CHALMERS

Managing change

- Change processes and the industrialization of the construction sector

Master's Thesis in the Master's programme

Design and Construction Project Management

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Department of Civil and Environmental Engineering
Division of Building Economics and Management
CHALMERS UNIVERSITY OF TECHNOLOGY
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ABSTRACT

The purpose of this master's thesis is to show how a change process can be compassed on the account of an organizational change. Hence a suitable scope of research for this thesis is a case study of the construction sector's need for change. The aim is to investigate and discuss the construction sector's change processes and to give recommendations on how the change process from traditional to industrial construction processes could be carried out. The study is based on both primary and secondary data acquired from literature studies and interviews.

The conclusion of this study is that the construction sector has succeeded in identifying a need for change as well as the reasons for it. Although, the construction sector have succeeded in carrying out the first three steps in a change process properly, the sector must put more effort into the remaining parts of the change process as there is no distinct continuance of the change process towards industrial construction.

Key words: change process, change agent, change resistance, industrial construction

Hantera förändring

- Förändringsprocesser och industrialiseringen av byggsektorn

Examensarbete inom magisterprogrammet Design and Construction Project Management

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SAMMANFATTNING

I Sverige råder det för närvarande en bostadsbrist och de allra flesta kommuner runtom i landet påstår att produktionskostnaderna är en av de främsta orsakerna till detta. Bostadsbristen grundar sig främst i att det i början på 1900-talet skedde en avreglering av bostadsmarknaden och att de statliga subventionerna som funnits under många år slopades. Detta ledde till att full mervärdesskatt infördes på byggandet, vilket i sin tur orsakade mycket omfattande strukturförändringar i byggsektorn och på bostadsmarknaden. Den ökade produktionskostnaden har dock sina orsaker i ett flertal faktorer som exempelvis otidsenliga upphandlingsformer, låg förtillverkningsgrad, bristande planering och logistik m.m.

En av de förändringar som förespråkas för att byggsektorn skall komma tillrätta med de höga produktionskostnaderna är att byggsektorn bör utvecklas till en sektor som använder industriella modeller och arbetssätt jämförbar med andra industrisektorer. För att kunna möta efterfrågan gällande sänkta produktionskostnader måste en förändring av de nuvarande värdekedjorna i byggsektorn genomföras.

Själva förändringen som företagen i byggsektorn genomgår är radikal, d.v.s. stora organisatoriska förändringar till följd av ändrade arbets- och produktionsmetoder. Studien baseras därför på en fallstudie om byggsektorns förändringsbehov samt på både primär- och sekundärdata vilka inhämtats i form av litteraturstudier och sju genomförda intervjuer. De sju intervjuade respondenterna arbetar på sju av Sveriges största byggföretag, som i dag arbetar med industriellt byggande i någon form. Den här studien syftar till att visa hur en förändringsprocess, driven av en organisationsförändring, kan genomföras. Målet är att undersöka byggsektorns förändringsprocesser samt ge rekommendationer om hur förändringsprocessen från traditionellt till industriellt byggande skulle kunna genomföras.

Studiens slutsats, baserad på såväl primär- som sekundärdata, är att byggsektorn lyckats med att identifiera ett förändringsbehov samt även orsaken till denna. Vi anser även att byggsektorn, i allmänhet, genomfört en del av förändringsprocessen som är nödvändig för att införa industriellt byggande. Däremot finner vi ingen tydlig fortsättning på denna förändringsprocess och rekommenderar därför byggsektorn att lägga mera kraft på den resterande delen av förändringen till industriellt byggande.

Nyckelord: förändringsprocess, förändringsagent, förändringsmotstånd, industriellt byggande

Contents

Preface

This study is a mandatory master's thesis for the civil engineer programme at Chalmers. The thesis covers 30 university points and has been carried out with guidance from the Division of Building Economics and Management at Chalmers. The idea to do the master's thesis came from own initiatives, that along with our tutors comments, has been developed into this final thesis.

We want to thank the following:

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- The seven respondents that were interviewed, who has shown a big interest in the subject and contributed to interesting discussions.
- Karin Johansson, our opponent, who has assisted with ideas and proposals and been a big support during our work process.
- Our dear and beloved, families and friends, who supported us during this process.

Göteborg, December 2007

Johannes Rapai Camilla Wallgren

1 Introduction

This chapter describes the background to the need for change the construction sector stands before today. The need for change concerns production of housings as the companies in the construction sector is on their way towards an increased degree of industrialization. Furthermore, the chapter presents the purpose, aim and limitations for this Master's Thesis.

1.1 Background

Between 2005 and 2006, 60 percents of Sweden's population lived in municipalities with housing shortage (Boverket, 2005). Five years ago it was only each third inhabitant who lived in a municipality with housing shortage and 1998 not more than every tenth. 40 percents of the municipalities in the country made, between 2005 and 2006, the assessment that it is necessary to build more housings than what is expected to be built during the next few years. Most of these municipalities argue that the high cost of production is the foremost reason to why housings are not built on a larger scale (ibid.). The average production cost per square meter for a block of flats amounted during 2005 to 23 680 SEK compared with 2000 when the cost amounted to 18 122 SEK, i.e. an increase with approximately 30 percent (SCB, 2007). The average production cost per square meter for apartments in group built small houses, on the other hand, amounted during 2005 to 15 234 SEK compared with 2000 then the production cost amounted to 13 484, i.e. an increase with approximately 13 percent.

The reason for the advised housing shortage in Sweden began during the early 90's when a deregulation of the housing market took place and the state subventions, which had existed for many years, were abolished (Apleberger, Jonsson and Åhman, 2007). As a consequence, full value added tax was introduced on construction which in turn caused very extensive structural changes in the construction sector and on the housing market. What have been the contributing factors for the increase of production cost in Sweden during the past years? Factors as old-fashioned purchasing forms, low level of preproduction degree, inadequate planning and logistics and actors who, instead of interacting and cooperating, guard their positions have together contributed to inefficiency within the sector (ibid.). Apart from increased production costs, quality deficiencies have also been occurring in the form of inaccurate building and sick houses (Ilestam and Törnkvist, 2004).

These problems have prevailed in the construction sector and several investigations such as the State Building Cost Delegation's "From construction sect to construction sector" (SOU, 2000:44) and "Skärpning gubbar" (SOU, 2002:115) have adverted these. The aim with the first investigation is that the State Building Cost Delegation will, in collaboration with the actors in the construction sector, actively work to lower production and administrative costs for housings and thereby achieve lower accommodation costs. In other words, work in order to create a market where the sector produces housings that normal wage earners can afford and want to pay for (ibid.). Jan Borgbrant (2003) reckon that the high production costs originates in that companies within the construction and the real estate sector had some difficulties during the last years with few activities becoming profitable. It has meant that the

companies tried to find areas for housing production which are so attractive for the customers that the price levels could be pushed up in order to, by these means, reach reasonable profit margins (ibid.).

When other sectors have succeeded to lower their production costs substantially, the construction industry has instead increased theirs. The question is whether they will come to terms with this problem? One of the changes that are advocated in the State Building Cost Delegation's report "From construction sect to construction sector" (SOU, 2000:44) is that the construction sector should be developed into a sector that uses industrial models and methods, comparable with other industrial sectors as for example the automotive industry. An increased degree of industrial building should, according to these arguments, lead to an increased cost efficiency improvement, which also makes low prices possible for the individual normal wage earner. In order to meet the demand regarding increased cost efficiency improvements, which makes a lower price for the normal wage earner possible, a more cost effective construction process need to develop. Which in turn can only be achieved by transforming the current value chains, argues the State Building Cost Delegation in the report "From construction sect to construction sector" (ibid.). This is in line with Borgbrant (2003) who also have established this and states that:

"A well balanced increase of the level of industrialization creates conditions for a more effective construction process and enables a larger function and customer adaptation to lower production costs"

It is, for the sake of clarity, important to separate the concepts industrial construction and industrialized construction. We have chosen to define these concepts in accordance with Apleberger, Jonsson and Åhman (2007) who defines industrial construction as production processes in a closed environment where only the final assembly is on the construction site. Industrialized construction, on the other hand, is defined through the construction and planning processes are run according to industrial principles. Where among other things, pre-produced components are used and where a majority of the construction happens on the construction site (ibid.).

Many of the methods for industrial construction originate in the automotive industry and Toyota's production philosophy *lean production*, which aims to relinquishing project-based production and instead increase the production in factories with continuous production and to increase the use of standardized components. PEAB, NCC, Skanska and JM are some of the largest companies who have invested in this concept although in different contexts, i.e. the companies have made different approaches to achieve their aim; namely to improve the quality and lower the production costs. Some have invested in factories for production while others have focused on developing guidelines for the design work in order to increase the use of standardized components. Although the approaches vary, there are some common ingredients in them; increased control over the building designs, longer relationships with other stakeholders and increased use of prefabricated components.

1.2 Purpose, aim and Limitations

The purpose of this master's thesis is to show how a change process can be compassed on the account of an organizational change. The aim is to inquire the construction sector's change processes and to give recommendations on how the change process from traditional to industrial construction could be carried out.

We have chosen not to study the various industrial construction methods which are used in the construction sector today, because of the simple reason that the focus is not on the methods but rather on the change from traditional to industrial construction. This thesis is therefore limited to consider organizational aspects of change actuated by implementing industrial construction in the Swedish construction sector.

2 Theoretical Framework

This chapter describes the nature of changes and the difficulties with resistance to change. Resistance is one of the major hindrances organizations stand before when implementing changes, however, there are methods for managing resistance and to perform a successful organizational change.

2.1 Change

According to Bakka et al. (2006) a change does not need to be a process which is deliberately steered towards a specific goal. It can instead be an unaware, constantly ongoing process as an answer to a constantly changing environment.

2.1.1 Factors making a change necessary

There are several reasons to why a change is necessary and Nilsson (1999) describes them as:

Higher change rate

A higher change rate means turbulence in companies' economy as new products and work methods are added at the expense of the existing ones. Therefore Nilsson (1999) entitles this as the economical dynamics, i.e. adaptation to new conditions. Today, this process is faster than ever due to an intensifying growth of new ideas and trends. In other words, this means shorter product lifecycles which in turn makes the planning of future company activities uncertain.

Increased competition

As the production catches up with the demand on the market it devolves into a buyer's market and thereof to an increased competition for the customers. An increased competition also enhances the demand on the companies' skill to meet the requirements on quality and price of their products and services.

