this is probably essential for them as well.

Other findings have shown that private buyers of houses find the interior design to be the most important aspect when it comes to housing design. Still, higher flexibility often implies higher costs and the buyers tend to choose lower flexibility above an increased cost. The requirements of a professional client and owner of residential property could somewhat differ from those of a private buyer or end user but also clients that build rental housing would most likely want to build dwellings that the tenants are satisfied with. At the same time, the client probably has a more long term perspective, considering operating costs in relation to other parts of their property and also costs that occur as tenants move.

4 Empirical methodology

In this chapter the selection of method is described, followed by literature study, selection of cases and interview study.

4.1 Selection of method

A qualitative research method has been chosen for this master thesis and includes an empirical study with a selection of cases and interviewees, aiming to investigate the acceptance of SABO Kombohus framework agreement. The research method in this thesis consists of an inductive view where observations and results form the basis of the choice of theory (Bryman, 2011). A deductive view is based on one or more hypotheses that will be empirical examined. In this case a theory has not been found in the subject of the purpose, which is why there is no hypothesis in this report. Therefore, an inductive view permeates the study. The collection of data in this thesis comprised primary data from interviews and secondary data from literature such as previous work of other researches within the research field.

4.2 Literature study

To be able to fulfil the purpose of this thesis, it is important to be familiar with the field of research (Bryman, 2011). Therefore, a literature study was conducted before the interviews. Scientific articles, books and reports within the area of the housing market, legislation, industrialised house building and customer satisfaction were covered. In order to ask relevant interview questions and be able to analyse the data, scientific methodology have been studied in advance. Furthermore, the gathering of relevant literature has been an on-going process during the whole thesis.

4.3 Selection of cases

The selected cases comprised ten public housing companies who have built or planned to build Trygga Boendet. One public housing company was chosen as the first project to visit due to their geographic location and that Trygga Boendet was completed, in other words there was an opportunity to visit the houses. The selection of the remaining cases was based on their sizes, how many flats they had built/planned to build, experience in new construction, and the geographical location. The selected public housing companies are listed below, but the names of the interviewees are kept anonymous.

- Båstadhem AB
- Bjuvsbostäder
- Hebygårdar
- Håbohus
- Karlshamnsbostäder
- Strömstadsbyggen
- TrelleborgsHem
- Uppsalahem
- Lunds Kommuns Fastighets AB (LKF)

- Halmstads Fastighets AB (HFAB)

4.4 Interview study

In qualitative research, interviews are common to use in order to collect data. Qualitative interviews put emphasis on the interviewee's own opinions, experiences and views, compared to quantitative interviews where numbers are more important than words (Bryman, 2011). A semi-structured interview strategy was used, since it allows the interviewer to ask new questions based on the interviewee's answer (Silverman, 2008). Moreover, in semi-structured interviews the interviewees have the opportunity and freedom to formulate the answers in their own way (Bryman, 2011).

The interview questions were formulated, prepared and structured before the first interview, with help from Petter Jurdell, Head of Property Development at SABO. The questions were divided into different categories in an interview guide and contained opening questions, key questions and closing questions (Dawson, 2002). This in order to receive a structured interview that was easy to follow both for the interviewer and the interviewee (Hennink et al., 2011). The guides, written in Swedish, are found in Appendix I and II.

The selection of interviewees is an important task since the choice becomes a crucial part for the result. By making a wrong selection, the result of investigation can differ from the purpose and research questions of the study (Holme and Solvang, 1997). The interview study started with a pilot interview with one of the local housing companies. According to Hennink et al. (2011) a pilot interview is of advantage since it creates an opportunity to observe how the interviewee interpreted the questions. Furthermore, it also gives the interviewers a chance to practise and prepare for the following interviews. The pilot interview is also included in the final findings although some additional information was gathered afterwards through emails. The pilot interview was performed with two employees, the CEO and the Property Manager. Both had valuable suggestions and discussions between them came up during the interview. It takes more time to perform a group interview, but the discussion between the interviewees should be considered as valuable. The pilot interview lasted approximately one hour. After the pilot interview, the interview guide was evaluated and revised in order to make it better and more suitable for the remaining interviews.

The remaining interviews were, as far as possible, held with the CEO, Project Manager and Property Manager of each selected case. The interviewees in each company were selected based on their experience and knowledge regarding Trygga Boendet. In total, 10 interviews were conducted between February and April 2014. Each interview at the companies was approximately one hour long and was conducted by the authors, one who was responsible for asking questions, and one who observed, asked additional questions and took notes. The interviewees were asked if they wanted to be anonymous and all interviews were recorded, to ensure that all data was collected. All interviews were carried out in Swedish and the interviewees had the possibility to read the results and comment. In addition, attempts to do an interview with the contractor JSB have been done without success but JSB has been answering questions by email.

The analysis of data from the interviews was based on grounded theory, which is connected to a qualitative study (Bryman, 2011). The data from the interviews were collected, transcribed, coded and analysed through an iterative process.

5 Research findings

In this chapter, backgrounds to the SABO Kombohus framework agreement and the product Trygga Boendet are presented followed by a presentation of each public housing company. Thereafter, the findings are structured in themes based on the headlines from the interview guide, seen in Appendix I and II, and present the most important results from the interviews.

5.1 SABO Kombohus framework agreement

SABO is an industry and interest organisation with approximately 300 members, which mainly consist of public housing companies (SABO, 2014a). Together, the member companies own and manage almost 730 000 flats. The members are located all over Sweden and their sizes differ, ranging from 72 to 26 378 flats. The municipalities own the public housing companies and together the members have a turnover of SEK 52 billion a year and about 12 000 employees.

In 2009, SABO started to examine the market among its members to see if there was an interest of building low-cost prefabricated rental dwellings (SABO, 2014b). The result indicated that if the members could choose what to build at the right price it would be small multi-family houses. According to the members, there was a need to build smaller houses all over the country and an interest of building at least 500 new flats. On this basis, the construction companies were invited to the competition of the framework agreement SABO Kombohus in 2010.

Requirements in the tendering documents for the framework agreement were that the building should have two to four storeys with four flats per floor, lifts and a low energy performance. In addition, the house should be possible to build all over the country and the construction cost per square meter, m^2, (BOA) should not exceed SEK 12 000, excluding land costs, foundation, ground works and VAT. First, there was a pre-qualification process where six contractors out of ten were selected. These were particularly selected because of their financial strength, technical skills and capacity. Second, the tenders of the selected contractors were evaluated based on five criteria: design, exterior materials, usability of flats, interior materials and technical equipment. In June 2011, a jury consisting of representatives from SABO presented the result.

The winner of the SABO Kombohus competition was JSB with their product called Trygga Boendet, see Figure 6 (SABO, 2014b). As number two in the competition came BoKlok Housing AB with their product Bo, hopp och kärlek and as number three came Lindbäcks Bygg AB with their product Hemlängtan. If JSB declines an enquiry from a public housing company, the question goes to the number two BoKlok Housing. Thereafter, if number two declines, the question goes on to number three in the framework agreement, Lindbäcks Bygg. Up till now JSB has been accepting all requests in the framework agreement, except from three projects which they had to decline since the transportation costs became too high due to the location, and one project that requested a wooden framework and facade. The framework agreement is valid from June 2011 and expires in the end of December 2014.

5.2 Trygga Boendet

The medium sized contractor JSB operates in the construction industry in the south of Sweden (JSB, 2014). Before the involvement in SABO Kombohus framework agreement, JSB had been working on a project that would result in standardised, industrialised multi-family housing to a competitive price (SABO, 2014b). A customer focus was seen as an important aspect when developing the concept and therefore an investigation was carried out among the members of SABO (Kadefors et al., 2013). This in order to find out which building qualities that the clients consider being important when building rental dwellings. Results indicated that important building qualities were for instance low lifecycle costs, high energy and environmental performance, materials and technical solutions, resulting in low maintenance costs and indoor materials that were robust. On this basis, JSB began to develop their concept before they got involved in the tendering for the SABO framework agreement. Therefore, the competition SABO Kombohus framework agreement suited the company very well since they had a good foundation to rely on. The concept would also contribute to extending their market throughout Sweden.

One of the reasons for SABO to award JSB as number one in the framework agreement was the rectangular design of the house which is of advantage regarding the aspect to fit in the surrounding environment (SABO, 2014b). Furthermore, the floor plans, the high standard and quality regarding both the interior material and technical equipment of the house contributed to that JSB excelled among the other tenderers. The product comprises prefabricated concrete elements suited for both low and higher buildings. In addition, a low maintenance requirement was also taken into account when selecting JSB as the winner.

Figure 6: Trygga Boendet four-storey building. Number one in SABO Kombohus framework agreement (SABO, 2014b).

To be able to build the product Trygga Boendet all over the country, JSB have nationwide framework agreements with suppliers and subcontractors (Kadefors et al., 2013). JSB assembles the floor slabs by themselves and in some cases they place the windows and assemble the roofs (JSB, 2014). JSB are also responsible for the site management during the production process, otherwise the same suppliers and subcontractors perform work from manufacturing and assembly on site to solving issues that arise during the liability period (Kadefors et al., 2013). By having the same team to perform works in all projects all over Sweden, repetition and learing effects can be achieved which can result in less defieciencies in the product.

The product Trygga Boendet is available in two, three or four-storey buildings where the construction prices differs depending on number of floors, see Table 2. On each floor there are two one-bedroom flats of 60.5 m^2 and two two-bedroom flats of 72 m^2, see Appendix III. The technical standard in the building is further described in Table 3.

The building has a framework, floor structure and interior walls in concrete. All interior walls and inner ceilings are painted, and the overall housing standard is high with, parquet floors, clinker in the hallway, and tiled bathroom with washing machine and drying machine, see Appendix III. Flats have a patio or balcony, where the placement of the balconies is flexible.

Table 2: Construction price for JSB´s Trygga Boendet in the SABO Kombohus framework agreement (based on SABO, 2014b).

Building	**Construction price* (excluding foundation, ground works, land and VAT)**
Two-storey building, 8 flats	12 000 SEK/m^2 BOA → 6 348 000 SEK
Three-storey building, 12 flats	12 690 SEK/m^2 BOA → 10 075 000 SEK
Four-storey building, 16 flats	12 618 SEK/m^2 BOA → 13 350 000 SEK
* Regulated according to the Consumer Price Index, CPI	

Table 3: Technical standard in Trygga Boendet (based on SABO, 2014b).

Technical standard	
Ventilation	Exhaust and supply air ventilation with heat recovery
Heat	District heating
Multimedia	One network plug in each flat
Measurement	Individual measurement of warm water

Lift	In each building

5.2.1 Optional additions

In the framework agreement, the number one contractor JSB has several optional additions which the customer can add to the standard product. These are further described in Table 4. All optional additions have fixed prices.

Table 4: Optional additions in JSB's product Trygga Boendet.

Optional addition 1	Foundation slab, four alternatives
Optional addition 2	Storage building and recycling centre
Optional addition 3	Geothermal heating
Optional addition 4	Kitchen fan
Optional addition 5	Expanded IT with star-shaped network
Optional addition 6	Glazed balconies
Optional addition 7	Dishwasher

5.3 The studied public housing companies

In this chapter, short descriptions of the interviewed public housing companies are presented. The information includes the size of the company, experience in new construction, number of flats built with the SABO Kombohus framework agreement and stage in the building process. All public housing companies have built or have planned to build JSB's product Trygga Boendet. Some of the companies have more than one project and sometimes the projects are divided into stages.

A summary of the interviewed public housing companies' sizes and experiences in construction of new buildings are presented in Table 5. Noteworthy is that three companies, Uppsalahem, LKF and HFAB own and manage significantly more flats and also have more experience in construction of new buildings compared to the other public housing companies.

5.3.1 Smaller public housing companies

Karlshamnsbostäder is a public housing company with a property stock of 2500 flats. Each year they build approximately 25 flats. The company has two ongoing projects with Trygga Boendet with 28 flats in total. The first project is in Asarum, a community located outside the centre of Karlshamn, with one three-storey building with 12 flats. The second project is in Mörrum, comprising one four-storey building with 16 flats. Currently, demolition of the existing building is taking place in Asarum while the municipality is working with the detailed development plan in Mörrum.

Båstadhem is a public housing company that owns and manages 1000 flats and has since 2010 built approximately 30 flats each year which is in accordance with the owner directives. The company has one completed project with Trygga Boendet in Förslöv, a community in the municipality of Båstad. The project comprises 32 flats in two four-storey buildings and the tenants moved in during the summer of 2013.

TrelleborgsHem is a public housing company that owns and manages 1835 flats. The company has little experience in new construction and the last project was completed in 2010. TrelleborgsHem has an ongoing project with Trygga Boendet in Smygehamn, a community in the municipality of Trelleborg. The project comprises 16 flats and is divided into two stages, where the first stage that comprises one two-storey building was completed in September 2013 and the second stage that comprises one two-storey building was completed in April 2014. The company has chosen to rent out all flats to people over the age of 55.

