

CHALMERS



Exploitation and/or Exploration?

Barriers for innovation within the construction industry

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

VERONICA JOHANSSON AND LOUISE TRENS

Department of Civil and Environmental Engineering
Construction Management
CHALMERS UNIVERSITY OF TECHNOLOGY
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ABSTRACT

This report covers the subject of innovation within the construction industry, described from the perspective of organizational ambidexterity and the separation of exploitation and exploration activities. Based on theories in the field and four interviews with employees at different organizations within the construction industry both in Sweden and in Hong Kong, a general understanding of the area of organizational ambidexterity within project based organizations within the construction industry are reached. The lack of innovation in the construction industry is explained in accordance with the results from interviews and the strategies for organizational ambidexterity adopted in the companies are described and analysed. In conclusion, the report also includes suggestions for strategies that are concluded to be suitable for the construction industry. The report highlights the importance of establishing a context in the organization in which individuals are given the possibility to improve on current methods as well as come up with new suggestion and ideas. Furthermore, the mentality concerning innovation within the construction industry is concluded to be a barrier for innovation, which must be changed in order to develop the area.

Key words: Organizational ambidexterity; Exploration; Exploitation; Innovation; Construction industry; Project based organization

Exploatering och/eller utforskning?

Barriärer för innovation inom byggbranschen

Examensarbete inom Design and Construction Project Management

VERONICA JOHANSSON AND LOUISE TRENS

Institutionen för bygg- och miljöteknik

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SAMMANFATTNING

Rapporten behandlar ämnet innovation inom byggbranschen, sett ur ett "organizational ambidexterity"-perspektiv samt uppdelningen av exploaterings- och utforskningsaktiviteter. Baserat på teorier inom området samt fyra intervjuer med anställda på olika företag inom byggbranschen både i Sverige och i Hong Kong, har en generell förståelse för området "organizational ambidexterity" nåtts. Bristen på innovation inom byggbranschen är förklarad genom resultat från intervjuer och strategierna som företagen infört är beskrivna och analyserade. Slutligen inkluderar rapporten förslag på passande strategier för byggbranschen. Rapporten belyser betydelsen av att etablera en kontext i organisationen där individer är givna möjligheten att utveckla befintliga metoder och även komma på nya förslag och idéer. Fortsättningsvis är en dragen slutsats att mentaliteten rörande innovationer inom byggbranschen är ett hinder för innovation, och att dessa måste förändras för att skapa större möjligheter för utveckling inom området.

Nyckelord: Organizational ambidexterity; Utveckling; Exploatering; Innovation; Byggbranschen; Projektbaserad organisation

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Preface

This thesis was possible to perform thanks to CMB, Centre for Management of the Built Environment, who contributed with a scholarship, which made it possible for us to travel to Hong Kong to perform two of the interviews.

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Last, but not least, we would like to thank our supervisors, Roine Leiringer, University of Hong Kong, and Göran Lindahl, Chalmers University of Technology, for the support and guidance throughout the process.

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Göteborg, September 2013

Veronica Johansson

Louise Trens

1 Introduction

1.1 Background

In order to survive, organizations must succeed in achieving two different goals, being able to exploit while at the same time invest in future exploration. They must stay profitable and at the same time find future opportunities, innovate, in order to stay updated and survive on the market (March, 1991; O'Reilly and Tushman, 2011; ...). Pursuing both these goals is proven to be a difficult task. In fact, most organizations do not survive in the long run (O'Reilly and Tushman, 2011). This is partly explained by these organizations inability to balance the goals of exploitation and exploration. The task is made particularly difficult because the two goals are in conflict and is fighting for the same resources, both time-wise and economically (March, 1991). The situation is in the field of knowledge management literature described as a trade-off (March, 1991) or as a paradox (Gibson and Birkinshaw, 2004).

The term exploitation includes the process of refining and extending existing competences, technologies and paradigms. Exploration includes experimenting with and finding new alternatives, which has not been used before (March, 1991). Being able to balance these two goals is described as organizational ambidexterity. The term ambidexterity originally refers to a person's ability of being equally skilful with both hands. In the field of knowledge management literature, the term refers to the simultaneous pursuit of the conflicting goals of exploitation and exploration. Research concerning organizational ambidexterity within projects and project based organizations are scarce, which is why this is an area in need of further research.