Changed buying habits

As the consumers' primary needs are satisfied they do not only consume what they need but also things that satisfy their psychological needs. This consumption leads to the market being divided into several micro markets.

Increased service consumption

In today's society it becomes more difficult to separate products from services. This because the products are more service oriented at the same time as the consumption of pure services has increased.

Values change

Individuals of today make more demands on their work than they did before. Activities which involve fellowship, meaning, development and responsibility are prioritized.

New technology

It is important that companies incorporate the development in technology as new technology makes new business, new production methods, new organizational forms and new economical prerequisites possible. Moreover, new technology can also create new markets for companies.

Rationalization in a new way

It seems like the old rationalization ideas are drained. The information technology combined with new ideas about work organizations are expected to dramatically increase the productivity.

Political changes

Companies will always be affected by political decisions such as new laws and regulations. These political changes can be seen as forces which affect, strengthens and overlap each other and can hopefully point out if the company is in need of a radical change.

2.1.2 Various types of change

Organizations can change in various ways according to Ahrenfelt (2001), and can be divided into changes of the first respectively the second order. Changes of the first order are internal changes within the company which are not affected by the surrounding environment. The change work is, in this case, about increasing the productivity and lowering costs. Changes of the second order are on the other hand affected by the surrounding environment and are implemented as a result of increased external requirements (ibid.).

Bruzelius and Skärvad (2004) and Jacobsen and Thorsvik (2002) describes changes similarly as Ahrenfelt (2001) but refer to changes of the first order as incremental changes and changes of the second order as radical changes. Incremental and radical changes are separated by the changes' scope as the scope influences both the difficulty to apply the change and the way to lead and manage the change process (Bruzelius and Skärvad, 2004; Jacobsen and Thorsvik, 2002). Incremental changes infer change activities in an organization which are supposed to improve and refine what already exist within the organization, e.g. processes and procedures. The change work itself, considering incremental changes, occurs within the framework of the organization's existing structure. Radical changes, on the other hand, infer changes which aim to structurally reshape the business, e.g. change an organization's business concept, strategic direction and/or the organization form. The characteristics of incremental and radical changes are illustrated in *table 1* (ibid.).

Table 1: *A comparison between incremental and radical changes (Bruzelius and Skärvad, 2004)*

Incremental changes	**Radical changes**
• Minor scale • Successive • Evolutionary • Built upon history • Lower risk • Less potential • New competence can evolve during a longer time	• Larger scale • Fast/Radical • Revolutionary • Breaks with history • Higher risk • Greater potential • New competence is often needed instantly

According to Balogun and Hope Hailey (2004) there are mainly four ways to changes, *figure 1*. These four ways are defined in two dimensions – the aim with the change and the way of change.

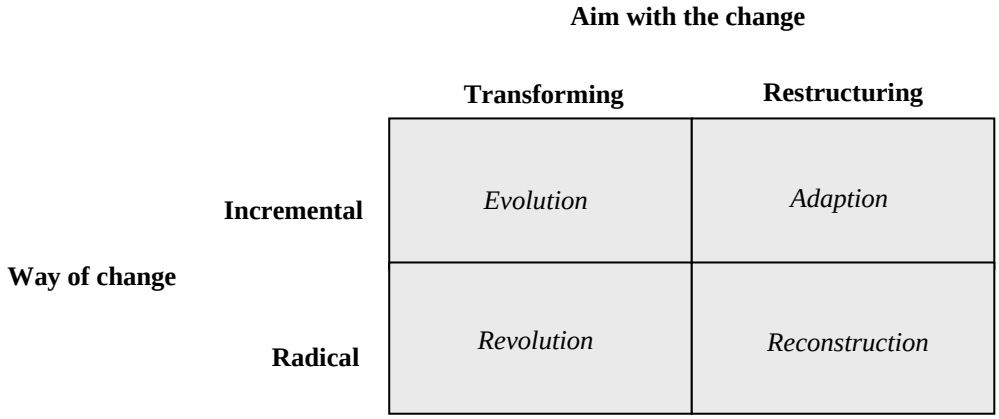

Figure 1 *Four ways to change (Balogun and Hope Hailey, 2004).*

Evolution infers trying to change values, attitudes and behavior among the employees. This means a fundamental change within the company which happens gradually over a long period through a series of activities. Even though a company's competitive situation demands a rapid change, there can be other aspects within the organization which deter a revolutionized change.

A *revolution* infers a radical transformational change which is implemented in a stroke on several fronts and often during a relatively short time period. This type of change emerges normally when the organization is forced to a rapid change in order to survive harsher competitive situations.

Adaptation infers a less profound change of the organization, which in turn is implemented gradually.

Reconstruction also infers adaptation of the organizational way to work, although with more dramatically means. This type of change aims to improve the organization or to make it more efficient, but do not aim to remarkably change the present organizational culture (ibid.).

Balogun and Hope Hailey (2004) do not want to use the term *types of change*. They prefer the term *way of change* as change work can include more than one type of change before the aim is reached. An organization can for example be forced to begin with a *reconstruction* to resolve the company's economical situation before it is possible to implement a long-term *evolution* (ibid.).

2.2 The role of the change agent

In order to create the best conditions for changes to succeed it is essential to have someone who manages and has the responsibility for the change, a so called change agent (Johnson and Scholes, 1999). The change agent is an individual or a group who executes a change in an organization, consequently those who develop the strategy for a change does not have to be the same ones to actually manage the change work. Change agents can be either internal or external and a common example of an external change agent is the change consultant (Werr, 1997). The advantages with an external agent are that the organization is seen unbiased and that someone who resides in the organization during a limited time period can experience more freedom of action and also relieve the usual organization representatives from reactions to the change. However, a disadvantage can be the declining effect of the external change agent's influence when the agent's commission is completed (Meyer and Stensaker, 2006). Yet another disadvantage is that external change agents might not take long-term consequences of their actions and decisions into consideration. This because they are not forced to take part of any subsequent consequences the change might result in.

An internal change agent can be a manager, an employee or a colleague within the organization. The advantage with an internal change agent is that they are generally well-known and respected within the organization. Furthermore, they have more interest in taking care of the long-term consequences as they themselves will be affected by the change. Hence the internal change agent risks becoming more careful with taking chances and can thus become less efficient in the short term (ibid.).

2.2.1 The change agent's qualities

Buchanan and Boddy (1992) account for a study where fifteen key competences have been identified as essential for a change agent to be efficient in his/her work. The authors merge these key competences into five categories: aim, roles, communication, negotiation and managing up.

Aim

1. The change agent must be keen to changes among key personnel within the organization.

2. The change agent must be clear when specifying the aims as these have to be achievable. There are many ways to mediate aims and there are several types of aim which makes it paramount to be clear so misunderstandings can be avoided.

3. The change agent must be flexible towards changes which emerge beyond the agents control as they can require major changes in the project aim and/or the management as well as they can entail risks. Large projects and complex projects do rarely progress as they were meant to from the start so the change agent should anticipate sudden turns during the project.

Roles

4. The change agent must be good at team building, bringing together key stakeholders and creating efficient work groups along with being able to define and delegate responsibilities.

5. The change agent should have abilities in creating and maintaining good connections with suitable contacts within and outside the organizations limits.

6. The change agent must have an understanding for and indulgence with differences to be able to work in a comfortable, patient and efficient way in a changeable environment.

Communication

7. The change agent must have good communication skills to be able to communicate the need of changes in a project, regarding individual tasks and responsibilities, to colleagues and personnel.

8. The change agent needs good mediation skills which involve doing selections, listening, gathering correct information, discover troubles among other people and to manage meetings.

9. The change agent must show a personal enthusiasm when presenting plans and ideas as the agent can influence others in the change work by his/her commitment and enthusiasm.

10. The change agent ought to stimulate a motivation and commitment in other members involved in the change work. A change can often drag on time and it is important that the involved persons are continuously motivated and committed in the change work.

Negotiation

11. The change agent must be able to market his/her thoughts and ideas to others by creating a sought after and challenging vision of the future.

12. The change agent must be able to solve conflicts and to negotiate with key persons about resources or changes in procedures.

Managing up

13. The change agent should be aware of corporate policies to identify potential fusions and to balance contradictive aims and apprehensions.

14. The change agent must be able to affect and spread influences to increase the commitment for project plans and ideas even among potential skeptics and opponents.

15. The change agent ought to have a so called helicopter perspective, i.e. have the possibility to take a step back and consider the project more objectively.

2.3 The change process

An organizational change is a process in several steps. Dessler (1992) illustrates an organizational development's progress and implementation, *figure 2*.

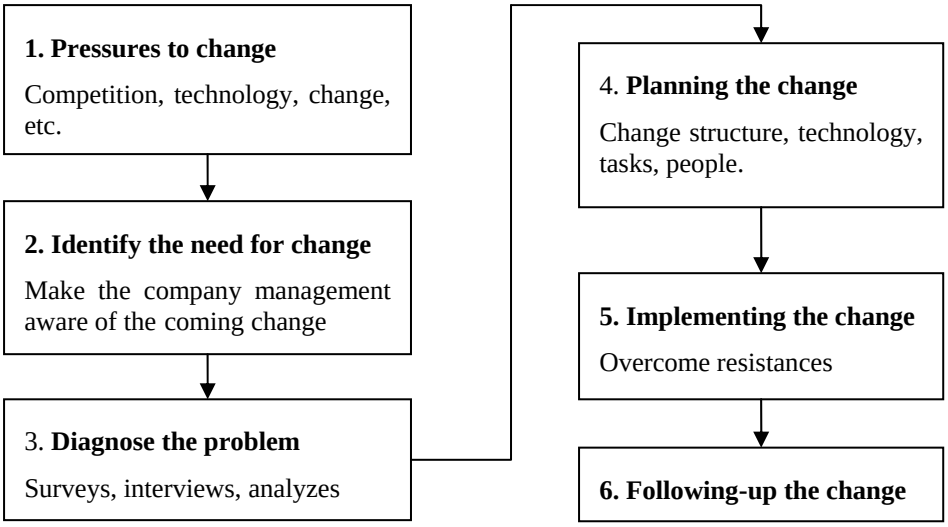

Figure 2**:** *A model over an organizations change process (Dessler, 1992).*

1. **Pressures to change:** Most organizational changes are controlled by either pressures from the surrounding environment or by pressures from within the organization itself. Moreover, there are external sources of pressure which forces organizations to initiate changes, as for example technological changes, laws and regulations. Conflicts, personnel turnover and anxiety can arise within an organization when it outgrows an old way of working, which in turn results in internal pressure to change. It is such pressures which in turn create a need for changing an organizations structure, technology, ways of work and personnel.