Strömstadsbyggen is a public housing company that owns and manages approximately 1500 flats. The company has one completed project with Trygga Boendet in Skee, a community 10 kilometres outside the city centre of Strömstad, which is divided into two stages. The first stage comprises two two-storey buildings and the second stage comprises three two-storey buildings. In total the buildings contain 40 flats. The first stage was completed in the first of October 2013 while the second stage was completed in February 2014.

Bjuvsbostäder is positioned in the municipality of Bjuv and owns and manages 1060 flats. The company has little experience in new construction and their latest project was completed in 2006. Bjuvsbostäder has one ongoing project within Trygga Boendet, divided into two stages. The first stage comprises 24 flats into three two-storey buildings where tenants moved in the first of May 2014. The second stage comprises two two-storey buildings, with the total of 16 flats, where the tenants will move in the first of October 2014.

Hebygårdar is a public housing company in the municipality of Heby. The company owns and manages 850 flats and has planned a project with Trygga Boendet in the community of Morgongåva. In total 24 flats will be built allocated in two three-storey buildings. The company has not signed the contract with JSB yet but the application for building permit is handed in.

Håbohus is a public housing company in the municipality of Håbo that owns and manages 1300 flats in the community of Bålsta. The company has one ongoing project with Trygga Boendet consisting of 52 flats, divided into two stages. The first stage comprises three three-storey buildings and the second stage comprises two two-storey buildings. The first stage was completed in January 2014, whereas the second stage was completed in May 2014. One of the houses will be an LSS-residency, which means an accommodation for persons with certain functional disabilities.

5.3.2 Larger public housing companies

Halmstads Fastighets AB, HFAB, is positioned in the municipality of Halmstad and owns and manages 9800 flats. The client has two projects with Trygga Boendet, one completed with 44 flats and one ongoing with 48 flats. The completed project comprises three four-storey buildings. Two of the buildings consist of 16 flats each. In the third house there is a health centre and 12 flats for what in Sweden is called Trygghetsboende, in other words housing for healthy elderly who want to have more

security and social interaction than in an ordinary flat. The ongoing project comprises 48 flats and will be completed in February 2015.

Uppsalahem is a public housing company that owns and manages 15 500 flats, where 3500 are student flats, in the municipality of Uppsala. Uppsalahem is the second largest public housing company in Sweden and each year they start to build 500 new flats. The company has planned to build Trygga Boendet in the area Stenhagen, 40 kilometres from the city centre of Uppsala and the detailed development plan for the land is completed. No contract is signed but they hope to start to build in September 2014 or Spring 2015. In total, 88 flats are planned allocated in eleven two-storey buildings.

Lund Kommuns Fastighets AB, LKF, is a public housing company that owns and manages approximately 9000 flats which is almost 40 percent of all rental housing in the municipality. The company has a goal to complete 250-300 flats per year. The company has applied for building permit and a decision to use the product Trygga Boendet will be made before the summer 2014 with a possible completion in August 2015. In total, 48 flats are planned in four three-storey buildings.

Table 5: Public housing companies' sizes and experiences in construction of new building. The two columns to the right in the table present the companies' predicted new construction of a future framework agreement similar to SABO Kombohus and their predicted total new construction.

Public housing company	Property stock (amount of flats)	Experience in new construction	Predicted new construction of similar framework agreement	Predicted total new construction in 4-6 years
Karlshamnsbostäder	2500	Some	20 flats per year	300 flats
Båstadhem	1000	Some	-	75 - 80 flats
TrelleborgsHem	1835	Little	10 - 15 flats per year	200 - 480 flats
Strömstadsbyggen	1500	Some	30 flats every third year	100 - 200 flats
Bjuvsbostäder	1060	Little	15 flats in a four year period	75 flats
Hebygårdar	850	Little	36 flats in a five year period	70 flats
Håbohus	1300	Little	70 - 90 flats in a four year period	170 - 190 flats
HFAB	9800	Much	100 flats in a five to six years period	500 flats
Uppsalahem	15 500	Much	50 - 100 flats per year	2500 flats
LKF	9000	Much	50 - 100 flats in a four year period	1000 flats

5.4 Theme 1: Drivers for using the framework agreement

The interviewed clients were asked why they chose to use the SABO Kombohus framework agreement. In Table 6, the clients' answers are divided into different categories. The most significant reason to use the framework agreement is that the product is perceived to be affordable with good quality, followed by the reason completed procurement. Noteworthy is that the majority of the smaller public housing

companies think that it is valuable that most of the procurement is already completed and thereby avoiding the normal procurement process according to the Public Procurement Act. The majority of the small clients say that it saves a lot of time and the time between the choice of using the framework agreement and until the building process started was shorter than in usual new construction. In contrast, the larger companies do not emphasise avoiding the Public Procurement Act. Instead, two of the large clients say that owner directives of building more and cheaper flats made them want to see if it was possible to build cheaper with Trygga Boendet compared to earlier new construction. Furthermore, five of ten clients emphasise that completed design is one important driver for using the framework agreement where one client says that "it is an advantage to know the building design and floor plans from the start".

According to four of ten clients it is of advantage to be able to predict the costs in advance. Some of the clients say that it simplifies the decision making when presenting the costs to the board, while others appreciate that the rent can be calculated in advance and the potential tenants' interest can be identified early. The fixed construction price of 12 000 SEK/m^2 BOA is considered to be low and was therefore an important factor for three of ten clients.

Three of ten clients argue that it is good to have a standardised concept where the product is used and inspected by many clients. One of these client states that "we prefer not to invent the wheel every time and instead use an already tested housing concept like Trygga Boendet". Another factor that four clients argue is important is the fast process, referring to the period between awarding the contract based on the framework agreement and the start of production.

Table 6: Public housing companies' drivers for using the framework agreement.

Public housing companies	**Completed procurement**	**Completed design**	**Affordable product of good quality**	**Predicable costs**	**Low construction price**	**Tested product**	**Fast process**
Client A	x	x	x		x	x	x
Client B					x	x	
Client C	x			x		x	x
Client D			x	x			
Client E	x	x	x				x
Client F	x	x		x	x		
Client G	x	x					
Client H			x				
Client I			x				
Client J	x	x	x	x			x

5.5 Theme 2: Opinions about the concept house

In this theme, the most important opinions regarding the degree of flexibility, exterior and interior design, flat distribution and size, environmental perspective, and technical standard are presented.

5.5.1 Degree of flexibility

All clients agree that the concept is based on acceptance and the majority of the clients acknowledge that higher flexibility results in increased costs, which is the main reason why most of the clients do not want to change the product. Seven of ten clients compare the concept with buying a car since the buyer have to accept the product as it is. Further, one client quotes T Ford – "You can have any colour as long as it is black". However, one of the clients argues that there should be more optional additions to choose between, exactly as it is when buying a car. In contrast, two clients say that it is not optimal if there are too many optional additions because that makes it difficult to cut the costs and the clients stress that they are interested in a low cost.

The interviewed clients have different views on what optional additions that should be offered in a future framework agreement. Several clients say that current optional additions are good, where one of the clients states that "I think it is good to have optional additions for foundation slab, heating with geothermal energy, recycling centre and storage building and that it is up to the client to design the ground works".

As previously mentioned, the majority of the clients compared the concept with buying a car. One client says that there should be packages with optional additions, exactly like when buying a car, instead of offering separate optional additions. The client further states that "if you choose for instance Premium Plus, an optional addition package is included that contains several things". The client argues that there should be three optional additional packages to choose between that are applicable for the entire building including all flats.

One of the clients says that there is a trend in today's society regarding individuality and that the tenants should have the same possibilities as if they would live in their own tenant-owned flat. However, several of the clients stress that there should hardly be any optional additions for the tenants. Therefore, the majority thinks that the limitation in Trygga Boendet is considered to be good. Two clients say that if there are too many optional additions to offer the tenant, one tenant might choose every optional addition because they can afford it, which results in a very high rent. Whereas the next tenant that moves in might not afford to pay this rent. Therefore, it is always better with limited choice, such as either grey or white walls.

5.5.2 Exterior and interior design

All interviewed clients say that the architecture and exterior design are acceptable and that the building is nice but some of them stress that the architecture is not unique. Two clients say that the exterior of the three and four-storey buildings looks better than the two-storey building since the latter appears a little disproportionate. Another client however thinks that the exterior design is boring and that it reminds of a house built in the 1960s. Since all the buildings look the same, this client sees a risk to build a new Million Homes Programme. The facade joints due to the prefabricated blocks are perceived as a negative aspect and one client suggests building the facade with brick. However, this client also stresses that once materials are being changed the cost will increase. Three clients find it advantageous to have the possibility to choose facade colour. One of the clients stresses that "even if there is a need to cut costs and build cheaper, this does not mean that the appearance of the house should suffer". According to six of ten clients, the exterior material, concrete, is of advantage in a

maintenance perspective. Three clients state that they never build a facade in wood due to high maintenance costs.

All clients agree that the quality of the interior materials and the floor plans is high. One client says that the interior is beautiful with its open floor plans, high windows and white walls which give a uniform appearance. Another client declares that the flats are nice and do not give the impression of being low-priced. Instead materials and suppliers are traditional and well-chosen which the tenants recognise. Several clients emphasise that tenants are satisfied with the floor plans and material in the flats and say that the flats have good sound isolation. Most of the interviewed clients declare that the flats have the same standard as in other new construction, for instance the parquet floors in the rooms and the tiled bathroom. Moreover, lifts and accessibility are considered to be added values which improve the general impression of the house. Several of the clients say that the size of the balconies is good and that the tenants are satisfied with the balconies or patios.

Two clients stress that the entrance with the stairwell could be better and more space-efficient. Another client claims that the storage building should be placed inside the building since this is expected by tenants. An additional aspect raised by one client is that the installation and ventilation room is too large and some of this space could instead be used in the flats.

Regarding interior optional additions, three clients argue that there should be optional additions for built-in oven and built-in microwave in the kitchen and tub as well as shower glass-sliding doors in the bathroom. These optional additions have also been requested from several tenants. Another client, who similarly says that a higher standard in the kitchen and bathroom is preferable, says that different optional additions for floor material should be offered too. Another possible optional addition is wallpaper but two clients stress that from an operation- and maintenance perspective it is of advantage to avoid wallpapers since the resetting cost becomes higher with wallpapers than if everything is painted in the same colour.

5.5.3 Flat distribution and sizes

All clients are satisfied with one-bedroom and two-bedroom flats as it is in Trygga Boendet but the clients have different views on what they regard as the optimal distribution of flats on each floor and their sizes. Several clients stress that it is often easier to rent out a one-bedroom flat than a two-bedroom or three-bedroom flat since the monthly rent is lower for one-bedroom flats. According to one client, three-bedroom and four-bedroom flats are needed in a society perspective but that the potentials tenants would not afford the high rents. Moreover, two clients say that it is difficult to decide the optimal flat distribution since the demand differs between areas. This makes it hard for the client to know in advance what flat distribution that is best. Nevertheless, all clients find one-bedroom and two-bedroom flats essential on each floor plan, but the majority also say that there is also a need for smaller studio flats. However, the clients have different opinions whether the studio flats should be in the standard floor plan or if it should be as an alternative floor plan.

Two clients prefer to have the studio flats in the standard floor plan, where one says that it should be four flats per floor consisting of one studio flat, two one-bedroom flats and one two-bedroom flat. The other client says that an optimal flat distribution would be to have five flats per floor with one studio flat, two one-bedroom flats and two two-bedroom flats. Four clients prefer to have an alternative floor plan, where it

is up to the client to add a studio flat or a three-bedroom flat. Another client stresses that the standard floor plan should not include a studio flat or a three-bedroom flat and instead this should be offered as an alternative floor plan since the demand in the local housing market differs. According to three clients there is a great demand for studio flats in the city of their municipalities, but neither of them have plans to build Trygga Boendet buildings in the city and therefore the standard floor plan should not involve studio flats or three-bedroom flats. Several of the clients state that there should be more flexibility when it comes to distribution of flats per floor but at the same time one client stresses that higher flexibility equals higher cost which is not desirable. One client says that there should be a standard floor plan with an option to choose an alternative floor plan where flats are designed as Trygghetsboende.

Three clients find the size of the flats quite optimal since it has been easy to rent out the flats. However, most of the clients say that more space-efficient flats would have been preferable since it most certainly equals lower rent. One client says that "by making the flats smaller, the monthly rent decreases without reducing the quality". The majority of the clients agree that smaller flats are desirable, with studio flats of 25-40 m^2, one-bedroom flats of 50-60 m^2, two-bedroom flats of 60-70 m^2, three-bedroom flats of 65-75 m^2 and four-bedroom flats of 75-85 m^2. One client emphasises that the flat should be even smaller, resulting in one-bedroom flats of 45 m^2 and two-bedroom flats of 55 m^2. The same client believes that the future market is going to change and that people is going to live in smaller spaces but with an increased quality. Another client however emphasises that the flats should be a little bit larger resulting in a one-bedroom flat of 65 m^2 and a two-bedroom flat of 75 m^2. According to the same client, an increase of the flat area in especially the bathrooms would be of advantage. While another client claims that it is a balance between larger spaces and higher rents. Everyone who moves from detached houses wants larger spaces but if the rent increases they want a smaller space.