The construction industry is in many ways the perfect example of a project based industry (Hobday, 2000; Eriksson, 2012). The work within project-based organizations are commonly performed in large, long-term projects where the different stages, for example design and construction, are separated economically, organizationally and geographically (Errasti et al., 2009). The projects involve the assembling of a large number of components and subsystems, and these difficult circumstances increases the requirement of a well-functioning collaboration, both internal and external. Furthermore, the construction industry is by Slack and colleagues (year) described as "low volume – high variety" since the opportunities for repetition are limited. The products are highly, or in some cases one-off, customized, where different projects faces different conditions (Hobday, 1998). Different organizations must be able to temporary work together on project specific tasks, which make it even more difficult to reuse the knowledge gained.

The construction industry is frequently berated for their low innovation capacity and their poor ability to learn from one project to another (...). Changing this would make the industry more profitable, and increase the efficiency. Both the drivers and the barriers for innovation within the construction industry will be described by interviews with actors within the industry. This report will also examine whether the theories of organizational ambidexterity can be applied to increase and finding a balance between exploitation and exploration within the construction industry, and in that case which strategies should be used.

1.2 Aims and objectives

The goal of this study is to understand how a large, project based organization in the construction industry is working with innovation and exploitation, and how new knowledge are utilized and used in the organization as well as between different projects. The difficulties that are faced will be investigated by using organizational ambidexterity theories. The difficulties and barriers for innovation in the construction industry will be examined, and the common accusation of the construction industry as non-innovative will be explained, if possible.

This will be achieved by conducting interviews with employees in some way responsible for the innovation activities at four different companies within the construction industry, in Hong Kong and in Sweden. The findings will then be examined and discussed by comparing results between the different organizations as well as with the theoretical framework of organizational ambidexterity.

The conclusions of this study will be answering the question of how organizational factors impact the exploration and exploitation activities that are undertaken at firm, project portfolio and project level, as well as the question if previous research studies on organizational ambidexterity can be used also for project based organizations.

Furthermore, which organizational initiatives for innovation are undertaken within the organization will also be examined. Both the drivers and the barriers for innovation will be investigated and described. Finally, some strategies of how to properly balance exploitation and exploration within the construction industry will be suggested.

The goal is to contribute to existing knowledge within the subject of organizational ambidexterity in project based organizations. Most studies are conducted on product development companies/initiatives, and very few on project based organizations wherefore this area needs to be further examined.

1.3 Scope and limitations

There are many aspects influencing the possibility for an organization to succeed in balancing their exploration and exploitation activities. However, all of the contributing aspects will not be investigated in this report, due to time and space limitations. The content of this report is stated in aims and objectives above.

(Organizational culture has a large influence on how the organizations work with achieving ambidexterity, especially within the contextual ambidexterity strategy. However, the cultural influence will not be investigated in this study. Move to “future research”?)

The comparison between companies in Hong Kong and Sweden do not seek to compare the extent of innovation in the different areas, due to the large differences in construction and architecture in the two countries. Such a comparison would not be helpful in the search for answers for the research questions mentioned earlier. Instead, the comparison seeks to describe what initiatives are undertaken at different organizations compared to the market in which they are active, i.e. mostly within their respective countries.

Furthermore, only one interview has been conducted with each company, which poses the risk that the results may not reflect the view of the whole company. However, the report seeks to find views of different individuals with responsibilities of innovation that have large influence on the respective company, and therefore can speak about their view of the construction industry.

1.4 Structure of the thesis

The master thesis is based upon a literature review. The theoretical frame of references in this literature review is based upon organizational ambidexterity in a project based organization.

The literature review is introducing the subject by a description of the construction industry, the project based organization and defines the term of innovation. The concept of organizational ambidexterity, its history and terms, is thereafter being described and is followed by descriptions of the three strategies for organizational ambidexterity within organizations.

The theoretical frame of references is followed by the interviews of the organizations. The results from the interviews will be presented in this part of the thesis and the answers will be compared. The theoretical frame of references is being connected and compared with the result from the interviews.