2. **Identify the need for change:** The second step infers the company managers to identify and accept the need for change. This phase is required to make the company managers as well as the employees aware of the need for change.

3. **Diagnose the problem:** The aim with this step is to identify the reason to the problem so a suitable change can be planned and implemented. Customary techniques are interviews, questionnaires, observations and secondary data.

4. **Planning the change:** The fourth step in an organizational change infers planning the change. Decisions must be made concerning both the implementation and the time schedule for all aspects of the change.

5. **Implementing the change:** Organizational structure, technology, ways of work and personnel will change; hence likely create resistance which in turn must be surmounted.

6. **Following-up the change:** The last step is to evaluate the effects of the change. This means that the aim must be established so the level of impact can be valued.

2.3.1 The strategy choice

According to Dunphy and Stace (1988), there are four strategies the change agent can use to implement a change and the choice of strategy is dependant of the present situation. The four strategies, *figure 3*, are categorized after the change's character, i.e. if the change is radical or incremental and if it is characterized by cooperation or conflict and force.

	Incremental change	**Radical change**
Cooperation	*Organizational Development*	*Charismatic revolution*
Conflict and force	*Incremental Development*	*Dictatorial change*

Figure 3: *Four change strategies suitable for different situations (Dunphy and Stace, 1988).*

Organizational Development

The Organizational Development method (further on referred to as OD) is mainly used in situations where there is sufficient time for an organization to change through small steps and where there is a low degree of conflicts (Jacobsen and Thorsvik, 2002). Thus OD emphasizes the importance of incremental changes, i.e. changes where many small changes becomes a big change. Cummings and Worley (2001) means that organizational development is a system wide application of behavioral science knowledge to the planned development, improvement, and reinforcement of the strategies, structures, and processes that lead to organization effectiveness.

The change process emanates from five different activities during implementation of the change with OD, *figure 4*. Initially, the change agent must create a sensation of need for a change and justify the purpose with the change. In other words, make the employees so unsatisfied with the present situation that they are willing to try out new work procedures and new technology. The next step in this method is to create a vision of what the employees want the change to result in. Nonetheless, after the creation of the vision it is important to develop a support for the change from other influential persons and groups within the organization. The fourth step in the implementation infers to relocate the organization from a current state to a desired future state while the last step in implementing the change is about maintaining the

change. This can be done through allocating extra economical and personnel resources (ibid.).

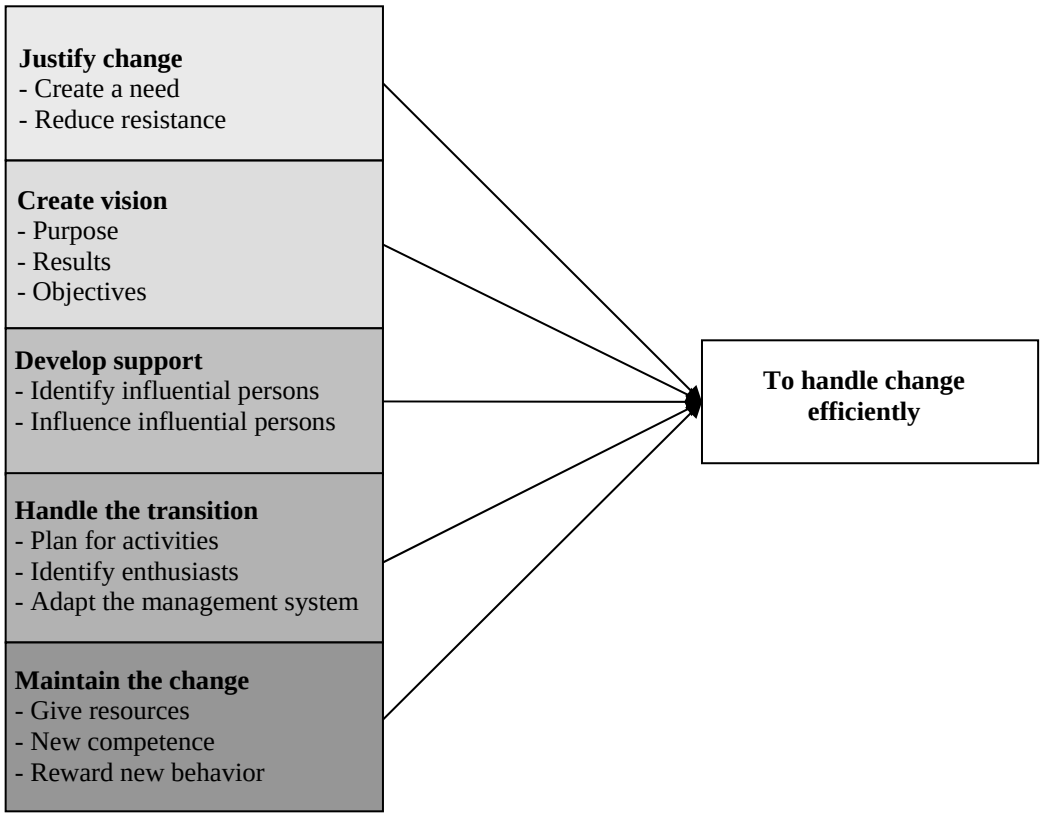

Figure 4: *Activities contributing to efficient change with OD (Cummings and Worley, 2001).*

Charismatic revolution

The charismatic change strategy is generally used when there is a need for a major radical change and where there is access to a charismatic leader (Jacobsen and Thorsvik, 2002). The resistance to change within the organization can be reduced if the change agent has charismatic authority and if the agent can, through personal features, be seen as a role model to other employees (Weber, 1971). Bryman (1992) describes charismatic management as something that decreases resistance against change and, through the strength in the emotional conditions that arouses, creates a feeling of excitement and enthusiasm.

The process of change begins with the charismatic leader creating an image of dissatisfaction with the prevailing situation and describing a crisis unless measures are to be taken (Jacobsen and Thorsvik, 2002). Concurrently, the charismatic leader creates an image of a future which demonstrates the advantages of the change. Moreover the change agent creates a positive energy among the employees with his/her personal commitments and driving force which in turn makes the employees to enthusiastically implement the change by their own. This is however only possible if the employees look up to the charismatic leader and can identify themselves with

him/her. Hence, the dominating feature for a charismatic leader is that he/she is reliable, which in turn leads to the information coming from the change agent being highly credible (ibid.). However the problem with this strategy is to know in advance who the charismatic leader can be, since it is difficult to define what charisma is and in which situation a certain charisma is to prefer (Bryman, 1992).

Incremental development

Incremental development means that changes are implemented in small, cohesive steps (Jacobsen and Thorsvik, 2002). This means that a larger change constitutes of many small changes, although even these small changes can have a certain resistance. Yet these smaller changes rally smaller resistances than big changes do (Quinn, 1988).

The strategy comprises very well thought-out and prepared proposals for how and why something will be implemented and builds on that the management tries to fit in many small changes on different areas in a bigger change strategy (Jacobsen and Thorsvik, 2002). The proposals to changes will however come from the employees who work on lower levels in the organization, since they can get through proposals easier. This means in turn that initiatives to changes that do not satisfy the management easily can be rejected because they are small local changes. Thus smaller changes in different units do not create strong resistance alliances in the same way as big changes do, which in turn makes the level of conflict fairly low. Through this type of strategy a more extensive change can grow on the basis of small changes and seems for the employees more as a natural development than a management governed process of change (ibid.).

Dictatorial change

Dictatorial change is used when a dominating coalition exists who have enough power to implement changes without considering any resistance (Jacobsen and Thorsvik, 2002). This strategy is also known as a top-down change and is highly focused on enforcing radical changes by power and force. The strategy is generally brutal and in many cases redundant, however these kinds of change processes can sometimes be necessary. It can concern situations where a hostile takeover by rivals is threatening or when the market has changed drastically. The change process begins with the change agent performing a thorough analysis prior the forthcoming change where every threat and possibility is registered. Strategic objectives and action plans are then established with outset from the analysis. Finally, the execution is studied along with how and where the resistance can arise. Thus the strategy builds on outmaneuvering resistance and forcing through a change (ibid.).

2.3.2 Resistance to change

That people are opponents to changes does not necessarily need to be seen as something negative, since resistance contributes to a more stable organization (Robbins, 1990). Resistance to changes is a natural part of an organization and no matter how an organization plans to implement a change; the resistance must always

be counted on. According to Sandström (2000), 80 percents of the population regards changes as threats while only 20 percents as possibilities, hence it is natural that a change causes resistance among the employees in a company. It is therefore important to draw attention to the root of the resistance and develop strategies to overcome it. To be able to efficiently implement a change, it is important to be aware of the different causes to the resistance and to use efficient techniques to gain co-operation from the employees (Honold, 1999).

Resistance can be divided into two separate groups; namely individual resistance and organizational resistance (Dessler, 1992).

Individual resistance

The reasons to individual resistance are often related to personal values, personalities and needs. Dessler (1992) describes five reasons to individual resistance which are habits, safeness/security, economical factors, selective information gathering and fear of the unknown.

1. Habits

Most people find a certain routine which they use regularly to simplify their workday. When a change is about to be implemented there is a tendency to question the change as it interfere with these habits.

2. Security

The employees want to feel secure about keeping their work. A lot of changes result in cut-backs and rationalizations hence the employees can feel insecure if they will be able to keep their work or be let go. This insecurity can heighten the resistance to change.

3. Economical factors

Another reason to individual resistance is the economical factor. This can cause uncertainty if the change will lower the employee's income or force them to change standings within the company and thus lead to a lower salary.

4. Selective information gathering

It is difficult to change people's valuations and can usually cause resistance when this is attempted by the company. Selective information gathering infers that the employees hear what they want to hear hence ignoring the managers efforts to explain the advantages with the change.

5. Fear of the unknown

Changes often bring trade-offs, i.e. changing something known for something new and unknown. Thus this also brings uncertainty and fear of the unknown. Employees can feel that their knowledge and skills are not enough hence resisting the change.

Organizational resistance

Organizations are naturally conservative and are actively opposing changes according to Dessler (1992). Production, work processes and organizational form are aspects organizations usually want to leave unchanged as these have, in most cases, worked well enough for several years. Katz and Kahn (1978) describes six main reasons to organizational resistance; structure, limited change focus, groups, threat against expertise, threat against established power relations and threat against resource allocation.

1. Structure

Organizations have built-in mechanisms to produce stability. The employees are hired with aforethought; they have to fit in the right position in the organization. Hence there is a built-in inertia which makes a change difficult.