5.5.4 Environmental standard

Most of the clients claim that the product Trygga Boendet works well with the companies' environmental approach, because of the solid materials and the low energy consumption. One client stresses that if the company receives owner directives to build more environment-friendly and use environmental certificates, such as Svanenmmärkt or Miljöbyggnad, it becomes difficult to use the concept since the house does not achieve these directives. However, another client argues that the contractor could get the environmental certification Svanenmärkt if the company paid a fee. In addition, another client says that Trygga Boendet could achieve the environmental certificate Miljöbyggnad Silver which according to the client is good. One suggestion, given by two clients, is that there should be higher environmental focus with for instance LED-based lighting. Furthermore, one client emphasises that it is important to have more optional additions when it comes to energy solutions. In contrast, another client says that the concept is based on acceptation and therefore deviations such as solar panels or environmental certificates could be expensive.

5.5.5 Technical standard

Regarding the technical standard, an overall opinion is that it is acceptable. However, most clients say that the IT-system, is outdated. Instead the IT-system should follow Swedish standard and a star network should be standard instead of an optional addition. Two clients stress that a network plug in every room would increase the standard level because as it is now only one network plug in the entrance of each flat

is included which is not considered to be modern. Only one client thinks that the technical standard is good enough since the company has planned to build Trygga Boendet in a smaller community outside the city centre where the demand for higher standard do not exist. Another client says that the technical systems are more suitable when building tenant-owned flats since the systems are designed to be regulated from inside the building. In a building with rental flats, monitoring and remote control of the heath and ventilation system should be included in construction price. According to two clients, individual measurement of cold water and heating should be added, however they should be optional additions since some clients might not be interested in having them in the standard product. All clients say that the lift is an advantage, especially compared to other new construction of two-storey buildings.

Several clients have noticed that it has been a problem for the tenants to receive mobile network coverage inside the flats. Another aspect raised by some clients is that in a future framework agreement, future requirements regarding technical solutions should be taken more into consideration. One client thinks it would have been beneficial to have solar cells at the roof as an optional addition, though in their areas the demand for it does not exist and the rent would become too high.

5.6 Theme 3: Framework agreement

Most of the interviewed clients are satisfied with the content of the framework agreement. All clients can imagine using a similar framework agreement again if there is available land where the building could fit and if there is a demand for more flats in the municipality. One small client says that "this kind of framework agreement enables us to build new construction even though we hardly have any experience in new construction". Correspondingly, two large clients have similar opinions and believe that smaller clients probably have much more use of the framework agreement since it facilitates procurement.

According to three of ten clients, the period for the framework agreement is too short. One of these clients says that there are no incentives for the contractor to develop the product during the framework agreement since the period of four years is too short. A suggestion which is given by one client is to extend a framework agreement after four years, with one to two years, provided that the contractor has fulfilled the requirements written in the framework agreement. Still, one client claims that JSB develops the product continuously while another client has not noticed that JSB has developed the product between the projects. The client believes that this may have something to do with the fact that the contractor has been selling well and therefore does not need to spend more time on product development.

When it comes to disadvantages of the framework agreement, several clients think that it was unclear what was included in the construction price. The client stresses that "from the beginning the price sounds amazing but this is only until you know what is actually included". According to two clients, the interfaces between building costs and foundation costs were unclear. For instance, preparations for the foundation slab and wiring network was juridically unclear. One suggestion is that the edge beams should be included in the house and not in the foundation slab. The same client stresses that the price for the foundation slab was too high. Another client thinks that the foundation slab should be included from the beginning and not as an optional addition.

The clients have different views on the fixed construction price in the framework agreement. One client stresses that when building several buildings, there should be some sort of discount. The client claims that "it is much more difficult and costly for the contractor to build and manage one house than four". Another client, who was one of the first public housing companies that used the framework agreement, argues that the first ten public housing companies who use the framework agreement should receive a subsidised price. The client further explains that "the later you use the concept the better quality you should get" and since the company were early they experienced more of the initial problems. According to another client SABO should be able to cut the construction costs even further since the framework agreement most certainly results in large volumes for the contractor.

Several clients believe that it would be preferable if the number one contractor had a limit of projects that they could undertake. For instance, number one builds 200 flats and then it is automatically transferred to number two in the framework agreement. A similar view is addressed by another client who stresses that if the aim with SABO Kombohus framework agreement is to cut the prices in new construction, it might not be of advantage to give exclusivity to one contractor for four years. Another client argues that they do not understand the point in having a second and a third contractor in the framework agreement, especially since these together only have had three projects. This results in a false marketing. Therefore, the client states that it is better to have one contractor, who gets all assignments and is not allowed to turn down any assignments. The client makes a comparison with the alternative to have a renewed invitation to submit tenders, as in SABO Kombohus Plus framework agreement. The flexibility then is higher which according to the client is of advantage. However, the procurement for the client is more resource demanding in a renewed tender and therefore the SABO Kombohus framework agreement with one contractor should be of advantage especially for smaller public housing companies.

Furthermore, in a future framework agreement one client claims that SABO should set clear requirements where every contractor should have the same basic standard on their product, for instance completely tiled bathrooms and parquet floors. In a new framework agreement, two clients claim that it should be possible to cut the costs for the optional additions more. One client stresses that JSB's optional additions are 50 percent more expensive compared to what they usually could get with their own agreements, as for instance glazed balconies. This is confirmed by another client who believes that JSB has not put any effort in cutting the costs for the optional additions in the framework agreement and claims that there today is an unnecessary high cost. One client says that a smaller production with for instance one-storey buildings would be preferable to offer in a framework agreement.

5.7 Theme 4: Municipal regulations

Several clients stress that the planning process takes too long time and is resource demanding but for most of the clients it has been quite easy to receive a building permit. Two clients say that in the future it should be unnecessary to have a building permit administrator in each municipality who examines the same drawings. Instead the building could be nationally approved and thereby more focus in each municipality may be put on the site and accessibility.

Eight of ten clients say that there are no special municipal regulations, beyond the National Building Regulations, and most of them have not received any complaints about the project from the Local Planning Authority or the public. In contrast, the remaining two clients, which were both larger, had to consider special regulations for their respectively municipality. One of them has been granted an exception since Trygga Boendet does not fulfil the municipal special regulation for accessibility. According to this client, opinions from the municipality vary but due to a strong desire to build cheaper dwellings the client received a final approval to build Trygga Boendet. The second client says that a debate has been going on between the municipality and the Local Planning Authority regarding the ventilation system. Generally, the municipality does not accept that kind of ventilation system. However, according to the client, the contractor said that there is a possibility to change the ventilation system. The client states "the special requirement drives the costs and prevents this kind of concept houses and since the house fulfils the national standards it should be acceptable everywhere in the country". In the same municipality, special requirements regarding energy, accessibility, parking and noise exist which indeed will increase the cost.

One client stresses that that the Local Planning Authority in the municipality is not impressed by these houses and instead wants to build more unique houses designed by renowned architects. Several clients, especially the larger ones, believe that concept houses are not suitable in urban environments where the focus is densification and urban development. However, the clients agree that the concept house is adequate in locations outside the city centre.

Even if there are no municipal special regulations, requirements can occur in the detailed development plan. One of the smaller clients says that it is more problematic to build the house in larger cities since the detailed development plans have more restrictions than in smaller cities. In several of the projects the clients have not been able to build four storeys which they think is a limitation. One client says that the parking norm also was a barrier to the number of floors because if the company builds more flats the required amount of parking lots cannot be achieved. Two clients made minor deviations from the detailed development plan but one of them emphasises that the changes in the detailed development plan became better for the surroundings because the height decreased from three to two floors and at the same time it became possible for the company to build five houses.

5.8 Theme 5: Cost and rent

In the following sections the total production costs, land costs and rents for the projects are presented together with the maximum costs and rents that the company could accept in order to use a similar future framework agreement.

5.8.1 Current framework agreement

Six of ten clients have used the calculation tool that SABO has developed and all of them are very satisfied with it. According to several clients the calculation constitutes a good basis for decision-making. In addition, several clients emphasise that the calculation was of great advantage when they presented the calculation to the board. Noteworthy is that the majority that have used the calculation tool are smaller clients and only one of the larger clients used it as a complement to their own calculation. Two of the larger clients claim that smaller clients probably benefit more from the

calculation tool since they do not have the same experience of new construction. These clients have used their own calculation tools and both of them say that they do not have a need for the SABO's calculation tool. One of the smaller clients claims that the calculation tool is very oriented towards the product Trygga Boendet with the optional additions, meaning that if the client has deviations from the concept it becomes rather complicated to use the tool. Another client also says that they thought that SABO's calculation tool seemed a bit complicated and therefore chose to use their own.

In Table 7, the predicted total production cost, the final total production cost for the completed projects, land cost, predicted average rent and determined average rent are illustrated for the Trygga Boendet projects. As a comparison, the public housing companies' usual total production cost and average rent in new construction are presented. However, some of the less experienced clients have not built in a couple of years and could not estimate their usual total production and average rent because of earlier governmental subsidies. For those Trygga Boendet projects that are not yet completed, the final total production costs and average rent are not known and the corresponding cells are left empty.

Table 7: Costs and average rent for the public housing companies.

Public housing company	**Predicted total production cost (SEK/m² BOA* incl. VAT)**	**Final total production cost (SEK/m² BOA incl. VAT)**	**Land cost in calculation (SEK/m² BTA**)**	**Predicted average rent (SEK/m² BOA and year)**	**Determined average rent (SEK/m² BOA and year)**	**Usual total production cost in new construction (SEK/m² BOA incl. VAT)**	**Usual average rent in new construction (SEK/m² BOA and year)**
Client A	21 300	21 300	-	-	1420	19 000 - 28 000	1250
Client B	21 341	22 700	1172	-	1415	25 000 - 30 000	1365 - 1475
Client C	21 000	-	0 (usually 250)	1390	-	-	-
Client D	20 540	-	0 (usually 100)	1500	-	26 000	1300 - 1350
Client E	23 000	25 566	850	-	1650	-	-
Client F	20 225	-	1000	1300	-	23 000	1200 - 1400
Client G	23 000	22 700	418	-	1500	29 000 - 32 000	1500 - 1550
Client H	27 000	-	2000	1650 - 1850	-	30 000 - 32 000	1800 - 1850
Client I	22 700	-	1500	1300	-	-	1350 - 1450
Client J	21 225	21 510	600	-	1280	21 000 - 24 000	1500

* BOA is the Swedish designation for living area

** BTA is the Swedish designation for the total floor area

The total production cost has been or will most likely be between 20 000 and 23 000 SEK/m^2 BOA for the majority of the projects, with an exception for Client H and Client E. The majority of the clients claim that the demand for the flats has been high and that it was easy to rent out the flats. According to Client J, the determined average rent of 1280 SEK/m^2 BOA and year is low for the municipality which the client says is mainly because they hardly have chosen any optional additions. In some of the projects there have been costs that have been remarkably high, where five of ten clients had increased costs due to difficult ground conditions. Of these five clients, Client E and Client G had to perform piling which had a substantial impact on the final total production cost. In addition, Client D will also most likely need to pile which is why the client has included piling costs of approximately a half million SEK in the predicted total production costs. However, the costs for decontamination of land

are not considered in the calculation of Client D and since the client owned the land no purchase price of the land is included. Noteworthy is that Client E argues that the land cost of 850 SEK/m^2 BTA was expensive due to the poor ground conditions while Client H says that the land where they plan to build Trygga Boendet is cheap, 2000 SEK/m^2 BTA, compared to the land in the centre of the city where it usually costs twice as much. As seen in the table above the land costs differ significantly between the different municipalities.

Client E says that because of the bad ground conditions the client could not use the standard foundation slab since it only is applicable during normal ground conditions. Moreover, another unforeseen cost is the connection to the municipal water and sewage system. Client C says that the foundation cost became an unforeseen cost since residues from a former building such as old culverts and a sewage system has been in the way. This resulted in high additional costs and the client stresses that it certainly would have been less expensive to build on a completely new ground. Another unforeseen cost was the disposal of storm water where a reservoir had to be built in order to take in the surface water.

Local disposal of storm water is also an unforeseen cost according to both Client B and Client C. Client F says that one important cost is demolition, though according to the client this is an investment for the future because otherwise they would have been forced to renovate the demolished buildings later on. For Client I, another unforeseen cost in the calculation was the IT-system, since the optional addition of expanded IT is set per floor, which results in a high cost when building several buildings with four floors. The client states that it is not reasonable to pay 400 000 SEK extra for IT when it should have been included in the construction cost. However, the client thinks that several smaller public housing companies may not need the expanded IT which means that they can benefit from the low price without the expanded IT-system.