The master thesis will end up with a summary and conclusions based on the interviews and the theoretical frame of references.

2 Innovation in project based organizations

2.1 Construction industry

The construction industry is mostly seen as a process, rather than an industry, and the process of the construction industry largely includes design, construction, maintain and adapt the built environment, involve organisations and be able to temporary work together on projects-specific tasks (Gann & Salter, 2000). Errasti et al., (2009) describe the construction environment as "low volume – high variety", since the opportunities for repetition within construction are limited. The construction industry is further segmented according to different product types. : housing, commercial and industrial building, civil engineering structures and infrastructures, public works, and repair, maintenance and improvement to existing facilities.

The production and operation within the construction industry requires, and indeed often involves functioning collaboration between organizations and people, involved in the same area, in order to deliver good quality products and services (Gann & salter, 2000). The different stages within projects, for instance design and execution, are normally separated economically, organizationally and geographically (Errasti et al., 2009). The separations, organizationally and geographically increase the requirements of good collaboration both internal and external. Projects can take many months, even years, to complete and involve the assembly of large numbers of components and subsystems that are made off-site (Errasti et al., 2009).

Production of the built environment involves making many types of technically and organisationally complex products. According to Kolltveit and Grønhaug (2004) projects within the construction industry are frequently characterized by a great deal of operational uncertainty. The technical systems need to be improved and developed on a regular basis in order to compete with other companies within the same area (Gann & Salter, 2000).

Fig. 1 illustrates the types of actors, activities and knowledge flows found in construction activities (Gann & Salter, 2000).

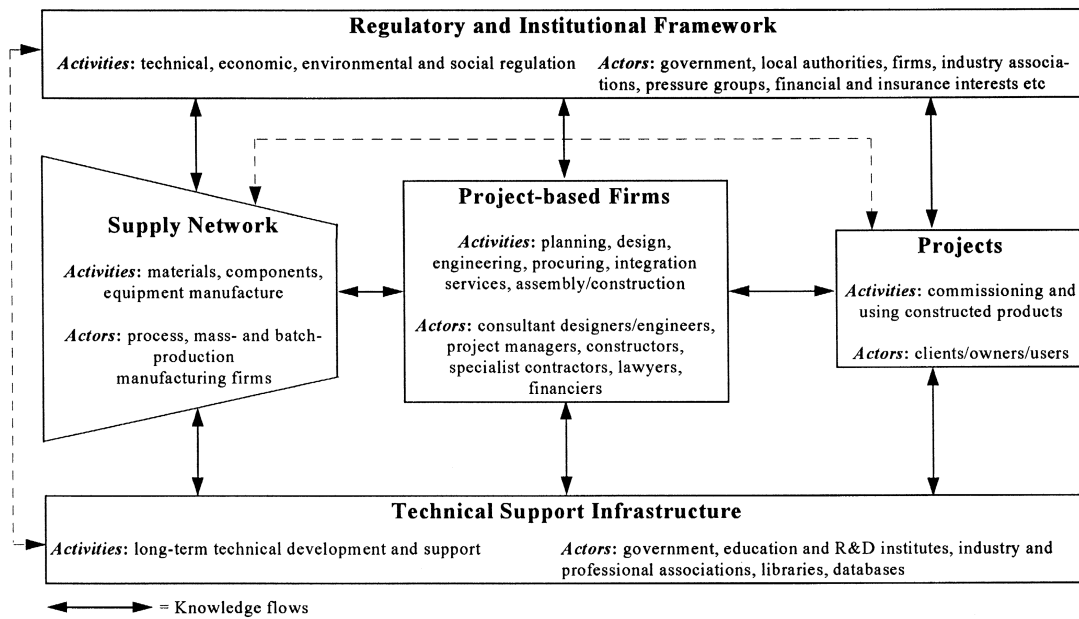


Fig. 1. Knowledge, information flows and actors in project-based processes.