2. Limited change focus

Organizations usually consist of several departments and it is not possible to change one department or system without affecting the other departments. Hence it is difficult to concurrently satisfy all departments.

3. Groups

Even though the individuals want to change their behavior the groups' customs can remain. One employee may accept new tasks while the employee's team/group opposes the change.

4. Threat against expertise

Changes in an organization's design or form can threaten certain expertise groups. New knowledge can make the unique knowledge which these experts possess superfluous.

5. Threat against established power relations

Changes within an organization can threaten established power relations. An example is when teams/groups are allowed to make own decisions and the manager take it as a threat. The reaction emerges because the manager feels like he/she lost some of the authority.

6. Threat against resource allocation

Departments in an organization usually want to keep things as they are. A change can cause a decrease of their budget which in turn can bring about a need for cut-backs.

Sandström (2000) also discusses change resistance and mean that the reasons to resistance can be found in some of the following aspects:

- Territory thinking.
- Not convinced about the need for change.
- Not committed.
- Change is inconvenient.
- Inadequate prospects to influence the change process.
- Fear of the unknown.
- Unwillingness to handle uncomfortable or unpopular actions.
- Prior experience of unsuccessful change processes.

2.3.3 Resistance management

For the change agent to be able to handle resistance in relation to change Bakka et al. (2006) suggest a management model. The model consists of the following five points:

- Reconstructing the employees' self-confidence/self-image with the assistance of information. The information should be understandable and clarify the background to the specific change.
- Developing new competence, giving moral support and encouraging the employees to try out new things. It is also important for the change agent to be understanding and to envision the employees' situation caused by the change.

- Providing the employees with knowledge and insight of the change i.e. let the employees know their new roles early on so they can get an apprehension of the change.

- Listening to the employees' view points and opinions.

- Let the employees get involved so they become more committed and motivated. This in turn will lead to the employees gaining a better comprehension of the change and how the change can be implemented. Though this requires a lot of time and commitment from the entire organization.

3 Case study

This chapter describes the Swedish construction sector and its need for change towards more industrialized construction methods. The purpose with this case study is to use the Swedish construction sector as an example where organizational changes are needed and to illustrate what the scope of these changes can be.

3.1 The construction sector – project organizations

The construction sector is characterized by the activity which is carried out in project form hence the projects, in some degree, are temporary by their nature (Gluch, 2006). Thus the sector consists of apparent project organizations where the project work is the main activity (Bruzelius and Skärvad, 2004). Actors in this project based sector can be companies such as construction companies, construction supply dealerships, companies within the construction material industry, wholesalers, architects, consultants, and distribution- and transport companies among others. These actors are active within the so-called construction process which covers everything from planning, financing and designing to production and administration of buildings and infrastructure. In other words, these activities together compose the construction process' value chain which consists of trade flows and buyer/seller relations, *figure 5* (ibid.).

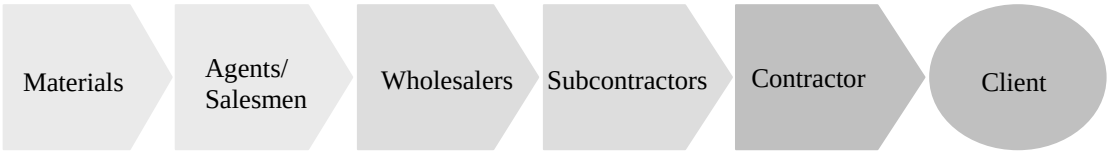

Figure 5: *The construction process' value chain of trade flows and buyer/seller relations, (Lutz and Gabrielsson, 2002).*

The construction sector's project based organization generate a challenge to coordinate the vast amount of actors, activities, labor, materials and processes which are required during a construction project (Gluch, 2006). Josephson and Saukkoriipi (2005) identifies this problem and points out that the construction sector's current structure with many actors fragments the construction process and creates administration whose avail for the end-user is unclear. Thus, the resources labor, capital and materials are misspent and in turn leads to that the construction process cannot be run efficiently but rather constantly increases the costs (Lutz and Gabrielsson, 2002). Another problem, which can be considered to arise because of the construction sector's structure, is that too many decisions are taken based on lowest cost at the expense of best quality, environment and the product's future usage (Lindfors, 2003). The focus on lowest cost can be blamed, to a certain extent, on the sector's actors who seems to accept short term thinking; nevertheless it is also caused by the lack of integration in the sector's value chains.

The major difference between the construction industry and other industrial activity is therefore the construction sector's fragmented processes. This means that management

control measures are lacking throughout the value chain, i.e. from supplier of land to supplier of completed building and all actors in between (ibid.). The construction process' value chains in a construction project can thus be described as a complex structure of locked, flexible and invisible actors (Lutz and Gabrielsson, 2002). It is only the flexible parts of the construction process that are comprised by any form of selection at the purchasing and control whereas the remaining locked or invisible parts are taken for granted. The construction process' otherwise straight diagrams of value chains, straight with respect to trade flows and buyer/seller relations, has therefore in other words in reality a disordered structure in a construction project, *figure 6* (ibid.).

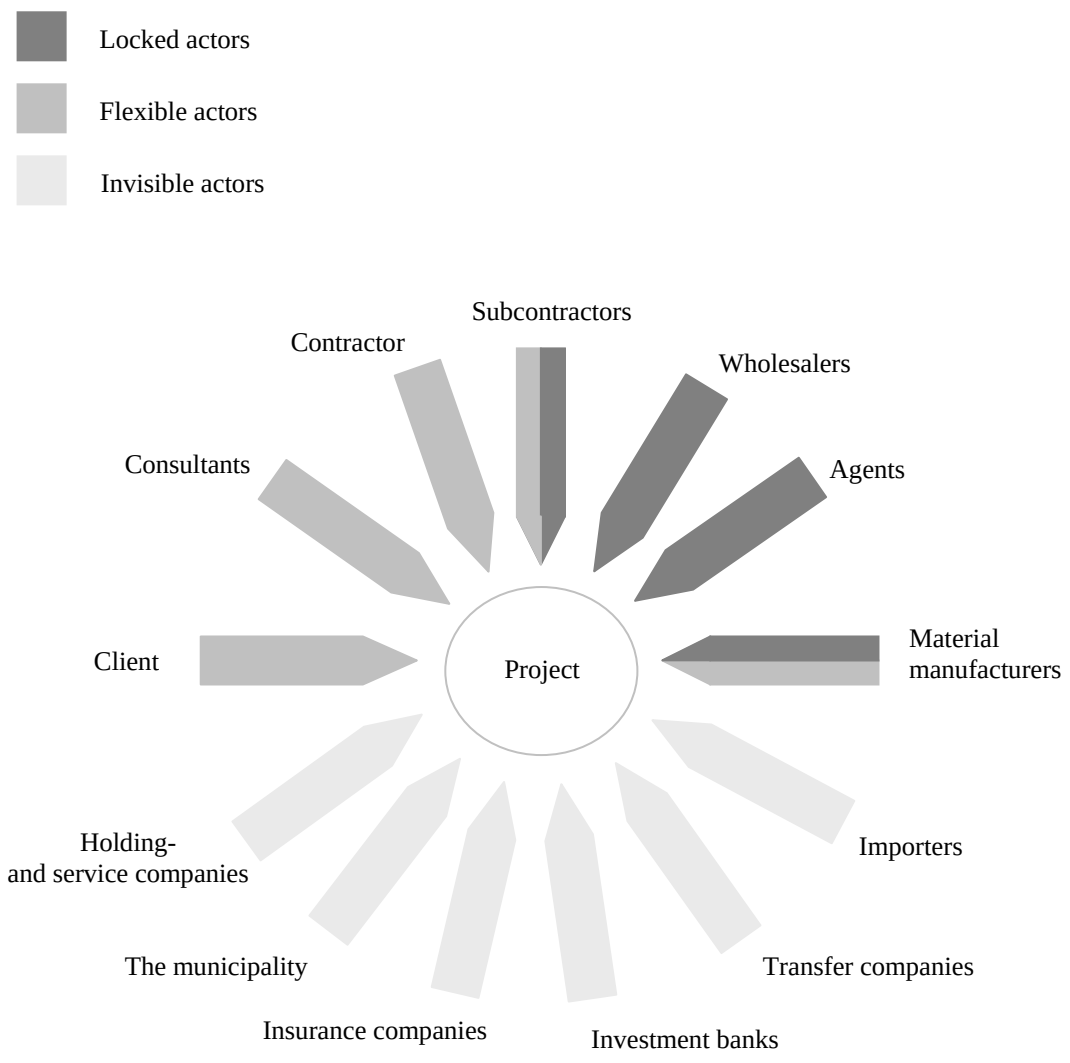

Figure 6: *The construction process' value chain for a construction project (Lutz and Gabrielsson, 2002).*

All actors illustrated in *figure 5* contribute with products or services needed for the project and are thereby objectively included in the value chain. On the other hand, as mentioned above, the coordination of the actors and the processes is problematic. Combined with absent collaboration between large parts of the value chain's actors

and lacking insight in each other's costs and processes, these actors cannot be controlled nor managed accurately (Lutz and Gabrielsson, 2002). This in turn results in separation of design, production and administration during the development of the end product instead of being congregated in the design phase, which in turn leads to errors emerging in an unnecessary ample extent both during production and after the building have been taken into use.

Since projects in the construction sector generally are considered unique, the short-term view arises that neither the project nor the process need to be evaluated for the participating actors to achieve a better process during following projects. The potential for improvement is, with this view on knowledge and experience feedback, thereby relatively small even though some 80% of everything included in the construction process is the same from project to project (ibid.). Josephson and Saukkoriipi (2005) claims that the construction sector has large improvement potential, however to exploit this potential the sector need to get by a number of hindrances, as for example the opinion that every construction project is unique and that the construction sector is unlike all other industries. Project based organizations, which companies in the construction sector generally can be considered to be, tends to be inferior on coordinating processes, resources and competence within the organization (Hobday, 2000). This assertion can have its explanation in the previous mentioned inadequate knowledge and experience feedback which advice in the construction sector. Thereof, one can say that the project based organization constitutes a weaker organization form when it concerns the execution of procedure work, mass production and when it comes to achieving scale advantages, i.e. benefits generated of large scale operation (ibid.).