According to Client B it is hard to cut the costs further when they are only allowed to build two floors. The client believes that a better value can be achieved when building in three or four storeys. Client H says that generally the total production cost depends on how many flats that are built and the client says that "the fewer flats, the more expensive it becomes". The client has a minimum limit of 30-50 flats per project and claims that the amount of flats plays a very important role for the total production cost. According to Client I the predicted total production cost for Trygga Boendet is not very low compared to the cost for similar construction of new building. However, the client is aiming for an average rent of 1300 SEK/m^2 and year, to show that they can build cheap. The client further says that it is good that the construction cost is regulated according to CPI.

Client J had an unforeseen cost due to increased electricity consumption. According to the framework agreement the client shall pay for all the electricity during the production phase and in this regard the contractor has no incentive to minimise the consumption. The client claims that the contractor used electrical fans for drying the three first houses and that the lights in the houses were running 24 hours a day, which resulted in extremely high bills for the client. In their second project, Client J therefore settled a price ceiling with the contractor which should give the contractor an incentive to keep the energy consumption at a low level.

5.8.2 Future framework agreements

The interviewed public housing companies' were asked what maximal total production cost, land cost and average rent they could accept in a similar future framework agreement to SABO Kombohus. These numbers are presented in Table 8, though some of the clients could not answer the question.

Table 8: Acceptable total production cost, land cost and average rent.

Public housing company	**Maximum total production cost, (SEK/m² BOA incl. VAT)**	**Maximum land cost, (SEK/m² BTA)**	**Maximum average rent, (SEK/m² BOA and year)**
Client A	-	-	-
Client B	23 000	1000	1400
Client C	-	-	-
Client D	20 000 (excluding land cost)	100	1450
Client E	26 000	850	1650
Client F	23 000	1000	1300
Client G	24 000	1300	1550
Client H	27 000	2000	-
Client I	-	1500	-
Client J	22 000	600	1350 - 1400

The majority of the public housing companies can imagine using a similar framework agreement in the future. However, the total production cost and average rent should be similar to the costs that have been in SABO Kombohus framework agreement.

Client I stresses that the construction cost should not exceed 15 000 SEK/m^2 BOA. If the construction cost moves towards 20 000 SEK/m^2 BOA the client considers it better to build themselves, with unique design, and not a concept house. The client further argues that the SABO Kombohus framework agreement is a good way of showing that it is possible to build cheaper.

The majority of the Trygga Boendet projects have been built outside the city centre where the average rents generally are lower. In order to have an optimal average rent for the location, Client J therefore states that the total production cost cannot exceed 21 000 – 22 000 SEK/m^2 BOA.

5.9 Theme 6: Client-contractor interaction and after-sales market

All of the clients think that the contact with the contractor JSB has been working well, although some of the clients who have completed projects have opinions and complaints about the way JSB is handling regular contacts and the final stage of the delivery process, when all remaining issues and errors are taken care of as well as the guarantee period. According to six of ten clients, JSB has too much to do with a full focus on producing buildings and are too optimistic regarding the time schedule, resulting in little focus in the after-sales market.

Several clients say that JSB has been acting professionally during the production phase. One client thinks that "it has been hard to get in touch with some persons, but when we finally come in contact, JSB shows strong commitment". This opinion is similar to another client who argues that JSB has been a good listener and has come up with proposals related to the client's needs. The same client stresses that it is important to understand that JSB is fully scheduled due to that the framework agreement only is applicable to the end of 2014. Still, several clients are more critical and emphasise that feedback from JSB has not worked well and has taken too long time to receive. Two clients claim that there is a disadvantage in having a framework agreement with one contractor who is supposed to build extremely many houses in a short period and JSB does not have the capacity to carry out as many projects as they have signed.

According to one client, it has been of advantage that JSB is located not far from the office, but at the same time they do not think that they receive any priority because of this. However, several clients believe that the distance is a drawback which has resulted in many phone calls and e-mails and hardly any face-to-face meetings. In addition, two of the clients with completed projects claim that due to the distance it has been difficult for the contractor to handle problems arising during the after-sales market. Three of the clients complain that there have been too many small deficiencies and remarks at the final inspection and according to one of them JSB has not informed if they have corrected all remarks. One client reports that the contractor has not corrected single inspection errors that have occurred and instead has waited until there have been several errors before correcting them. The same client says that "it is not acceptable to take that long time to correct minor deficiencies such as a fan". Another client argues that JSB should have more self-inspections and correct errors before the final inspection in order to receive a cleaner protocol. In one project there have been many deficiencies which the contractor did not correct before the tenants moved in which has been subject to criticism from tenants. In contrast another client perceives that JSB has been handling errors well and that errors were corrected before the tenants moved in. One client states that "if you create a product you have to have an after-sales market that takes care of the product". The same client has received complaints from a tenant who reported faults in the flat. However, JSB never contacted the tenant which has resulted in that the tenant after four months still has not moved in.

One client believes that a public housing company has two approaches to choose between when using this kind of framework agreement. Either to inspect the construction documents in detail during the process or to rely entirely on JSB until the building is completed and inspects it afterwards. By choosing the latter strategy, deficiencies cannot be discovered early in the building process and therefore cannot be changed in time. One client claims that JSB's service organisation has not been good, especially when updating drawings based on changes. According to this client it is of great importance to later have access to the correct construction documents and therefore SABO should consider what requirements regarding the administrative parts that need to be put on the contractor. One client argues that the distribution between responsibilities among those employed at JSB is unclear, which makes it hard to know who to get in contact with. According to this client, there have been three different site managers during the construction period. Moreover, the client feels that their project has been neglected in the final stage. The client states that it would have been

preferable if the site manager checked the project once a week and also had a traditional coordination meeting where a protocol was written.

Another client emphasises that JSB has been accommodating so far in the process compared to other contractors who they have collaborated with. The client perceives that JSB has a positive attitude to improve the product as for instance developing more modern IT as optional additions as well as the ventilation system. However, regarding the many deficiencies in the after-sales market one client believes that in the end it will be the tenants who complain directly to the contractor instead of the company itself. Furthermore another client stresses that JSB should be able to have a zero error level since the working methods are standardised, saying that "if the self-inspections are made professionally, every technical detail should function".

6 Discussion

In this chapter, a discussion is performed based on the interviews in relation to the frame of reference. The discussion is divided into three sub chapters structured after the research questions.

6.1 Research question 1

Which are the most important drivers and obstacles for clients to use a framework agreement for industrialised multi-family housing?

In earlier research within the area of industrialised house building, it is clear that the industrialised multi-family housing concepts that exist are based on different degrees of client involvement. Depending on if the concept is based on standardisation or not, the client can have different drivers and obstacles for using a concept. High production costs are generally seen as the main barrier to an increased construction of new buildings (Boverket, 2013). One of the main drivers for clients when initiating projects are value for money, primarily aimed at lowest whole-life cost (Gibb and Isack, 2001). Hence, Wallin (2008) claims that by choosing concept, based on standardisation, the lowest price can be attained. Clients perceive the benefits from using standardised processes and components as lower costs, dependable quality and operational benefits since clients and end users know how to use the components and how the end product will look like (Gibb and Isack, 2001).

Another driver for using a standardised product is, according to Olofsson et al. (2012), a completed design with all construction documents prepared in advance. Moreover, through the use of standardised products, defects can be avoided because the same product is used many times (Veenstra et al., 2006) and thereby the quality in the product can be increased. This can be a major advantage for the client, since the production can be based on systematic performance and re-use of experiences and thereby even the production time can be shortened.

However, the literature regarding client drivers for adopting concepts for standardised multi-family housing is limited, especially when it comes to rental housing. Clients that build rental housing may have different drivers for using a standardised house building concept compared to clients that build tenant-owned flats or individual homeowners. The majority of the interviewed clients say that one of the main drivers to use the product Trygga Boendet was because it is an affordable product with good quality. This driver can be related to the standardised product as well as to the framework agreement since the construction price and good quality may be achieved partly because the product is standardised with the same design in each project, and partly due to that the framework agreement results in larger volumes for the contractor.

For six of the clients, another important driver is that SABO has completed most of the public procurement process. Noteworthy is that the easiness to use the framework agreement, and not having to perform a traditional public procurement, is more important for the small clients than for the large. This driver is more related to the framework agreement than to the standardised product since the framework agreement also enables clients with less experience and resources to build new construction. Further, five of ten clients say that the completed design is an important driver for using the framework agreement since all drawings and construction

documents are made in advance which enables clients to shorten the early phase. A completed design can be connected to that the product is standardised; even without the framework agreement the Trygga Boendet product would still offer a completed design.

Other drivers that are important for several clients are to be able to predict the costs in advance, a low construction price and a fast construction process. According to Lessing (2006), the building process for an industrialised product is based on continuity where experiences, knowledge and technical solutions are re-used. Hence, in the long run this should result in fewer errors. Only one of the clients stated that better quality due to the construction process with repetitive and continuous working methods was an important aspect when using the framework agreement. However, three small clients stress that it was an advantage that the product has been tested before and other clients thus have examined the construction documents.

Several obstacles for using a concept that is not adapted to the specific client can be found. According to Olofsson et al. (2012) standardised concepts can be more complex to build in metropolitan regions than rural regions due to that the detailed development plans in central locations have more requirements regarding the design, such as floor plans and technical solutions. Moreover, in some cities the Local Planning Authority can oppose the use of a standardised product, since they prefer unique buildings that are adapted to the specific site. Three large clients emphasise that the buildings do not fit in central locations because of the strict detailed development plans. Surely some pieces of land may exist in central locations where the standardised concept can fit, but it seems to be difficult to work with urban development and Trygga Boendet at the same time. On the other hand, in small municipalities Trygga Boendet can be seen as a good supplement in existing environments, and the majority of the small clients confirm this.

In many municipalities special regulations exist that can limit the possibility for using an industrialised concept. The current Swedish Government wants the same regulations all over the country (Tollesson, 2013), and according to Svensson (2014) this could facilitate and increase clients ability to use industrialised concepts. Some of the interviewed clients have the same opinion and think that the municipal requirements should be abolished, since these are obstacles for public housing companies to use an industrialised concept. If the industrialised concept would be nationally approved, all clients who want to build the concept would have the same opportunities. With the same regulations and no municipal regulations the design only needs to be checked once which, in turn, would expedite the planning process.

6.2 Research question 2

How do clients experience an industrialised multi-family housing concept?

The product Trygga Boendet can be seen as a typical standardised product, as in the model described by Olofsson et al. (2012), with few choices for the customer. The product is not 100 per cent pre-developed but very few optional additions for the customer exist. In relation to Winch (2003) model, Trygga Boendet can be placed between the Make-to-Order and Make-to-Forecast. In the Make-to-Order strategy, the similarities are that there is a detailed design of the product Trygga Boendet and that the process starts when the client places the order. However, in this strategy the product is configured to meet the client requirements which are not in accordance with Trygga Boendet. Therefore, Trygga Boendet has some similarities with the

Make-to-Forecast strategy since the client is able to choose only a few optional additions.

Tension between flexibility and standardisation

Several authors claim that customer demands for a high degree of choice have increased (Olofsson et al., 2012; Hofman et al., 2006; Veenstra et al., 2006). In fact, clients' requirements for a high degree of influence should mean that products most likely would focus on mass customisation, rather than on standardisation based on the Make-to-Forecast strategy. However, it is noteworthy that the demand for Trygga Boendet has been very high, even if the product is characterised by low flexibility for the client. According to Wallin (2008) many clients accept the limitations when choosing a standardised product and realise that the optional additions are for instance exterior and interior colour. This is supported by the interviewed clients, where the majority understand and accept that the choices are limited. Several clients argue that higher flexibility results in increased costs and therefore the clients do not want to change the product. The findings showed that the majority of the small clients were satisfied with the product and did neither question the product nor the contractor. In contrast, the large clients have been more involved during the entire process and have in general set higher requirements on the quality of the product, especially regarding the technical equipment. Noteworthy is that even if the large clients say that it is good that the product is based on standardisation, they have been more inclined to change the product than the small clients. Nevertheless, the cost should be low according to most clients even if there should be more optional additions to choose between.

Several interviewed clients say that there has been a greater flexibility than indicated from the start in the product Trygga boendet. A greater flexibility was obviously desirable from many clients, but at the same time it is important that the contractor is able to manage all projects and changes without quality suffering. According to Lessing (2006), in industrialised house building it is important to have a process where knowledge and experience can be developed and connected to each project in order to achieve high quality. However, if the contractor is not able to produce high quality buildings because of too many changes, then one purpose with an industrialised product is lost.

Usually, the majority of the interviewed clients do not offer the tenants any optional additions when building new construction. Instead, each client decides which optional additions to use for all flats in the entire building. One client suggests that that there should be three packages with different optional additions to choose between in a standardised product. This could be beneficial to have if it was up to the tenants to choose, since it facilitates the work for the client as well as the contractor offering few choices in packages. However, if it is up to the client to choose, with no involvement from the tenants, it might be better to have several optional additions as it is in today's framework agreement. In contrast, many clients who build tenant-owned flats probably put more emphasis on individuality where each end user can choose between varieties of different optional additions.