2.2 Project based organizations

Project based organizations is, according to Hobday (1998), a form of organizations which are ideally suited for managing increasing product complexity, fast changing markets, cross-functional business expertise, customer focused innovation and market, and technological uncertainty. Hobday (1998) states that project based organizations are characterized by usually producing products and providing services, which are highly, or in some cases one-off customized. He also states that they often consist of different companies that can be found within the supplier-customer chain. The work within project-based organizations are commonly performed in large, long-term projects and can be referred to as the definition of the construction industry due to its interesting context of unique projects (Hobday, 2000; Eriksson, 2012).

The staff within project-based organizations is usually allocated differently geographically (Gann & Salter, 2000). The off-site allocation often results in limited communication with senior managers, working in the core of the company with day to day responsibilities of managing the company. Project managers of projects within project based organizations have high status and direct control over business functions, planning, staff, and other resources in order to achieve the goals of the project (Hobday, 2000). In order to communicate with core leaders, teams allocated at sites are forced to communicate through site-managers, which, according to Gann & Salter, can be limited. Knowledge, experiences and capabilities within the project-based organization are developed from the organizations execution of different projects (Hobday, 2000).

Projects within a project-based organization have a temporary organizational structure with different staff involved, which often changes from project to project (Hobday, 2000). Further, the differences in size, complexity, and duration for each project are shaping the structures and business processes of project based organizations. Due to

the temporary organizational form, the project-based organization is inherently flexible and reconfigurable in contrast with the anti-innovation bias of large integrated, hierarchical organizations. Economically, a project-based organization achieves the greatest deal of their income by operating in larger projects (Hobday, 2000).

2.3 Innovation and improvement in the construction industry

Innovation may be seen as a creation of act, meaning a change in a habit pattern into a new pattern of work. Innovation within organizations is mostly about changes in their way of working, their working processes (Aasen & Amundsen, 2013). Further, according to Andriopoulos and Lewis (2012), innovation is defined as intricate knowledge management processes of identifying ideas, tools, and opportunities to create new or enhanced products or services.

The construction market is constantly searching for improvement and renewal. The growing pressure for improvement and renewal of the construction industry forces organizations into struggling and competing against each other (Corso et al, 2013). This study will focus on innovation within the construction industry, which means firms operating in project-based organizations and are working in projects to produce and service infrastructures and buildings on a daily basis (Gann & Salter, 2000). The project-based organization is daily facing project- and site-specific challenges and innovation may be necessary to overcome these challenges (Wang & Sheng, 2012).

According to Wang and Sheng (2012), the process of exploring new ideas and solutions in order to overcome challenges and problems on site, the process of innovation need to be implement in the early stages of the project. Although, before implementing innovation ideas into projects there are often requirements saying that new ideas or processes need to be tested. Pilot projects is carried out in order to try out new developed ideas in order to be ready for being implemented in subsequent, often larger engineering projects (Wang and Sheng, 2012). Wang and Sheng (2012) explain that this type of set up is performed due to the cost- and time overruns that may occur when putting a lot of time and effort in exploring new solutions during the construction time for a larger project. Performing a pilot project one approach to avoid cost and time overruns in full-scale projects when trying out new ideas.

As mentioned above, projects within the construction industry often feature unique challenges, according to Liu and Leitner (2012). Innovation can be classified into two groups, incremental innovation and radical innovation. Incremental is the type of innovation that will refine and reinforce already existing processes, technologies and services. Radical innovation is also an innovation on already existing products, technologies and services. Thus, radical innovation has a more dramatically makeover and transform already existing products, technologies and processes in that extent that prevailing product, technologies and processes obsolete. Both incremental and radical innovation may often be required to innovative processes and solutions in order to deliver the project within constraints (Liu & Leitner, 2012).

2.3.1 Innovation Drivers

There are a number of forces that are related with each other that together drive the innovation process. According to Harty (2008), the construction industry seems to have a hard time using innovation from other areas, unlike other sectors, such as the manufacturing industry where innovation seems to be more affective in innovate their processes and methods.

The most significant driver for innovation in project-based organizations within the construction industry is the competition among different construction organizations, since they have to achieve new orders and deliver the best products on the market (Gann & salter, 2000). There is a demand for structures and buildings that have not been built before, and that are using new technologies. Further, Barlow (1999) states that the use of new technologies and processes on the market may push the organizations into a change because they need to respond to the technological advances or external threats. He means that when the market is changing and develops, the organizations are forced to innovate and develop in the same rate in order to compete with each other.