The construction sector shows a tendency to be in need of change and thereby develop the state of the project based organizations to resemble the organizations within the manufacturing industry (Lindfors, 2003). One of the reasons for the need to change is that new technology, political and economic unions and alliances, deregulation of trade and industries among others, creates new conditions and infer new challenges for companies and other organizations (Bruzelius and Skärvad, 2004). The form an organization had when it was created was probably purposive then, however it can be out of date when the organization meet new challenges. The companies within the construction sector stand before these new conditions and challenges, and has done it for many years, without concrete measures been taken. In order to maintain and to strengthen the effectiveness, an organization need to have capacity to constantly develop and change their products and services, resources, processes and work organizations. If this requirement on further development and change becomes neglected, the organization becomes inadequately adapted to the surrounding demands, prerequisites and conditions thus risking becoming inefficient (ibid.). Lindfors (2003) claims, in relation to these issues, that the belief on that the construction sector should learn of the manufacturing industry have increased the last couple of years. This has induced the process alignment philosophy to be recognized as a solution on the sector's problems by advocates for a modern customer focused sector.

3.2 Lean production – process organizations

During the 1980's a new philosophy for industrial production was developed and became known as *lean production* (Helling, 1992). This production philosophy has its roots in the Japanese automotive industry and has since the 1980's been applied throughout the world and in industries far beyond the automotive industry. In order to illustrate the differences between *lean production* and traditional production methods it is apt to compare the Japanese production philosophy with the traditional handicraft and mass production, *table 2*. The production philosophy is called *lean* since it utilize less of everything compared to traditional mass production, i.e. less workers in the factory, less manufacturing surface area, less investments in tools and equipment, shorter development time, less stock, less faults and cassations etc. However the production philosophy allows that the customers' options can be increased as the production transpires by order not by stock (ibid.).

Table 2: *A comparison between handcrafted production, mass production and lean production (Helling, 1992).*

Production system / **Factors**	**Handcrafted production**	**Mass production**	**Lean production**
Products	Customer adapted products	Standardized products	Standardized but customer adapted products
Production series	Piece production	Production in long series	Piece production in large-scale operation
Co-workers	Broad and profound competence	Narrow and often shallow competence	Team of co-workers with broad and successive profound competence
Equipment	Simple and flexible	Capital intensive with considerable reconversion costs	Capital intensive but flexible and with diminutive reconversion costs
Feature	Expensive	Cost efficient but rigid	Cost efficient and flexible

The production philosophy *lean production* has later on led to the rise of new types of organization forms (Bruzelius and Skärvad, 2004), which are:

- Process based organization
- Learning organization
- Quality aligned organization
- Resource efficient organization
- Time efficient organization

Each unit and function in the traditional construction process is normally only responsible for its own part of the process without seeing the overall picture and without having any direct contact with the process' customer (ibid.). Again, this can be linked to the construction sector's fragmented processes in a construction project where it is lacking an overall control over the project's value chain. Willoch (1994) identifies these problems and describes the process as:

- Fragmented, many units are involved.
- Anarchistic, nobody has responsibilities for the whole process as everyone only sees to their own part.
- Nameless, no named unit responsible for the whole process.
- Invisible, not made visible in the organization plan.

In order to cope with this problem and make the construction sector become more customer focused it is apt to implement a process based organization (Lindfors, 2003). By organizing along the processes, the organizations can also maintain and develop their competitiveness (Bruzelius and Skärvad, 2004). When an organization is formulated with outset in the organization's processes the organization comprises an entire process part instead. This in turn gives the organization overview and facilitates control. To design an organization with outset in the processes aims to improve the organization's productivity, cost effectiveness, quality, time effectiveness and service degree, and to simplify control. When processes and work organizations are formulated it is important to first set and answer the following questions (ibid.):

- Can duties be combined and batched to fewer functions?
- Can decision-making and responsibilities be delegated to those who work in the process?
- Can duties be carried out parallel instead of sequentially?
- Can the process be standardized?
- Can the work be carried out more cross-functionally?
- Can duties be transferred to customers?
- Can duties be transferred to suppliers?
- Can bureaucracy and control decrease in scope?
- Can information become more easily accessible for those who work in the process?
- Can the control be simplified?

If positive answers can be given to these questions there is good potential to develop a process based organization (Bruzelius and Skärvad, 2004). The transition from a current organization form to a process based organization is referred to as process alignment (Andersson, 1992). Process alignment means that the activity's value chains are identified and documented whence a picture of how different activities are linked appears. Through focusing on value chains, i.e. the activities which create value for the customer or client, the organization can concentrate on improving what is of prime importance for the customer or client (ibid.).

In most activities, bottlenecks and errant associations exist within the value chains which lead to deviations that in turn require additional work and guarantee obligations towards the customer or client (Andersson, 1992). Unless the processes are identified these bottlenecks and errant associations are invisible, thus both management and employees have difficulties to find the reason to the problem. Nothing new is actually introduced in the organization with the process concept as the processes are already there (Ekenhamn and Eldh, 2002). All businesses contain processes where activity is linked to activity to form chains, so called value chains or work flows. What can be

considered as new when an organization chooses to process align is the identification and the description of the previously invisible processes (ibid.).

4 Method

This chapter describes the methods for the gathering of the empiric needed in order to treat our purpose and aim, where primary and secondary data been acquired in forms of interviews and literature studies. The gathering of, as well secondary as primary data, has made it possible to verify the results and conclusions that we made, which in turn increases the credibility and the quality of this thesis.

4.1 Methods used in the study

We have used both primary and secondary data for this thesis. Primary data is data collected for the first time while secondary data is all the information that is already available (Jacobsen, 2002). Our primary data have been gathered through qualitative interviews while secondary data have been retrieved in literature and reports. The secondary data consist of a theoretical framework followed by a case study which is used to describe a case where the thesis' purpose is topical (ibid.).

In order to grasp the special with the social reality, another way of approach is required in contrary to studying natural science. In a survey whose central actors are individuals it is needed to have an understanding of behavior. In order to get a deeper understanding, interviews are the best and perhaps the only way (Merriam, 1994). Another way of approach to pursue and to catch the social reality is the interpretation perspective, which is a method that is built upon understanding and interpretation (Bryman and Bell, 2005). As a contrary to the strict scientific methods and as it falls naturally, we handle our survey from an interpretation perspective.

4.1.1 Literature study

We have studied literature in form of books, reports and dissertations within the subjects of industrial construction, lean production, the Swedish construction sector, organization forms, change, resistance to change and change agents. The literature was searched in CHANS, LIBRIS, GUNDA, Lovisa and DiVA. In order to get relevant and as extensive information as possible we used both Swedish and English literature within the mentioned subject areas.

4.1.2 Interview method

Before primary data could be acquired we were forced to make up our minds on which type of selection survey we would implement. A selection survey means that the survey covers a small part of the population (Denscombe, 2000). A population is the people which are in the segment that the survey is based on and because one cannot always examine the entire population the surveys can consist of a selection. There are two types of sampling methods, which are probability selection and non probability selection (ibid.). Probability selection does not guarantee a representative selection but it is very probable that the selection is representative (Johannessen and Tufte, 2003). Researchers that intend to use probability selection must have a sufficiently large group of people that represent the entire population in their selection for the survey. Non probability selections, however, do not emanate from that those

included in the selection represents the entire population (ibid.). Non probability is often used as the researcher does not consider that it is desirable or that it is too difficult to implement a probability selection (Denscombe, 2000). Non probability selection can be implemented by subjective, snowball, convenience or chance selections. We have chosen to onset from non probability and have used a snowball selection. Snowball selection mean that the researcher contact persons that know a lot about the current issue that will be examined. These persons can also link the researcher to other persons who have wide knowledge within the area for the question at issue (ibid.).

We have done seven telephone interviews with persons active within seven large construction companies who work with industrial methods. The interviewed respondents have contributed to the development of industrial construction in their respective companies and have thus the experiences that are needed in order to respond to the interview questions. However before we did the interviews we were forced to decide which type of interview forms we would use. There are namely four interview forms: structured, semi structured, open-ended and open-ended targeted interview (Lantz, 1993). If only one understanding of the problem exists one should use an open-ended interview. In cases where theory exists and includes concepts and mutual relationships, structured interviews should be used instead (Denscombe, 2000). On the basis of the partially limited theory that exists concerning our question at issue, our choice fell on a semi structured interview technique. A semi structured interview means that the researcher has structured the questions which concern issues the researcher want answers for. Respondents may thereby be flexible and express their own opinions concerning the subject (ibid.).

During the interviews, the information from respondents must be documented, which can be done in various ways. In order to facilitate the documentation and to be able to quote in the thesis we chose to use audio recording. Using audio recording has advantages; the most positive aspect is that it properly documents all information provided by the respondents. One does not have to worry about information articulated by the respondents during the interview will be lost. Moreover, there is a possibility for us to devote more focus on the interview than if we would be forced to take notes by hand and also eliminates the risk that we unwarily select the material. However, before the interviews, the possibility for the respondents to deny the audio recording was given. Two of the respondents denied audio recording and in these cases we took notes by hand. We have chosen to let the respondents be anonymous in this thesis because of the simple reason that focus is not on the companies' trademark and industrial construction methods except it is on the transition from traditional construction to industrial construction.

4.1.3 Approach

When aiming to examine something on the basis of a new perspective without earlier expectations on how the result will be, the inductive approach should be used (Jacobsen, 2002). In this case, one does not try to disprove or to criticize an already established theory. The outset is instead collection of information which, with the aid of theory and empiric, is analyzed and becomes converted to results and finally to new

theory (Bryman and Bell, 2005). Thus a completely inductive approach is not an option in our case as we do not have the intention to create new theory. The contrary to an inductive approach is the deductive where theory governs the research. The researcher sets, according to this way of approach, different hypotheses vis-à-vis established theory or theories, thus does not assume something new but strives after doing a deeper survey of already established issues. Thus, a fully deductive approach is neither an option in our case as we do not have the intention to examine theoretical validity (ibid.).

However, we use parts of existing theories in order to see how these can be used in order to create models for analysis of the new information we wish to find. This approach is referred to as abduction and means that through use of an abductive approach, the researcher strives after an understanding for how the interpretation of underlying patterns can explain new findings (Alvesson and Sköldberg, 1994). We therefore consider ourselves using an abductive approach, which however lies closer to the inductive than to the deductive approach.

4.2 Credibility

Wiedersheim-Paul and Erikson (2006) considers that following three criteria can be used as outset at the critical review of sources: the contemporary requirement, tendency criticism and dependency criticism. The contemporary requirement means time-related vicinity between what is typed in the study and the source. In the theoretical framework certain studies has been used which in the context is somewhat out-of-date, but as they are generally established and still current we consider that the contemporary requirement is met. The empiric section's information is recently acquired and thereby advices no doubt around the contemporary requirement's fulfillment.