The Million Homes Programme in Sweden 1965-1975 has been criticised for monotonous design and limited optional additions for the clients (Hedman, 2008). One client stresses that there is a risk to build a new Million Homes Programme with Trygga Boendet since the flexibility for the client is low and that all the buildings look the same with no unique architecture. However, the majority of the interviewed clients do not make a comparison between Trygga Boendet and the Million Homes

Progamme. It is most unlikely that the product would be a new Million Homes Programme since the aim with Trygga Boendet is to produce complementary buildings and not to build entire blocks with these buildings. Nevertheless, this aspect is important to consider in a future framework agreement since there is a risk to associate standardised concepts with boring buildings that do not fit into urban areas.

Cost and rent

The product Trygga Boendet has resulted in a total production cost of 20 000 – 23 000 SEK/m^2 BOA for eight of the clients, which in most cases are lower compared to the clients' earlier new construction. However, it is hard to compare the costs with earlier new construction since several aspects influence the total production costs over time. According to Lind (2007), higher standard and improved quality in housing, together with higher accessibility requirements are two aspects that may have an impact on the higher production costs. Generally, other aspects which may influence the total production cost are for instance the number of flats, amount of large respectively small flats, current market situation at the time of procurement and how complex the design of the building is.

The costs comparisons between Trygga Boendet and earlier new construction were based on how the public housing companies have experienced the differences. Therefore it would have been beneficial to go further into the calculations in order to have a better foundation when comparing Trygga Boendet with earlier new construction.

The construction price of 12 000 SEK/m^2 BOA should according to one client be able to be cut even more since the framework agreement is of advantage for the contractor who receives large volumes of construction. In a project-specific group, the construction costs are influenced by the project size, project complexity and quality (Warsame, 2006) and since all Trygga Boendet projects have the same complexity and quality it is the project size that influences the costs most.

The rents differ between the Trygga Boendet projects. In some projects where the total production cost is lower the rent is also lower. However, in two of the projects where the total production cost is the same, 22 700 SEK/m^2 BOA, the rent differs, 1415 SEK/m^2 and year respectively 1500 SEK/m^2 and year. No specific connection between total production costs and rents can be deduced among the projects and this may be explained by that the total production cost only represents one part of setting the rent.

According to Lind (2007), other factors which influence the rent are administration costs, operating costs and maintenance costs. Therefore, a variety of aspects should be considered when comparing the rents in the different projects. For some of the clients it may be important to set a higher rent in order for them to receive profit and a capital for a continued construction of new buildings. Different areas in a municipality and within the country require various rates of return and the risk of building new construction in a large city is often low resulting in a low rate of return. While in smaller municipalities where the risk of building new construction can be higher, the required rate of return is often higher. The same production costs can thereby lead to different rents in order to meet the required rate of return.

Some clients may want to create a coveted market with low rents for the possible tenants and thereby increase competition between the local housing companies as well as local contractors. Other clients have owner directives that require them to show that

they can build cheaper with lower rents which emphasises that the rent can be cut even further for many clients. Other clients have been able to set a lower rent and it may depend on what required return each company has set for the project together with the funding. In addition, having an extremely high liquidity makes it possible for the client to finance the construction of buildings without financial support such as loans.

6.3 Research question 3

Which aspects are important to consider when developing a framework agreement for industrialised housing?

To create a framework agreement for an industrialised concept that can be used by many clients it is important to find out what the clients can accept as standard solutions and what they require as optional additions. However, clients have different preferences regarding the standard of a product and therefore it is hard to satisfy everyone's values and to create a product that suits all clients.

According to six of ten interviewed clients, the choice of concrete in the framework, facade and floor structure in Trygga Boendet is of advantage in a long perspective since it equals lower maintenance costs. As mentioned by Lind (2007), high maintenance costs might be the results of low quality in the product but it may also be because other materials need to be maintained more frequently. Hence, it is important to use materials that are considered to be timeless, in other words to use solid materials.

Engström and Claeson-Jonsson (2005) emphasise that products that are perceived as high quality homes must be created, including details and materials. The majority of the interviewed clients were satisfied with the interior materials. Current parquet floor, white walls, and clinker and tile in the bathroom were perceived to be good choices of materials which are attractive to a wide group of tenants. Findings from the interviews were that the clients prefer to have interior material and technical solutions of high standard, but still a product to an affordable price. However, it is the price that is decisive because if the price exceeds what the client usually pays for new construction, especially the large clients rather build unique buildings instead of standardised buildings. At the same time many of the small clients do not have the possibility to build unique buildings due to a lack of experience in new construction, which emphasise that the small clients have a greater need for framework agreements with a fixed construction price. It was obvious during the performed interviews that the clients' estimated costs for the ground works and foundation represent one of the most difficult parts of the building process to manage independently, especially for the inexperienced clients.

Industrialised house building includes planning and controlling processes and long-term relations between participants (Lessing, 2006). Findings show that there are deficiencies in the communication between the clients and the contractor, especially during the after-sales market. In order to maintain a long-term relation, it is important that the contractor focuses on the entire building process, including the after-sales market and not only on the production phase. Gibb (1999) states that many clients are interested in value for money and in the end product, but are almost never interested in the process, which emphasise that the contractor should put more effort into the after-sales market. Nevertheless, the interviewed clients give the impression of that the early stages in the building process, with the almost completed public procurement

process and completed design, are as important as the product. In much literature, focus have been on developing a concept or product, but the findings show that more focus should be put on facilitating the process, from early phases to after-sales market, for the clients.

The findings further show that the number one contractor in the framework agreement works under a high pressure and being a small firm building all over the country has resulted in reduced focus on the after-sales market. Some clients claim that the number one contractor should have a limited number of projects so that the after-sales market can be prioritised. However, it may be of disadvantage for the clients if the number one contractor has a limit since the other contractors do not have the same product. In other words the supply becomes insufficient to the demand of the first product. Moreover, it may be difficult to set this limit because the contractor wants to maximise their profit. For instance, JSB has only turned down three projects so far. One benefit though with many projects for the number one contractor is that the repetitive processes can lead to fewer quality deficiencies. In contrast, if projects are divided between three contractors, as in a framework with renewed tender, there may be a quality risk since repetition becomes reduced. At the same time the contractors may build the same industrialised building outside of the framework agreement which results in repetitive processes.

In practice, it may be difficult for most construction companies to meet the delivery requirements in this kind of framework agreement since it is uncertain from the start how large the interest from public housing companies is. In this case, it is interesting that the contractor JSB has managed the amount of projects even though they are small and have not worked with similar concepts before. This shows that this kind of business idea can be viable for large as well as small contractors and the entire industry can learn from this case.

The SABO Kombohus framework agreement as it is today can limit many public housing companies' ability to build an industrialised concept. Therefore, in the future several parallel or overlapping framework agreements for different products could be offered, as in the KAB Almenbolig+ framework agreements, instead of adding many optional additions in the same product. On the other hand, many clients prefer to have the ability to choose between different optional additions which emphasises that higher degree of choice in the framework agreement for one product can be advantageous as well.

7 Conclusions and recommendations

Industrialised house building may have a history of bad reputation being compared to the Million Homes Programme and not considering the client value, but today industrialised house building is once again discussed and used in the house building industry. Findings show that public clients are satisfied working with a framework agreement for an industrialised concept, based on standardisation in the process as well as the product, where the main reason for the public clients to use an industrialised concept is that the product is affordable with a good quality. The findings indicate that the cost is the most important aspect for the clients when using a framework agreement for industrialised housing. If the cost exceeds traditional construction of new buildings, traditional customised buildings are preferred. However, many of the small clients do not have enough experience to build in traditional way, mostly due to demanding public procurement legislation, which emphasises that small clients have a greater need for framework agreements with a fixed construction price.

Clients have different opinions regarding the standard of multi-family housing, especially when it comes to the level of flexibility in an industrialised concept. Findings show that larger and more experienced public clients who are used to build in central city locations have more specific requirements on the product and therefore want to be able to influence it more. In contrast, the smaller and not so experienced public clients prefer not to have a high flexibility since when accepting the product as it is, the building process is significantly simplified. However, a higher flexibility is not preferred by the larger clients either if it means that the costs increase too much. This implies that the flexibility becomes less important to the clients as long as the product achieves a good quality.

The development of industrialised house building has resulted in concepts offering different degrees of client influence. Findings indicate that it is vital to have in mind that every client has different opinions of what can be accepted in a concept and it is hard to satisfy every opinion. Therefore, when developing an industrialised concept for multi-family housing, it is important to be aware of what type of client the concept is addressed to. The interviews with the public housing companies show that to be able to use an industrialised concept in central city locations, a higher flexibility in terms of flat distribution and more space-efficient flats are needed in the concept. Alternatively, a change regarding the municipal special regulations is required so that all clients have the same possibilities to use an industrialised concept. If the first alternative is to be applied, mass customisation should characterise the industrialised concepts where modules are standardised but with the possibility for the client to choose different combinations. In other words platforms should be used more where different modules can be used based on the clients requests.

Noteworthy is that the industrialised house building becomes very useful in a framework agreement, especially for smaller clients who may benefit from a standardised process in early stages as the procurement and design are already completed. This emphasises that public clients are not only interested in the product but also in the process. In theory regarding industrialised house building the focus is often on making the production phase more effective, rather than the entire process. In addition, complaints from the clients about the after-sales market also indicates that a better focus of the overall process is needed in industrialised house building. Aspects that influence client value are when the end users are satisfied and if the maintenance

cost is kept low, therefore it is extremely important to focus more on the after-sales market, which requires both a more standardised technical process with less errors, and having a good and continuous contact between the individual client and the contractor.

In this study, the focus has been on investigating the public clients' requirements and experiences in industrialised housing. In future research, it would be interesting to investigate the tenants' needs and requirements to better understand what they really want and are willing to pay for.

Recommendations to SABO

Currently SABO has plans for developing the framework agreement for SABO Kombohus since the first framework agreement expires in December 2014. The recommendations presented below can be used as help in SABO's work with the next framework agreement.

- **Keep the flat distribution**
  SABO should keep the flat distribution with two one-bedroom flats and two two-bedroom flats but consider offering an alternative floor plan with a studio flat since this is what the majority of the clients would like to have.

- **Create more space-efficient flats**
  SABO should in tendering documents set restrictions for a maximum limit regarding the flat areas, in order to create more space-efficient flats. For instance, suggestions for flat areas are: studio flat 25-35 m^2, one-bedroom flat 50-60 m^2, two-bedroom flat 60-70 m^2, three-bedroom flat 65-75 m^2. By having more space-efficient flats the framework agreement will most likely attract a wider audience since it results in lower rents.

- **Higher quality of technical solutions**
  SABO should set higher requirements for some of the technical solutions, especially regarding the IT-system. It is important to have a long-term thinking and therefore the product should offer solutions that most likely will not become outdated.

- **Discount based on economies of scale**
  In order to cut the prices even more, a future framework agreement could be based on economies of scale, meaning that a discount is given to the public housing company who choose to build several buildings.

- **Develop a detailed calculation tool for the ground works**
  Ideally would be if SABO developed a more detailed calculation tool for the ground works so that the public housing companies' estimated costs could be more precise, because as it is now several of the clients have misjudged the costs for the ground works which have resulted in significantly higher total production costs than estimated. Regarding the boundaries in a future framework agreement, SABO should communicate more clearly in the framework agreement what is included in the building costs respectively in the foundation costs.

- **More focus on the after-sales market**
  An important aspect for SABO to consider is how the problems with the after-sales market can be solved. One suggestion is to, in the framework agreement, include that each public housing company solves the problems that occur after the final inspection by themselves and thereafter sends an invoice to the contractor.

- **Keep focusing on small public housing companies**
  It is especially important to have a product which is in accordance with the small public housing companies' demand. Turning too much optional additions into standard might limit the construction of new buildings for especially the small public housing companies who do not want it since the demand for it among tenants do not exist. Hence, by having a standard product as it is today with several optional additions it is up to each client to decide what optional addition they want to add. It should therefore be the clients' own responsibility if they want to increase their costs in order to receive a higher standard or quality since everyone has different opinions of what improves their value. Still, more focus should be put to cut the prices for the optional additions in order to be more competitive in the housing market.

8 References

Adler, P. (2005) *Bygga industrialiserat*. Stockholm: Svensk Byggtjänst.

Barlow, J., Childerhouse, P., Gann, D., Hong-Minh, S., Naim, M. and Ozaki, R. (2003) Choice and delivery in housebuilding: Lessons from Japan for UK housebuilders. *Building research & information*, 31(2), pp. 134-145.

Barlow, J. and Ozaki, R. (2003) Achieving 'Customer Focus ä in Private Housingbuilding: Current practice and Lessons from Other Industries. *Housing Studies,* 18(1), pp. 87-101.

Bejrum, H., Berglund, M.,Hellström, A., Lind, H. and Lundström, S. (2004) *Bostadsföretagens väg från byggkostnad till hyra för en lägenhet.* Stockholm: Royal Institute of Technology.