Another important driver is the economic aspect, improving efficiency and cutting prices will save money (Gann & salter, 2000). The authors mean that there is an ongoing work by operators and owners of large types of buildings as they are looking for ways to ensure that the complicated projects and structures they are demanding will be performed in the most efficient way, within budget, on time and with the expected quality. In addition to this, they are demanding lower costs and better characteristics in the long-term performance of their facilities, as well as more flexibility to be able to cope with a fluctuating demand in the future.

Another driver as Barlow (1999) mention may be organizational growth, which may encourage innovation within organizations. As the production increases with number of products or services within the organization, it may evolve existing products or services to be improved and work more efficiency.

The innovation drivers of the recent decades have been, to some extent, the new ways in which we are using communication and information technology. The increased globalization of the markets and production within the construction industry, have created a demand for new types of buildings. Further, the increased growth of economy worldwide is one big factor that has forced organizations into today's developments and innovation (Gann & Salter, 2000)

2.3.2 Barriers for innovation

Innovation may be a successful activity for organizations, and in some cases a survival process within competitive markets. Although, there are common for organizations to have difficulties to apply new ideas and they are often meeting barriers for innovation. Barlow (1999) means that in order to manage innovation, it involves mediating between external forces for change and internal forces for stability.

The most discussed barrier for innovation is the economic aspect. Barriers within the construction industry may mostly be economically due to the expense of trying out new solutions and methods. Barlow (1999) talks about the stakeholders within projects, who are putting a lot of money into huge investments. In these cases, the barriers are the concerning over risky investments. Trying out new techniques, processes or methods may be more costly than ordinary methods or processes, and may also extend the length of the project, which can increase the costs significantly. These major risks taking could lead to economic losses for the stakeholders.

Another barrier, one of the biggest barriers for innovation, is the unwillingness of changing already operational methods and processes. There is all too often that innovation ideas are hindered within the organization due to fear of changes, most of all changes of previously successful work methods (Barlow, 1999). Barlow (1999) states that an organizations response to innovative ideas and to implement them into the organization is influenced by the structure and culture of the organization.

Another barrier for innovation is the government. Within the construction industry there are a lot of requirements that are to be followed. Today the regulatory and procurement policies of the government have a strong influence on the work within the construction industry. Demands are being influenced by the government's requirements and are limiting the technical developments, ideas and processes that are being explored within organizations (Gann & Salter, 2000). According to Gann and Salter, there is a new framework being developed nowadays, due to the demand for innovative ideas and developments within the industry.

3 Organisational ambidexterity

3.1 History of concept

Finding a balance between long-term success and short-term profit is essential for organizations to survive in the long run. Exploiting existing knowledge and improving current methods and procedures will ensure short-term profits, whilst exploring new methods and knowledge will make the company competitive and successful in the long run. Maintaining a proper balance between exploration and exploitation is essential for prosperity and long-term success in the organization. This is something that the scholars within the field of organizational ambidexterity are in full agreement about (e.g. March, 1991; O'Reilly & Tushman, 2011; Eriksson, 2012). In fact, most organizations do not survive in the long run, and this could sometimes be explained by these organizations inability to properly balance exploration and exploitation within their organization (O'Reilly and Tushman, 2011). The phenomenon of organizational ambidexterity has been known and described in the literature of the field for a long time. However, later literature have shifted focus from not only describing the paradox or, as some scholars view it, as a trade-off.

The views of how to achieve ambidexterity are varying with the different authors, which have suggested different strategies of how to reach the state of organizational ambidexterity. Already in 1991, March described the difficulties of reaching and balancing the two contradictory but necessary goals of exploration and exploitation. March describes organizational ambidexterity as a trade off between the two goals, where they are to be seen as two ends of a continuum. A balance suitable for the organization must be found, and this is an especially difficult task since focusing on either one will lead to less focus on the other one. However, later literature have developed a different view on the subject, where the goals are not seen as contradictory and as a hindrance for the other, but rather as a paradox where it is possible to achieve both (Gibson and Birkinshaw, 2004). Gupta and colleagues (2006) argue that the theories about how to achieve ambidexterity is dependent on whether the two tasks are treated as competing or complementary aspects of decisions and actions within the organization, as will be seen when the strategies are described.