The tendency criticism is concerned if the informant has interests of garbling the truth. As the secondary sources we used are written by researchers, we do not see any reason to believe that their information is incorrect. The tendency criticism can be more relevant when it concerns our empirical survey. We see a possibility that the information we received from our interview sources can be somewhat embellished and contain certain clichés, which can contribute to a certain tendency criticism. But as the respondents we interviewed have shown big interest in contributing to a good result, it is our hope and belief that our respondents replied as honestly as possible and thereby contributed to a true result. Dependency criticism treats the problem that two different sources can retrieve their knowledge or their material from a common source (ibid.). We have, in those cases we ran into literature or reports with the same source, made an attempt to find the source of origin with the intention to use it instead.

We have, as mentioned before, chosen to use both primary and secondary data to increase the credibility and the quality of our results. Support for this is gained from Yin (1994), who means that the credibility of a study increases when the researcher uses a wide range of approaches to the same issue. In our case, this means a comparison between the collected secondary data, which is described in the

theoretical framework *chapter 2*, with primary data, i.e. the interviews which are summarized in *chapter 5*. The purpose with the collection of secondary and primary data is, in other words, to verify the results and conclusions that we made, *figure 7*.

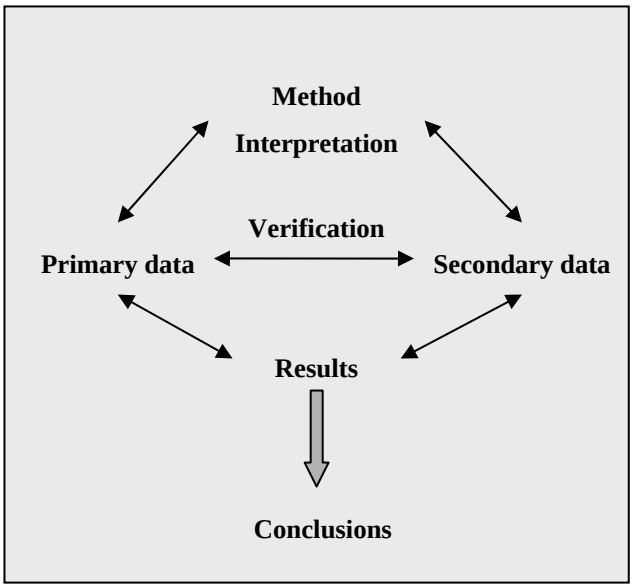

Figure 7: *Processing data (self made).*

5 Findings

This chapter includes our primary data comprised of seven interviews and compiled to a cohesive text. The respondents are referred to as respondent A, B, C, D, E, F and G, because focus is on the transition from traditional construction to industrial construction, not on the companies' trademark and industrial construction methods. The respondents work within seven respective construction companies and they work with some form of industrial construction thus experienced in some type of organizational change.

5.1 The construction sector's value chain

All interviewee's agreed with Lutz and Gabrielsson's illustration, *figure 3*, of the construction sector's value chain in a construction project and that it illustrated how they consider the value chain to be. *Respondent D* pointed out that the immense advantage with the traditional value chain, according to Lutz and Gabrielsson's illustration, is the actors who are specialists within their own area, but stresses that this in turn leads to the involved actors not having insight in each others' processes and costs. The respondent means that this deficiency in insight results in poor management control over the cash flow and thereof what is provided the project in terms of value. *Respondent A* however points out the problem with the current value chain in the construction sector as a deficiency of communication between the involved actors in a project. It depends, according to the respondent, on a large extent on a lacking connection between the involved actors because of the specialization within different areas, what also was mentioned before by *respondent D*. *Respondent E* explains that the problem with the traditional value chain is not only based in the deficiency of control or specialization but also in that certain actors, as for example wholesalers and agents, drives up the costs more than provide the projects any value. Even *respondent G* considers that wholesalers and agents are actors that do not provide adequate value to the construction sector's value chain. *Respondent F* also claims that the traditional value chain supports a price focus between the actors, which inflates the price on products and materials for each level in the value chain. The respondent stresses thereof that it is not sustainable to have such a value chain but rather means that focus should be on costs and not on prices, i.e. work towards lowering the costs in the value chain instead of covering increased costs with increased prices.

Respondent C, on the other hand, points out that the advantage with today's value chain is its flexibility, as problems can be solved quicker than with a locked linear value chain. The flexibility is however also a disadvantage, the respondent continues, because there is no overall control throughout the project as the actors are specialized within their own areas. There is, in other words, no overall organization which has control over the project's value chain. This is also pointed out by *respondent B* who explains further that there is a phase between design and production in the traditional value chain, which Lutz and Gabrielsson illustrated, where it applies to find actors who will deliver materials and actors who will do the construction work. This results, according to the respondent, in that the purchases are not always conformed to the design.

On the question how the construction sector's value chain should look like compared to other industries, *respondent C* replies that the current value chain in the construction sector must be changed in order for the production philosophy, lean production, to be implemented. The respondent presses the importance of overall control where an actor or a group with representatives from the major actors controls the project's value chain. This control has, in other words, the purpose to have control over the value chain from project start to completion. Even *respondent B* points this out and means that the design must be carried out more integrated with the material producer and the executing actor than what is done in the traditional value chain. *Respondent D* also emphasizes the importance of fewer steps in the value chain and believes that a reduction of the amount of steps can plausibly lower the costs. Even *respondent E* points out the importance of reduced stages and considers wholesalers and agents as examples on actors who do not provide the value chain sufficient value in order to justify their cost markup. According to *respondent D* the value chain should therefore, on certain areas, be more linear than what Lutz and Gabrielsson's illustration visualize. On the other hand, the respondent points out that an entirely linear value chain means that everything becomes more interdependent. Thus problems and delays are transmitted directly from actor to actor in an entirely linear value chain and thereby affect the entire chain in the end. It is however apt to split the value chain in processes, the respondent considers, which in turn is held together through overall control the same way as *respondent C* suggested. *Respondent A* means however that the value chain should be changed so it comprise of more re-engaged processes in order to make experience feedback from projects to projects possible.

Respondent G advocates long-term cooperation agreements with as well the client as the suppliers and subcontractors, what according to the respondent means added value to the value chain in terms of shared knowledge and experiences. Furthermore the respondent means that this in turn makes it possible for the entrepreneur to underpin the supplier to produce and deliver product specific materials and components in a so cost-efficient way as possible. Even *respondent F* considers that cooperation agreements are important in order to lower the costs which arise because of the traditional value chain. The value chain should therefore, according to the respondent, be more linear and be edified of long-term cooperation between the actors where focus lie on the costs, more equal to the automotive industry. Entrepreneurs should, according to the respondent, affiliate suppliers with longer agreements where the entrepreneur can transfer duties to the suppliers, who most often have a better expertise within their area. *Respondent E* answers the question how the construction industry's value chain should look like compared to other industry that they never speculate in value chains and can thereof not take position on if there is a better value chain then what Lutz and Gabrielsson's illustration show.

5.2 Changed organization

Respondent C do not believe that the traditional organization within the construction sector would function while working with industrial construction as one must follow the entire process to completed product during industrial construction. The respondent also points out that it is not possible to have external project- and work managers from

the actors in the traditional value chain, according to Lutz and Gabrielsson's illustration, when working with industrial construction. If it is needed these should be integrate in a central project organization, the respondent emphasizes. *Respondent A* does neither consider, precisely as *respondent C*, that the traditional organization can be used as there are too few work roles with industrial construction compared to traditional construction. With this statement the respondent means that certain work roles in the traditional organization are either unassigned or are integrated in other new work roles with industrial construction. Examples on this are, according to the respondent, the work managers who are no longer needed and that project leaders are integrated with the project managers and purchasers. *Respondent B* also points out that the traditional organization for projects is edified on defending positions and agreements and in order to cope with industrial construction this should be reorganized so responsibilities and participation are divided among all actors.

Respondent F also expresses clearly that using the traditional organization while performing industrial construction would not be applicable. The respondent means the reason is that the traditional organization is project based while industrial construction need a process based organization. Furthermore the respondent explains that the difference between industrial construction and traditional way of construction is that the traditional way is to manage prototype construction. Industrial construction, however, deals with standard components or modules which are the same each time but can be assembled in several ways in order to receive different end products. This requires, according to the respondent, another competence which the traditional organization lacks and cannot get with the structure it has today. *Respondent G* does neither consider that a traditional organization is able to perform industrial construction with the statement that there are not enough resources in early stages and too much resource in the final stage, i.e. the production. It does not, in other words, work to let the craftsmen have equally immense responsibilities in the production stage as they have in the traditional organization because all decisions are already made in the design stage, means the respondent. *Respondent D* considers that the traditional organization would not be applicable exactly as the above respondent demonstrates and adds that conflicts would arise as industrial construction projects must be controlled tighter than traditional construction projects. *Respondent D* means that this is a result of an already established design during the design phase which cannot give any scope for own solutions during the production.

Respondent E does not agree with the other respondents, hence considers that the traditional organization would be highly applicable for industrial construction. The respondent believes that it would be fully possible to work with the traditional organization. At present the respondent do not think that the organization in the production will be changed markedly, but considers on the other hand that the organization for the design work will be changed. The change means that all decisions happen during the design phase instead of being delegated to the production, which is the case with the traditional organization. However, r*espondent D* does not consider the traditional organization working with industrial methods in the production in the same way as *respondent E* advocated. The respondent specifically considers that the organization itself becomes more controlled by the introduction of more precise design documents when implementing industrial construction. Industrial construction thereby requires, according to the respondent, that decisions must be made in the

design phase, which in turn makes it expensive to change something when the project reaches the production phase. The respondent also emphasizes that if an organization mixes work with traditional methods and work with industrial methods it becomes difficult for the employees to adjust their focus on industrial construction after working with traditional construction and vice versa. Furthermore, *respondent D* explains that there are various ways to work with industrial construction. An organization producing modules in a factory for latter assembly requires an entirely different organization than if they work with different variants of standardization. An industrial organization is suitable for production in factory, but working with other methods can indulge that several parts of the traditional organization can be left as it is. *Respondent A* has the same argument as *respondent D* about industrial projects should not be mixed with traditional projects as it can create problems for the employees in terms of confusion by differences in the work methods. *Respondent A* explains that the organization looks differently for industrial construction as, among others, the project manager has more responsibilities and more duties than earlier thus is responsible for the whole process, i.e. from the project's initiation to completion. *Respondent G* emphasizes that work management in the production phase decreases strongly with industrial construction and that the amount of duties in the design phase increase. In other words, the resources are moved up from the production phase to the design phase so a larger part of the work is performed at the start of the project and followed by a smaller part of the work performed in the end. Even *respondent F* means that the distribution of duties looks differently with industrial construction. The respondent also points out that most traditional positions and roles are no longer needed or even exist with industrial construction.