Björnfot, A. (2006) *An exploration of Lean thinking for multi-storey timber housing construction.* Doctoral thesis in the Department of Civil and Environmental Engineering. Luleå: Luleå University of Technology.

Blomé, G. (2011) *Organizational and economic aspects of housing management in deprived areas.* Dissertation in the Department of Real Estate and Construction Management. Stockholm: Royal Institute of Technology.

Borg, L. and Lind, H. (2006) *De allmännyttiga bostadsföretagens roll på bostadsmarknaden.* Stockholm: Royal Institute of Technology.

Boverket (2006) *Legislation – The Planning and Building Act.* Karlskrona: Boverket.

Boverket (2011) *Bostadsmarknaden år 2011-2012: Slutsatser av bostadsmarknadsenkäten.* Karlskrona: Boverket.

Boverket (2011:19) *Analys av bostadsbyggandet i Norden – huvudrapport.* Karlskrona: Boverket.

Boverket (2013) *Bostadsmarknaden 2013-2014: med slutsatser från bostadsmarknadsenkäten 2013.* Karlskrona: Boverket.

Boverket (2014) Upplåtelseformer och boendeformer i Sverige. *Boverket – Myndigheten för samhällsplanering, byggande och boendet.* http://www.boverket.se/Boende/Sa-bor-vi-i-Sverige/Upplatelseformerboendeformer/ (Accessed 2014-03-02).

Brendinger, A., Johnsson, C. and Ersman, M. (2010) *Bostadsbyggande – begrepp och kostnadsfördelning.* Göteborg: Sveriges byggindustrier, Fastighetsägarna & Göteborgs Stad.

Bryman, A. (2011) *Samhällsvetenskapliga metoder.* Second edition. Malmö: Liber.

Byggkostnadsforum (2006) Byggbolagen som ligger steget före. *Forum*, maj. www.boverket.se/Global/Webbokhandel/Dokument/2006/Forum_2.pdf (Accessed 2014-03-02).

Capano, C. and Karshenas, S. (2003) Applying accepted economic indicators to predict cost escalation for construction. In *ASC Proceedings of the 39th Annual Conference.* 10-12 April, 2003, South Carolina: Clemson University, pp. 277-288.

Chan, S. L. and Park, M. (2005) Project cost estimation using principal component regression. *Construction Management and Economics,* 23(3), pp. 295-304.

Dawson, D. (2002) *Practical Research Methods: A user-friendly guide to mastering research techniques and projects.* Oxford: How to Books Ltd.

Dahlquist, H. (2010) Därför misslyckas industriellt byggande. *Ny Teknik,* 2010-12-06. http://www.nyteknik.se/nyheter/bygg/byggartiklar/article3030701.ece (Accessed 2014-02-28).

Dymén, C., Fredricsson, C., Claessen, H. and Reardon, M. (2012) *Hinder och potentiella framgångsfaktorer i bostadsbyggnadsprocessen – En nordisk utblick.* Nordregio Working Paper 2012:2. Stockholm: Nordregio.

Eliasson, K. (2012) Vi kan bygga fler och billigare bostäder. *Dagens samhälle.* 2012-11-19. http://www.dagenssamhalle.se/debatt/vi-kan-bygga-fler-broch-billigare-bostaeder-4043 (Accessed 2014-05-12).

Engström, D. and Claeson-Jonsson, C. (2005) Industrialiserat bostadsbyggande betyder inte betonggetton! *Väg- och vattenbyggaren, No. 2., pp. 16-17.*

Eurostat (2011) *Price level indicates for construction, 2011, EU-27.* http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Figure_3._Price_level_indices_for_construction,_2011,_EU-27%3D100.png&filetimestamp=20121213081548 (Accessed 2014-05-12).

Forskningsrådet (2012) *Miljonprogrammet – Utveckla eller avveckla?.* Stockholm: Formas.

Gann, D. (1996) Construction as a manufacturing process? Similarities and differences between industrialized housing and car production in Japan. *Construction Management and Economics,* 14(5), pp. 437-450.

Gerth, R. (2008) *En företagsmodell för modernt industriellt byggande.* Stockholm: Royal Institute of Technology.

Gibb, A. (1999) Standardization and pre-assembly: Distinguishing myth from reality using case study research. *Construction Management and Economics,* 19(3), pp. 307-315.

Gibb, A. and Isack, F. (2001) Client drivers for construction projects: implications for standardization. *Engineering, Construction and Architectural Management,* 8(1), pp. 46-58.

Gibb, A. and Isack, F. (2003) Re-engineering through pre-assembly: client expectations and drivers. *Building Research & Information,* 31(2), pp. 146-160.

Halman, J., Voordijk, J. and Reymen, I. (2008) Modular approaches in Dutch house building: an exploratory survey. *Housing Studies,* 23(5), pp. 781-799.

Hamrebjörk, L. (2005) Ett industriellt byggande. *Väg- och vattenbyggaren, No. 2., pp. 5.*

Hedman, E. (2008) *Den kommunala allmännyttans historia.* Karlskrona: Boverket.

Hennink, M., Hutter, I. and Bailey, A. (2011) *Qualitative Research Methods. Thousand Oaks (CA):* Sage Publications.

Hofman, E., Halman, J. and Ion, R. (2006) Variation in Housing Design: Identifying Customer Preferences. *Housing Studies,* 21(6), pp. 929-943.

Holme, I. and Solvang, B. (1997) *Forskningsmetodik: Om Kvalitativa och kvantitativa metoder*. Lund: Studentlitteratur.

Häggroth, S. (2011) *Bostadsförsörjningen i Stockholms län: Analys och åtgärder.* Stockholm.

Häkkinen, T., Vares, S., Huovila, P., Vesikari, E., Porkka, J., Nilsson, L-O., Togerö, Å., Jonsson, C., Suber, K. and Andersson, R. (2007) *ICT for whole life optimization of residential buildings.* Finland: VTT Technical Research Centre of Finland.

Höök, M. (2008) Industriellt byggande kräver en förändrad byggkultur. *Husbyggaren, No. 6.* http://www.bygging.se/husbyggaren/artiklar/2008_6_01.pdf (Accessed 2014-04-25).

Jaillon, L. and Poon, C. (2009) The evolution of prefabricated residential building systems in Hong-Kong: A review of the public and the private sector. *Automation in Construction,* 18(3), pp. 239-248.

Jansson, G., Johnsson, H. and Engström, D. (2013) Platform use in systems building. *Construction Management and Economics,* 32(1-2), pp. 70-82.

Johnsson, H. (2012) *Fånga det industriella byggandet.* Luleå: Luleå University of Technology.

Johnsson, H., Jansson, G. and Jensen, P. (2013) Modularisation in a housing platform for mass customisation. In *Annual ARCOM Conference: Conference proceedings.* 2-4 September, 2013, Great Britain.

Josephson, P-E. and Saukkoriipi, L. (2007) *Waste in construction projects - call for a new approach.* Göteborg: Chalmers University of Technology.

JSB (2014) *Trygga Boendet – en vinnare.* http://www.jsb.se/trygga-boendet/ (Accessed 2014-03-25).

Kadefors, A., Thomassen, M. A. and Jørgensen, M. N. (2013) *Long term strategic collaboration in the construction industry – case studies from Denmark and Sweden.* Copenhagen: Realdania

Konkurrensverket (2012) *The Swedish Public Procurement Act – an introduction.* Stockholm: Konkurrensverket.

Konkurrensverket (2013) *Konkurrensen i Sverige 2013.* Stockholm: Konkurrensverket.

Konkurrensverket (2014) Ramavtal. *Konkurrensverket, Swedish Competition Authority.* http://www.konkurrensverket.se/t/Process____3289.aspx (Accessed 2014-05-05).

Lessing, J. (2006) *Industrialised House building: Concepts and Processes.* Licentiate thesis. Lund: Lund University.

Lind, H. (2007) Bygg och boendekostnader i ett historiskt perspektiv. In *Familjebostäder: flera kapitel i svensk bostadspolitik.* Stockholm: Stockholmia Förlag.

Lind, H. (2011) Industrialized House Building in Sweden: A stress test approach for understandsing success and failure. In *6th Nordic Conference on Construction Economics and Organisation*; *Conference proceedings.* 13-15 April, 2011, Copenhagen.

Lindbäcks (2014) *Om Lindbäcks Bygg.* http://www.lindbacks.se/page77.php (Accessed 2014-04-28).

Malmgren, L. (2014) *Industrialized construction – explorations of current practice and opportunities.* Dissertation in the Department of Civil and Environmental engineering. Lund: Lund University.

Meyer, M. and Lehnerd, A. (1997) *The power of Product Platforms – Building value and cost leadership*. New York: Free Press.

Nybyggarkommissionen (2014) *En bostadspolitisk agenda för Sverige – 63 förslag för ett ökat byggande.* Stockholm: Nybyggarkommissionen.

Olofsson, T., Rönneblad, A., Berggren, B., Nilsson, L-O., Jonsson, C., Andersson, R. and Malmgren, L. (2012) *Kravhantering, produkt- och projektutveckling av industriella byggkoncept.* Lund: Lund University.

Ozaki, R. (2002) Customer-focused approaches to innovation in housebuilding. *Construction Management and Economics,* 21(6), pp. 557-564.

SABO (2011) SABOs Kombohus – en utmaning för leverantörer och entreprenörer av bostadshus. http://www.konkurrensverket.se/t/Process____3289.aspx (Accessed 2014-05-05).
http://omvarldsbevakning.byggtjanst.se/PageFiles/99087/Kombohus%20tävlingsbidrag.pdf?epslanguage=sv. (Accessed 2014-02-20).

SABO (2013) SABO Kombohus. Bygg nytt i liten skala – Prispressat typhus för kompletteringsbebyggelse.
http://www.sabo.se/kunskapsomraden/nyproduktion/SABOs%20Kombohus/Sidor/default.aspx. (Accessed 2014-02-05).

SABO (2014a) Om SABO. *Sveriges Allmännyttiga Bostadsföretag.*
http://www.sabo.se/om_sabo/Sidor/default.aspx. (Accessed 2014-03-27).

SABO (2014b) Flerbostadshus till fast pris! Ett färdigt alternativ för kompletteringsbebyggelse i 2-4 våningar.
http://www.sabo.se/kunskapsomraden/nyproduktion/SABOs%20Kombohus/Documents/SABOs_Kombohus.pdf (Accessed 2014-03-27).

SFS 1991:900. *Kommunallagen.* Stockholm: Finansdepartementet.

SFS 2002:102. *Lag om allmännyttiga bostadsföretag.* Stockholm: Socialdepartementet.

SFS 2007:1091. *Lag om offentlig upphandling.* Stockholm: Socialdepartementet.

SFS 2010:879. *Lag om allmännyttiga kommunala bostadsaktiebolag*. Stockholm: Socialdepartementet.

SFS 2010:900. *Plan- och bygglag.* Stockholm: Socialdepartementet.

Silverman, D. (2008) *Interpreting Qualitative Data: Methods for Analyzing Talk, Text and Interaction.* Second edition. London: Sage Publications.

SKL and SABO (2011) Ägardirektiv till allmännyttiga kommunala bostadsbolag – En handledning. Stockholm: SKL och SABO.

SOU 2002:115. *Skärpning gubbar! Om konkurrensen, kvaliteten, kostnaderna och kompetenser i byggsektorn.* Stockholm: Fritzes Offentliga Publikationer.

SOU 2008:38. *EU, allmännyttan och hyrorna.* Stockholm: Fritzes Offentliga Publikationer.

SOU 2012:88. *Att hyra – från en rätt för allt färre till en möjlighet för allt fler.* Stockholm: Fritzes Offentliga Publikationer.

Svanerudh, P. (1998) *Förkonstruerade byggnader: systemtänkande för en effektivare byggprocess.* Licentiate thesis. Luleå: Luleå University of Technology.

Svensson, N. (2014) Sveriges byggindustrier verkar för industriellt byggnad. *Fastighet och bostadsrätt. 2014-02-12.* http://www.fastighetochbostadsratt.com/Industriellt-byggande/50640-Sveriges-Byggindustrier-verkar-for-industriellt-byggande.html (Accessed 2014-04-25).

Tollesson, N. (2013) Attefall: Bort med kommunala särkrav. *Fastighetssverige. 2013-09-12.* http://www.fastighetssverige.se/artikel/attefall-bort-med-kommunala-sarkrav-12677/ (Accessed 2014-06-09).

Warsame, A. (2006) *Supplier structure and Housing construction costs.* Report 5:73 in the Department of Real Estate and Construction Management. Stockholm: Royal Institute of Technology.
Wallin, M. (2008) Strategin att industrialisera husbygge stegvis gick hem. *Husbyggaren, No. 2.* http://www.bygging.se/husbyggaren/artiklar/2008_2_01.pdf (Accessed 2014-04-25).

Veenstra, V., Halman, J. and Voordijk, J. (2006) A methodology for developing product platforms in the specific setting of the housebuilding industry. *Research in Engineering Design,* 17(3), pp. 157-173.