There are three main strategies used in the literature of the field today, structural ambidexterity, sequential ambidexterity and contextual ambidexterity. The two first ones separate the activities of exploration and exploitation by either business units or by dividing time between the two. These two strategies have traditionally been preferred by authors in the field, while the third strategy is developed as an alternative way to achieve organizational ambidexterity and is based upon the ability of a unit and the individuals within it to similarly focus on both tasks (Gibson and Birkinshaw, 2004). The strategies will be discussed in detail in chapter 4: strategies of ambidexterity.

3.2 Exploration and exploitation

The term exploitation includes the process of refining and extending existing competences, technologies and paradigms (March, 1991). The process usually includes some incremental innovations and learning (Gupta et al., 2006). Exploration

includes experimenting with and finding new alternatives, which has not been used before (March, 1991). Another difference between the two is the target to which the initiatives are directed (O'Reilly and Tushman, 2004). This may be current customers, an existing market that has not yet been directed by the organization, or an entirely new market. There is a difference in the time between the action and the results or profit of the activity, exploiting activities usually lead to profits for the organization within a short period of time, whilst exploration activities is profitable in the long run (March, 1991).

The term ambidexterity refers to a person's ability of being equally skilful with both hands. In the field of knowledge management literature the term organizational ambidexterity is used to describe the ability of an organization to similarly pursue the goals of both exploitation and exploration (Andriopoulos & Lewis, 2010). In other words, the ambidextrous organization succeeds in both exploiting the present and exploring the future (O'Reilly and Tushman, 2004). There is a strong consensus in the field of organizational ambidexterity that in order for an organization to be successful in the long run, there is a need to be able to properly balance both exploration and exploitation (e.g. March, 1991; O'Reilly & Tushman, 2004; Eriksson, 2012). O'Reilly and Tushman (2004) concluded in their study that organizations that are able to properly balance the goals of exploitation and exploration are more successful in many areas compared to those who used other structures. Both when it came to launching new products or services and when comparing competitive performance on existing products, the ambidextrous organizations were significantly more successful.

Finding an appropriate balance between exploitation and exploration is difficult and scholars have suggested several different strategies and structures for managing to divide resources properly between the two. Mainly, these strategies differ by advocating either separation or integration tactics (Andriopoulos & Lewis, 2009). These will be discussed further below.

The similar pursuit of exploration and exploitation is made particularly difficult due to the different levels that occur in an organization. The balancing between exploration and exploitation must be found both at the individual level. The organizational level and the social system level, thus creating a need for a multilevel approach (Andriopoulos & Lewis, 2009; March, 1991).

3.2.1 Managing both

Even though it is essential for organizations to emphasize profit and breakthroughs at the same time, this is a task that is particularly difficult to fulfil. As described by Andriopoulos & Lewis (2009), a strategic intent paradox is created where commercial success, exploitation, is caught in a tug of war against artistic expression, exploration.

The simultaneous pursuit of both exploration and exploitation is made particularly difficult because of the large differences in mind-sets and organizational routines needed for the two (Gupta et al., 2006). March (1991) argues that the two are to be viewed as different ends of a continuum, creating a trade-off, which forces the organization to make decisions between the two. The decisions could for example concern alternative investments, competitive strategies, organizational procedures and so on. The balance between exploration and exploitation are determined by these decisions and that the organization is capable of properly understanding the choices.

However, this is further complicated by the variances of values, variability, timing and distribution of results for the two (March, 1991). How to manage the two and achieve this balance should therefore be of high priority for all organizations.

The returns from exploitation are usually positive, proximate and predictable. This clarity makes it easy to tie consequences and gains to the activity quickly and precisely. The outcomes of exploration activities is less certain, distant and often negative (March, 1991).