Respondent C, however, points out that there will not be division between design and production but rather means that these will be seen as a single process and not as two subsequent processes. Furthermore the respondent means that industrial construction requires a more controlled organization where the employees handle more duties than in a traditional organization, i.e. holds more positions. The respondent believe that the project based organization, which the construction sector has at present, cannot fulfill the mentioned requirements except there is a need for a change to a process based organization to succeed with the implementation of industrial construction. *Respondent B* however, does not consider it as a necessity for the organization to undergo some major changes but emphasizes instead that there is a need for more competence and knowledge span among those who will coordinate the industrial construction.

5.3 Change work

All the respondents have, during the implementation of industrial construction, changed their organization to some extent and in relation to the change noticed various types of resistance. *Respondent C* states that there is resistance to changes related to the industrialization of the construction sector. A reason for resistance is, according to the respondent, that everything is not possible to industrialize and that certain subcontractors and suppliers are not interested in industrializing their own businesses. These external factors must, according to respondent, be taken into consideration when planning the change of an organization. The external resistance namely influence the internal resistance in an organization during the implementation

of a major change which the transition from traditional to industrial construction is, the respondent emphasizes. *Respondent F* notices same external resistances as *respondent C* mentioned and further claims that wholesalers and agents who only focus on price instead of costs often are unwilling to relinquish the traditional conjunction led pricing on products. The resistance from these actors is, according to the respondent, a hindrance for the industrial construction as it requires completely different agreements and cooperation between the parties to make it possible for industrial construction to be implemented. In order to counteract the external resistance, the respondent's company offers their collaborative partners education and resources in order for them to be able to structure their own work on the basis of the applied variant of lean production. The transition from work with traditional to industrial methods also meet a natural resistance within the organization, according to *respondent A*, as the change affects an existing system which has been in use and been developed during several decades.

Respondent G points out, exactly like *respondent A*, that there is an individual attitude towards change and claims that certain individuals have a bigger resistance towards changes within their personality than others. *Respondent D* establishes that it always will be persons in the organization who are negative towards change, but that it concurrently will be those that are enthusiastic before a change as well. Furthermore, *respondent G* explains that there are two types of individual resistances against change; those that at first are negative to the change becomes, after the implementation, committed followers. While those that in the beginning are followers to the change experiences the work as monotonous when the change is implemented. *Respondent D* claims that it is almost impossible to get all employees to accept changes. Another hindrance that arises during introduction of a new organization is, according to *respondent F*, distrustfulness towards changes. The resistance is most often caused by the employees experiencing the change in question as a threat against their own safety, i.e. a changed way of work which the employees are not used to. *Respondent B* agrees with *respondent F* that resistance against changes arises because people have work habits that they are comfortable with. A change means certain insecurity and it is important that one is aware of it when one plans a change of the organization. *Respondent D* refer to the construction sector as an old traditional sector that is, to a certain extent, unwilling to change and agrees with *respondent B* that the employees want to keep working as they have always done, since it is comfortable. *Respondent E* also claims that there are employees within the organization who creates a resistance against change when the change means new work methods or duties that they did not accept when they took the job. Furthermore, *respondent E* reckon that even the thought of being more centrally manage in their work creates a resistance among the employees as the construction sector has traditionally not been managed in that scope. Even *respondent C* establishes that the construction sector have, so far, had relatively untrammeled work roles, but with the industrialization the previously untrammeled work roles becomes increasingly managed, which in turn means resistance against changes within the own organization. Furthermore, *respondent C* notices resistance as a result of expert roles and hierarchies within the organization disappearing or becoming changed.

Respondent A expresses that change work is difficult as everyone in the organization must be convinced that the change is necessary and that it improves the results. In

order to counteract the individual resistance from the employees it is according to *respondent G* required that the employees receive understandable information as to why a change is needed and what results the change is expected to give. Even *respondent C* presses the importance of always being clear with what the aim of the change is and what effects it will have. One of the most important measures in order to avoid obstruction is, according to *respondent C,* to spread out the aim within the organization as soon as possible, in order to let all employees take part and discuss before the changes are implemented.

Respondent C points out that a department manager who has the employees' confidence, i.e. a key person in the organization, should be participating in both the initiation and the decisions that are done for the change, in order to convey the employees' wishes and concerns. The respondent means that the key person's task is thus to root the proposals and decisions within the organization so that the change meets as little resistance as possible when it is finally implemented. On the other hand the disadvantages with key persons participating in decisions are that, according to the respondent, perhaps the change will not always turn out as the management intended, i.e. the result may not correspond to the thought behind the change. *Respondent C* considers that the responsibility should lie at the management but that it concurrently can to be co-responsible employees on lower levels in the organization. The hindrances the respondent noticed most arises when the changes are initiated and implemented from the top without letting the employees participate or share their thoughts about the change. The respondent mean that everyone needs to participate in a change work as the most severe mistake one can to do is to force a change through the organization from the top without the employees' support. *Respondent D* also emphasizes the importance of key persons in the change work and agrees with *respondent C* that the key persons are paramount as they can root the decisions among the employees. *Respondent D* also considers that the responsibility for the process of change should be at management level but that the employees should be allowed to participate in the decision and to run the change work.

Respondent A also expresses a need for having key persons and emphasizes that the key persons should be a part of a group who has the task to lead the change work. Furthermore the respondent mean that key persons should show the employees what the advantages are with the change and explain that it is a directive from the management which will be implemented with the support from the entire organization. Concurrently, *respondent A* reckons that initiation of the change work should come from the top as the change of the organization is about changing the organization's structure. On the other hand, the respondent emphasizes that changes cannot come as a directive from the top without being rooted in the entire organization, of which the importance of having key persons in the change work. In other words the purpose is, according to *respondent A,* to get the employees involved and to get them to contribute to the new way of working in the organization. *Respondent F* agrees with *respondent A* about the main responsibility for the change should be at the management. *Respondent F* explains that all contributory employees should be responsible to a certain extent so that they all feel as they are a part of the change work. The respondent emphasizes that this change work combined with responsibilities should be carried out on all levels in the organization. Furthermore, the respondent reckons that the management must be sustainable as major changes

take time and employees need support in order to cope implementing the change. The advantage with initiating the change work from the top is, according to *respondent F*, that there are resources allocated for it in terms of labor, time and money. *Respondent E* also emphasizes that it is particularly important to have support from the management at the initiation of the change work. Furthermore, the respondent describes that they use key persons who lead the change work among the employees concurrent as the management gives support and makes decisions for the change process. The respondent also considers that it is important that all employees are involved in the change work in order to counteract possible resistance. The respondent points out the importance of having a well balanced dissemination of the commitment throughout the organization, both with respect to geographic location and to position. *Respondent G* agrees with that the initiation of a change should be done by the management and motivate this with that there must be support and signals from the top management that the change will happen. Moreover, the respondent reckon that a group of employees are needed who leads the change work, i.e. change agent's, who has the assignment to run the process of change and to make a plan for how the change will be implemented.

Respondent B has an entirely different view and means that the change should be initiated by those who work within the organization. The respondent considers that those who work within the organization knows best what needs to be changed and how the change should be implemented. What is needed from the management is support in order for the employees cope with the initiation and the implementation of the change work. The respondent reason that they will be involved in a process of change and concurrently be responsible for what they do.

6 Analysis and observations

This chapter deals with the analysis and discussion of the interview replies presented in the findings in relation to the theories found in the theoretical framework. The case study illustrates an initiation to change as a result of the industrialization within the construction sector.

6.1 Change requisites

The respondents agreed with Lutz and Gabrielsson's illustration, *figure 6*, of the construction sector's value chain in a construction project and that it illustrated how they consider the value chain to be, but noticed the following advantages respective disadvantages:

Advantages

- Actors in the value chain are specialists within their own area.
- The value chain brings flexibility, i.e. problems can be solved quickly.

Disadvantages

- The value chain supports price focus, which inflates the price on products and materials for each level in the value chain.
- The actors in the value chain do not have insight in each other's processes and costs.
- Lack of collaboration between the actors in the value chain.
- Purchases do not accord with the design.
- Certain actors allocate no value to the value chain.
- The value chain lacks overall control.

The respondents describe support of price focus in the value chain as one of the reasons for the constantly increasing production cost, which was mentioned in *chapter 1*. This price focus depends, according to Lutz and Gabrielsson (2002), on the deficiency of insight in the actors' processes and costs why collaboration problems between the actors in the value chain arises. The consequence of this collaboration problem between the actors in the construction sector means that the value chain for a

construction project becomes difficult to control. Hence construction projects in general lack an overall control (Lutz and Gabrielsson, 2002). The respondents have, in relation to the stated disadvantages of the value chain, identified the particular problems which leads to the lack of control, as Lutz and Gabrielsson (2002) mentioned. One can, however, question if the respondents actually see the chain of events leading to problem in question the way Lutz and Gabrielsson (2002) describes.

Another reason for the increased production costs is, according to the respondents that purchases do not accord with the design which in turn leads to, in many cases, a need for a new design. The reason is that design, production and administration are divided in the development of the end product instead of being congregated in the design phase (Lutz and Gabrielsson, 2002). One of the respondents reckons that since a new design becomes too costly, it seldom results in such actions being taken so the problems may simply be solved on site during the production. Thus this leads to that quality, environment and the product's future use gets superseded in behalf of the price as the actors adopt short term thinking. Hence the question if the advantages with specialization and flexibility can compensate the negative effects the traditional value chain results in. It can be determined that the advantages do not compensate the disadvantages as long as the considerable increase of the production costs has no better explanation then increasing expenses due to inefficiency within the sector. It is of major importance that the sector creates a market where housings are built which normal wage earners can afford and want to pay for. How come other industries have successfully lowered their production costs while the construction sector increased them instead? Lutz and Gabrielsson (2002) means that the answer to this lies in the construction sector's fragmented process where the resources labor, capital and materials are misspent and in turn leads to that the construction process cannot be run efficiently but rather constantly increases the costs. Willoch (1994) also means that the answer lies in the absent of an overall control over the project's value chain. The fragmented processes are also identified by Willoch (1994) who describes these as follows:

- Fragmented, many units are involved.
- Anarchistic, nobody has responsibilities for the whole process as everyone only sees to their own part.
- Nameless, no named unit responsible for the whole process.
- Invisible, not made visible in the organization plan.