Winch, G. (2003) Models of manufacturing and the construction process: the genesis of re-engineering construction. *Building Research & Information,* 31(2), pp. 107-118.

Appendices

Appendix I – Guideline for interviews with clients who have on-going projects

Bakgrund

- Vilken är din bakgrund (utbildning, erfarenhet)?
- Vilken är din roll på företaget/projektet?
- Har du någon tidigare erfarenhet av nyproduktion?
- Har ni på företaget någon tidigare erfarenhet av nyproduktion?
- I vilket skede är ni med Trygga Boendet?

Steg 1. Konceptet

- Varför har ni nyttjat ramavtalet SABO Kombohuset?
- Hade ni några specifika krav som var tvungna att vara uppfyllda för att ni skulle acceptera konceptet? (Minimikrav)
- Vad har varit bra med konceptet?
- Vad har varit mindre bra?
- Hur går konceptet ihop med ert bolags miljötänk?
- Vad tycker ni om standarden avseende på den tekniska utrustningen?
- Vad tycker ni om utformningen exteriört? (materialval och arkitektur)
- Har ni nyttjat optioner och tillvalspaketen? Vilka?

Steg 2. Ramavtalet

- Vad tycker ni om ramavtalet, var det något speciellt som ni reagerade på?
- Kan ni tänka er att nyttja ramavtalet igen?
  - Varför/Varför inte?

Steg 3. Tidiga skeden

- Hur lång tid tog det att få bygglov?
- Hur har allmänheten och kommunens syn varit på Trygga Boendet?
- Finns det några särkrav som gäller i er kommun och som i sin tur har påverkat projektet?

Steg 4. Kalkylen

- Har ni nyttjat det kalkylstöd som finns framtaget av SABO?
  - Har ni några synpunkter på kalkylstödet?
- Vad trodde ni att den totala produktionskostnaden skulle bli när ni skrev kontrakt? (inkl. moms och markkostnad)
- Vilket inköpspris för marken har ni med i den totala produktionskostnaden?
- Finns det någon anmärkningsvärd kostnad i kalkylen?
- Om man ser till annan nyproduktion som ni har haft, vad har er totala produktionskostnad hamnat? (Spann)

Steg 5. Hyra och hyresgäster

- Har ni gjort någon marknadsundersökning innan projektet startade?
- Vad trodde ni att den faktiska snitthyran skulle bli när ni skrev kontrakt? (kr/m^2 och år)
- Vad blev den faktiska snitthyran i projektet? (kr/m^2 och år)

- Om man ser till annan nyproduktion som ni har haft, vad har er faktiska snitthyra blivit? (Spann)
- Hur har ni satt hyran?
  - Varför valde ni detta?
- Har ni varit i kontakt med hyresgästföreningen?
- Hur har det gått att hyra ut?
  - Sämre eller bättre än vad ni trodde?
- Har ni någon målgrupp för lägenheterna?
  - Blev målgruppen som ni hade tänkt eller blev det någon annan målgrupp?
- Har ni fått några allmänna synpunkter från hyresgästerna?

Steg 6. Relationer

- Hur har kontakten mellan er och JSB varit under projektets gång?
  - Vad har varit bra/mindre bra?
- Hade ni kunnat tänka er att anlita JSB som entreprenör igen?
  - Varför?

Steg 7. Önskemål till en framtida ramupphandling

- Om ni skulle få välja en optimal lägenhetsfördelning, d.v.s. 1or 2or 3or, för ett plan hur skulle det då se ut?
- Hur stor ytstorlek skulle de i så fall ha?
- Vad gäller flexibiliteten, vilken påverkan från ert håll skulle varit önskvärd?
- Vad borde varit standard vad avser tekniken?
- Vilka optioner och tillvalspaket borde erbjudas i framtida ramupphandling?
- Inom vilket spann får det kosta i total produktionskostnad för att det skall vara acceptabelt?
- Vad brukar inköpspris för marken vara? (Spann)
- Vilka hyresnivåer bedömer ni att ni kan hyra ut produkten ni beskrivit för? (Spann)
- Hur mycket bostäder bedömer ni att ni skulle kunna bygga med ett nytt ramavtal under förutsättning att produkten är i nivå med vad ni här beskriver?
- Totalt, hur mycket bostäder bedömer ni att ni skulle kunna bygga på 4-6 år?
  - Vad begränsar antalet?

Steg 8. Övrigt generell fråga

- Sett till hela Sverige, vad anser ni är de största hindren för ett ökat bostadsbyggande?
- Vill ni delta i en diskussion för att ta fram utformningen av nästa ramupphandling?

Appendix II – Guideline for interviews with clients who have completed projects

Bakgrund

- Vilken är din bakgrund (utbildning, erfarenhet)?
- Vilken är din roll på företaget/projektet?
- Har du någon tidigare erfarenhet av nyproduktion?
- Har ni på företaget någon tidigare erfarenhet av nyproduktion?
- I vilket skede är ni med Trygga Boendet?

Steg 1. Konceptet

- Varför har ni nyttjat ramavtalet SABO Kombohuset?
- Hade ni några specifika krav som var tvungna att vara uppfyllda för att ni skulle acceptera konceptet? (Minimikrav)
- Vad har varit bra med konceptet?
- Vad har varit mindre bra?
- Hur går konceptet ihop med ert bolags miljötänk?
- Vad tycker ni om standarden avseende på den tekniska utrustningen?
- Vad tycker ni om utformningen exteriört? (materialval och arkitektur)
- Har ni nyttjat optioner och tillvalspaketen? Vilka?

Steg 2. Ramavtalet

- Vad tycker ni om ramavtalet, var det något speciellt som ni reagerade på?
- Kan ni tänka er att nyttja ramavtalet igen?
  - Varför/Varför inte?

Steg 3. Tidiga skeden

- Hur lång tid tog det att få bygglov?
- Hur har allmänheten och kommunens syn varit på Trygga Boendet?
- Finns det några särkrav som gäller i er kommun och som i sin tur har påverkat projektet?

Steg 4. Kalkylen

- Har ni nyttjat det kalkylstöd som finns framtaget av SABO?
  - Har ni några synpunkter på kalkylstödet?
- Vad trodde ni att den totala produktionskostnaden skulle bli när ni skrev kontrakt? (inkl. moms och markkostnad)
- Vilket inköpspris för marken har ni med i den totala produktionskostnaden?
- Finns det någon anmärkningsvärd kostnad i kalkylen?
- Om man ser till annan nyproduktion som ni har haft, vad har er totala produktionskostnad hamnat? (Spann)

Steg 5. Hyra och hyresgäster

- Har ni gjort någon marknadsundersökning innan projektet startade?
- Vad trodde ni att den faktiska snitthyran skulle bli när ni skrev kontrakt? (kr/m^2 och år)
- Vad blev den faktiska snitthyran i projektet? (kr/m^2 och år)

- Om man ser till annan nyproduktion som ni har haft, vad har er faktiska snitthyra blivit? (Spann)
- Hur har ni satt hyran?
  - Varför valde ni detta?
- Har ni varit i kontakt med hyresgästföreningen?
- Hur har det gått att hyra ut?
  - Sämre eller bättre än vad ni trodde?
- Har ni någon målgrupp för lägenheterna?
  - Blev målgruppen som ni hade tänkt eller blev det någon annan målgrupp?
- Har ni fått några allmänna synpunkter från hyresgästerna?

Steg 6. Relationer och eftermarknad

- Hur har kontakten mellan er och JSB varit under projektets gång?
  - Vad har varit bra/mindre bra?
- Hur har kontakten fungerat under garantitiden?
  - Hur har det fungerat med att entreprenören inte finns lokalt?
- Hade ni kunnat tänka er att anlita JSB som entreprenör igen?
  - Varför?

Steg 7. Önskemål till en framtida ramupphandling

- Om ni skulle få välja en optimal lägenhetsfördelning, d.v.s. 1or 2or 3or, för ett plan hur skulle det då se ut?
- Hur stor ytstorlek skulle de i så fall ha?
- Vad gäller flexibiliteten, vilken påverkan från ert håll skulle varit önskvärd?
- Vad borde varit standard vad avser tekniken?
- Vilka optioner och tillvalspaket borde erbjudas i framtida ramupphandling?
- Inom vilket spann får det kosta i total produktionskostnad för att det skall vara acceptabelt?
- Vad brukar inköpspris för marken vara? (Spann)
- Vilka hyresnivåer bedömer ni att ni kan hyra ut produkten ni beskrivit för? (Spann)
- Hur mycket bostäder bedömer ni att ni skulle kunna bygga med ett nytt ramavtal under förutsättning att produkten är i nivå med vad ni här beskriver?
- Totalt, hur mycket bostäder bedömer ni att ni skulle kunna bygga på 4-6 år?
  - Vad begränsar antalet?

Steg 8. Övrigt generell fråga

- Sett till hela Sverige, vad anser ni är de största hindren för ett ökat bostadsbyggande?
- Vill ni delta i en diskussion för att ta fram utformningen av nästa ramupphandling?

Appendix III – Trygga Boendet: Floor plan and interior design

In Figure 7, Figure 8, Figure 9, and Figure 10, the floor plans of Trygga Boendet are illustrated. In Figure 11, Figure 12 and Figure 13, the interior design in the kitchen, bathroom and living room are showed.