In order to cope with these fragmented processes the respondents considers that following measures should be implemented:

- Initiate long-term cooperation agreements.

- Increase the knowledge and experience feedback.

- Reduce the stages in the value chain.

- Integrate the subcontractors and suppliers in the design phase.

- Divide the value chain into processes in order to achieve an overall control.

It is however important to state that the construction sector is characterized by the project formed activities and that the projects, in some degree, are temporary by nature (Gluch, 2006). Thus the sector consists of apparent project organizations where the project work is the main activity (Bruzelius and Skärvad, 2004). Hobday (2000) means on the other hand that project based organizations tend to be inferior on coordinating processes, resources and competence which leads to the deficient overall control of the projects. Furthermore, Hobday (2000) means that this in turn is found in the inadequate knowledge and experience feedback. According to the respondents the knowledge and experience feedback is an important aspect in order to cope with the fragmented process which originates in the traditional value chain. One of the changes that are advocated in the State Building Cost Delegation's report “from construction sect to construction sector” is that the construction sector should develop into an industry sector comparable with other industrial sectors, e.g. the automotive industry. An increased degree of industrial building leads, according to this argument, to an increased cost efficiency improvement which in turn makes lower prices possible for the end users. The respondents also points out that an overall control of the project is paramount with industrial construction, why some of the respondents believes that a more linear process based value chain is to prefer. Two of the respondents clearly expresses that a process based organization is required for industrial construction, not the project based organization the construction sector has. This because a project based organization cannot meet the requirements that are set on the organizations while working with industrial construction. Lindfors (2003) also considers that it is suitable for the construction sector to organize themselves along the processes in order to cope with the previously described fragmented processes. To put together an organization with outset in the processes aims to improve the organization’s productivity, cost effectiveness, quality, time efficiency and service degree, and to simplify the control. If the sector becomes process based instead of project based the overall control will consequently increase, which the respondents expressed as the most important aspect for industrial construction.

6.2 Change work

The industrialization of the construction sector is incited by the surrounding world, why Ahrenfelt (2001) consider it as a change of the second order. Whether the organization goes from being project based to process based or if the organization begins to work with new methods the change is of large scale. Hence the transition

from project based to process based organization can be seen as a radical change according to Bruzelius and Skärvad; Jacobsen and Thorsvik (2004, 2002). All respondents except one agreed upon this being a radical change as industrial construction requires a major organizational change.

As all the respondents have implemented industrial methods in their respective companies, they have noticed various types of resistances in relation to the change. According to Sandström (2000), 80% of the population sees changes as threats while only 20% sees changes as possibilities, why resistance can be seen as a natural part of the implementation of a change. The resistances noticed by the respondents can be categorized as:

External resistance

- Subcontractors and suppliers who are not interested in industrializing their own activities.

- Wholesalers and agents who are unwilling to relinquish the traditional conjunction controlled pricing.

Individual resistance

- Distrustfulness against changes.

- Unwillingness to change duties.

- Changes are seen as threats which can give certain insecurity.

Organizational resistance

- The relatively free work roles becomes, with industrial construction, more controlled.

- Expert roles and power relations are integrated or disappear.

Resistance can, according to Dessler (1992), be divided into individual and organizational resistance. The respondents' identification of resistances can be compared to Desslers (1992) definitions. The individual resistance identified by the respondents fully comply with Desslers (1992) categories; habits, fear of the unknown

and security. When it comes to the organizational resistance it is more about structure, limited change focus, threat against expertise and threat against established power relations.

The territory thinking, which Sandström (2000) explains as a reason for resistance, can probably cause the external resistance noticed by the respondents since subcontractors and suppliers has short-term profit interests. However it should be emphasized that there can also be other underlying reasons to the external resistance such as collaboration difficulties, regulations and traditions. One of the respondents explains that it is possible to counteract this type of resistance by offering the collaborative partner education and to contribute with resources to make it possible to work with industrial construction together. The individual resistance can, on the other hand, be found in one or several of the reasons stated by Sandström (2000) why it is difficult to point out a single example. This since the employees can apprehend changes in various ways depending on their situation and personality, which in turn makes the type of change resistance vary from person to person.

The organizational resistance is, on the other hand, probably based on that established power statuses and work roles are restructured after a change. During the transition to industrial construction, some roles are integrated or disappear, which makes employees who had a certain role during traditional construction to occupy an entirely new role with industrial construction. The territory thinking can thereof be a reason to the resistance which the organizations bump into. In order to counteract the described resistances to change and succeed with changes within the organization it is vital that someone leads and takes responsibility for the change work. Thus, Johnson and Scholes (1999) advocate change agents in order to achieve the successful strategic changes which the transition from traditional to industrial construction requires. Furthermore, Johnson and Scholes (1999) mean that there are two types of change agents, external and internal, who each have certain advantages and disadvantages depending on the type of organization and the scope of the change. The advantages (+) and the disadvantages (-) can be illustrated according to following (Meyer and Stensaker, 2006):

Internal change agent

+ Well-known and respected by others within the organization.

+ Interest in the long-term consequences the change causes.

– Careful and less efficient due to the impact of internal reactions to the change.

External change agent

+ The organization is seen with fresh eyes and new knowledge can be allocated.

+ More freedom of action due to limited sojourn time in the organization.

+ Can relieve the regular organization representatives from some reactions to the change.

– The effect of the change agent can subside when the commission is completed.

– Inadequate considering of the long-term consequences of the change.

Several of the respondents identify key persons within their organization as change agents. Common for all respondents is that the key persons, who can be seen as internal change agents, have the task to support and to make proposals and decisions concerning changes within the organization. What separate certain respondent's replies from each other is that some describes the change agents as merely a middle hand between the governing management and the employees. Other respondents describe instead the change agents as a group that actively runs the change process and has responsibilities for decisions and the implementation of the changes. The replies from the respondents are a bit vague concerning the organization's strategy choice for the change work, which raises questions about how established the change agents' strategic knowledge are. Furthermore, it can be observed that neither of the respondents mentions external change agents as alternative to the internal change agent, which also leads to the question if they at all considered using change consultants at the major organizational change which industrial construction represent.

Overall, the respondents reckon that organizational changes should be initiated and run from the management, i.e. the choice of strategy seems to be dictatorial change. On the other hand the respondents relinquishes the dictatorial change strategy when questions about change work arises as of the replies became that the change work should be implemented by employees and key persons in their respective companies. The change strategy looks like, according to the replies from the respondents, to be either organization or incremental development. The question which then arises is if they after the initiation change the strategy from dictatorial strategy to organization or incremental development strategy. This subject leads to the query about them even having a change strategy. An important statement some of the respondents however did was that the worst mistake that can be done during a change work is to force a change through from the top. The respondents connote that all employees must be participating in the change work in order to reduce the resistance against the change.

7 Conclusions

For a change to have the best prerequisites for success it is essential to have someone who leads and is responsible for the change, a so called change agent. Whether this agent is internal or external, he/she should hold the fifteen key competences identified by Buchanan and Boddy (1992), *chapter 2.2.1*, to be able to implement the change efficiently.

The change process we recommend for the implementation of industrial construction is built on Desslers (1992) organizational change theories. To begin with, the organization needs to find out if the incentives for the change are internal or external. When implementing industrial construction we found the incentives to be both internal and external. Internal in regard to the construction sectors aim for efficient production which can generate higher profit and external in regard to the urban community who want to buy or rent housings which the normal wage earner can afford. Other highly relevant incentives to change are heightened competition within housing production, changing purchasing habits among customers, new ways of rationalizing within the companies and political changes affecting the housing market.

The next step in the change process is identification and acceptance of the need for change. The construction industry have identified the high production costs as a problem which have led to that most Swedish construction companies have accepted a need for change. In the following third step the change agent must investigate the cause for this need for change. From the case study and the respondents' answers it appears that the cause for the construction sector's high production costs is the fragmented processes and that some actors do not provide enough value to the value chain to motivate the added costs.

The fourth step in the change process is about planning the change where decisions must be made about how the change shall be implemented. We think that the charismatic change strategy, *figure 8*, appears to be a strategy the change agent should use during implementation of industrial construction. This because it fits the construction sectors need for change and is suitable for radical changes requiring reconstruction and where cooperation within the organization is important.

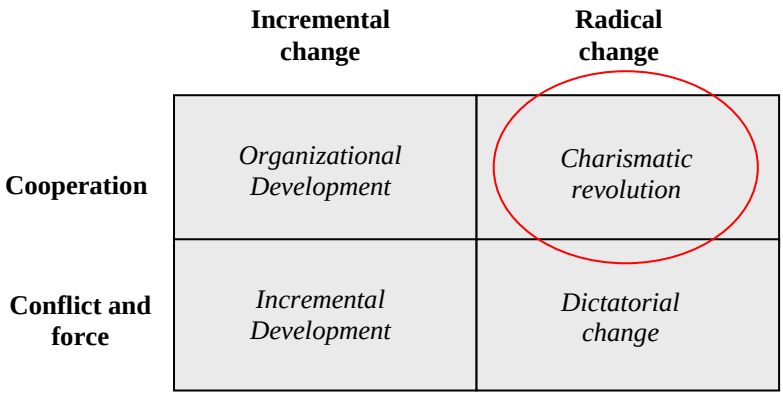

Figure 8: *Recommended strategy choice for transition from project based to process based organization. (Modified, from Dunphy and Stace, 1988)*

The fifth step is implementing the change and it is this phase where the change agent must overcome the resistance which can arise. It appears from the respondents' answers that territory thinking, structures, threats against expertise and threats against established power relations are the most probable reasons for resistance within the construction sector. These resistances are both internal and external by nature where the internal resistance can have both individual and organizational grounds. Hence, in this phase, we recommend the change agent using the so called management model described in *chapter 2.3.3* to counter the resistance to change. The final step in the change process is the following-up. In this phase it is up to the change agent to decide on what kind of feed-back and revision that should be carried out for the change.

We have come to the conclusion that the construction sector has succeeded in identifying a need for change as well as the reasons for it. We therefore mean that the construction sector have succeeded in carrying out the first three steps in a change process properly. On the other hand, we recommend the construction sector to put more effort into the remaining parts of the change process as we did not find any distinct continuance on the change process towards industrial construction.

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