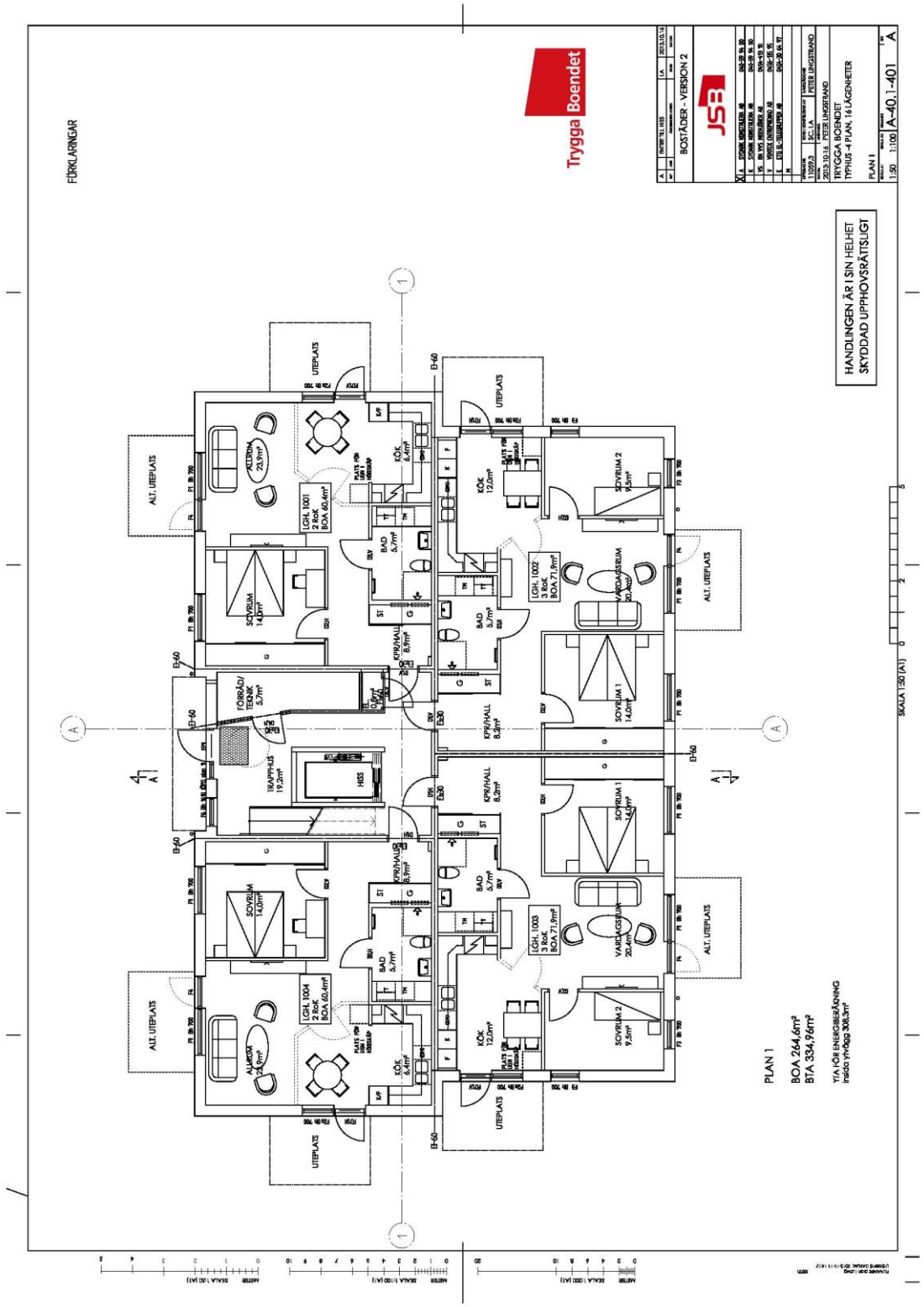

Figure 7: Floor plan 1

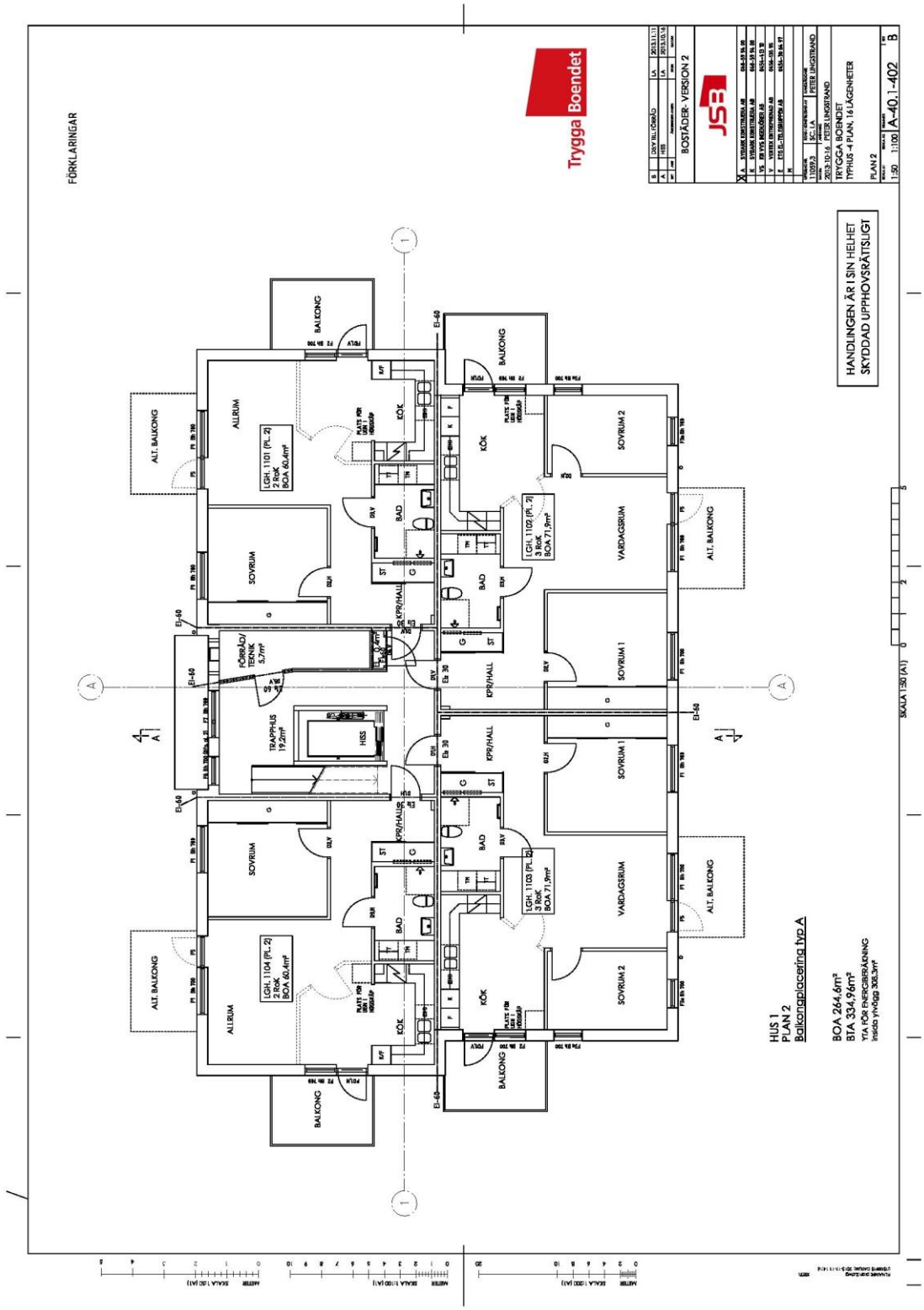

Figure 8: Floor plan 2

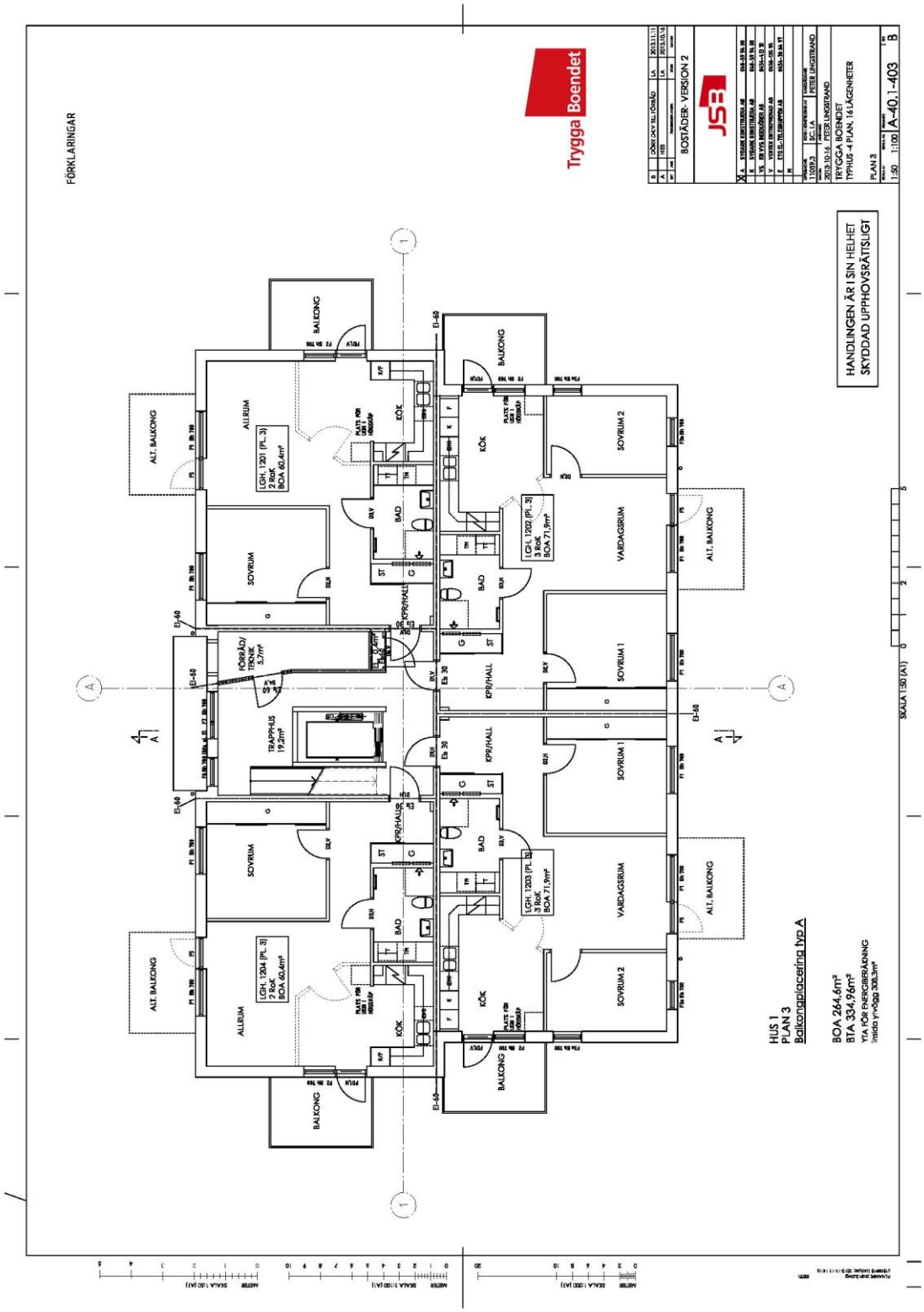

Figure 9: Floor plan 3

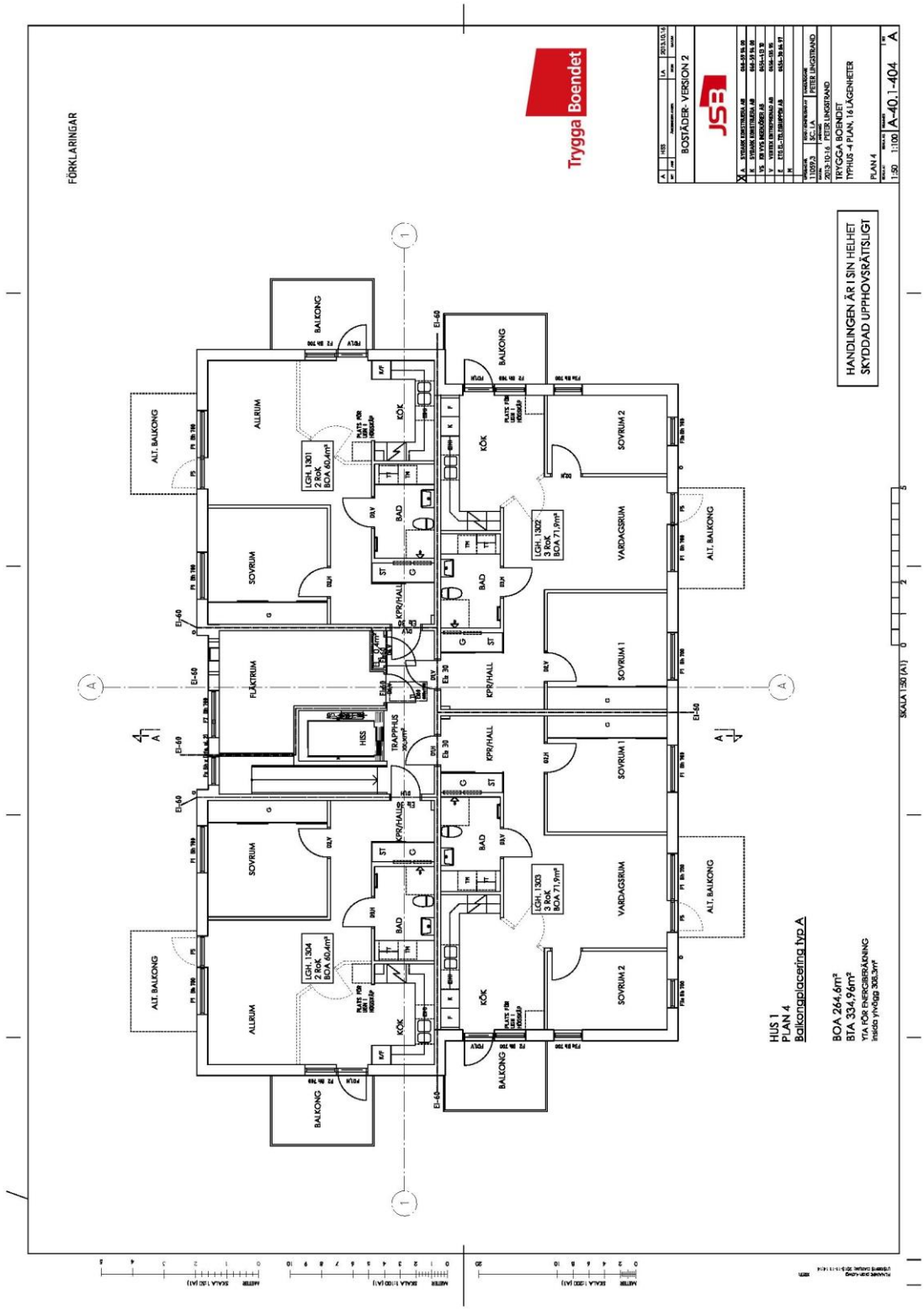

Figure 10: Floor plan 4

Figure 11: Kitchen in Trygga Boendet

Figure 12: Bathroom in Trygga Boendet

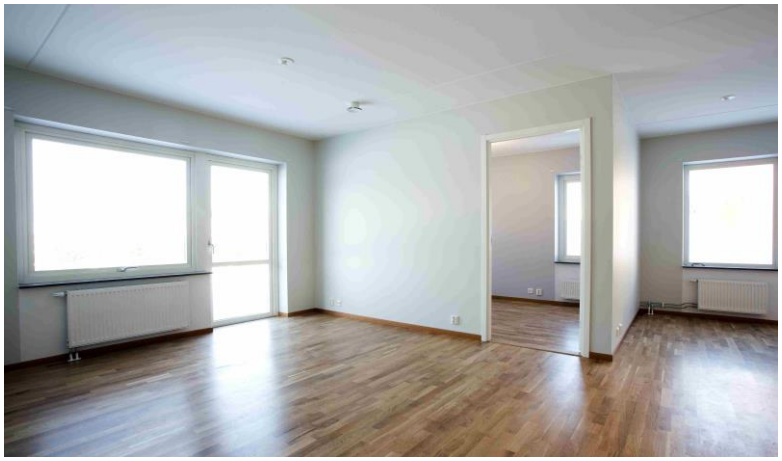

Figure 13: Living room in Trygga Boendet