The differences in time and certainty of returns may affect decision-making regarding the time and effort spent on exploration versus exploitation. It is not uncommon that organizations fail to divide the time properly and the tensions created by prioritizing between exploration and exploitation may trigger traps (Andriopoulos & Lewis, 2009; Eriksson, 2012; March, 1991). Exploration often leads to more exploration, and exploitation to more exploitation (Gupta et al., 2006). The difference in time and certainty of returns often creates a scenario where exploration activities could become less prioritized by the organization. The results from exploitation are much easier to observe in a short time, compared to those of exploration. Furthermore, the results are often positive. Therefore, the experience of how to divide resources in the organization may be affected by the difference in time and certainty of the results (March, 1991). Furthermore, this could create an advantage for the activities of exploitation, since adaptive processes (exploration) characteristically improve exploitation before exploration (March, 1991). Focusing too much on exploitation due to the believed certainty of proximate results and the early success could create a so-called “competency trap”, or “success trap” (Gupta et al., 2006). Exploitation activities will lead to short-term success and returns for the organization, and therefore an incentive to continue exploiting. However, the lack of exploration activities will most probably make the organization fail in the long run. On the other hand, if the resources are spent on exploring at the expense of exploiting, it may create a scenario where the lack of exploitation will obstruct the possible effects of the new knowledge gained, a so-called “failure trap” (Andriopoulos & Lewis, 2009). When exploration leads to failure, the search for even new ideas is promoted creating this undesirable outcome (Gupta et al., 2006). Supportive structures, strategies and contexts should be created within the organization to prevent organizations from developing a one-sided focus towards either exploitation or exploration (Andriopoulos & Lewis, 2009).

The strategies of achieving organizational ambidexterity can be divided by their focus towards differentiation or integration (Raisch et al., 2009). Differentiation refers to the subdivision of tasks into separate units, i.e. one for exploitation and one for exploration. The contexts in the divisions are developed in accordance to the tasks resulting in that the units tend to have different structures. The exploration unit are normally smaller, decentralized, and more flexible compared to the unit pursuing exploitation. Conversely, studies focusing on an integrated strategy address the behavioural mechanisms that enable the activities of both exploitation and exploration within the same unit. Affecting the individual’s possibility to pursue both activities could for example be the business unit context or the behavioural integration of top management. However, both these strategies have been criticized for their shortcomings (Raisch et al., 2009), critics of the differentiation strategy due to the supposed need to recombine exploitation and exploration in order for them to create value. Critics of integration strategies, however, suggest that the individual are

constraining the integrative context, due to their limited possibility to carry out both task whilst relying on the same basic experiences, values, and capabilities. Combining the two instead creates a paradox where neither exploitation nor exploration can be maximized. Differentiation and integration should therefore be considered complementary, instead of alternative (Raisch et al., 2009). Determining the right degree of differentiation and integration is therefore an important on-going managerial task. The need may vary over time and initiatives, creating a dynamic environment that must be managed properly in order to create and sustain organizational ambidexterity.

Central for managing the ambidextrous organization is the need for the organization to possess dynamic capabilities. Several researchers in the field points out that the similar pursuit of exploration and exploitation can not be explained in a static way (O'Reilly and Tushman, 2011; Raisch et al., 2009). However, many studies of how to similarly pursuit exploitation and exploration take a static view, by suggesting that the organization adapts to certain organizational configurations (Raisch et al., 2009). Since the market and the organization are naturally dynamic, the static view must be combined with dynamic elements. The dynamic capabilities should thus comprise and integrate both static and dynamic components (Raisch et al., 2009). Both the external and the internal environment are constantly changing, and the organization must be able to properly respond and adapt to new conditions. Sustained competitive advantage is achieved by the organization's ability to sense, seize and reconfigure its existing competencies and assets to respond to the ever-changing environment (O'Reilly and Tushman, 2011). The solutions required for adopting to new conditions is most likely to change over time, which precludes the possibility for the organization to use a steady-state functionality (Raisch et al., 2009). Furthermore, Possessing dynamic capabilities supports the organization in reconfiguring existing assets and developing new skills needed to stay successful.

The ambidextrous organization naturally creates challenges also for the managers. Ambidextrous organizations need ambidextrous senior teams and managers, to be able to combine the need for balancing cost-cutting as well as innovative initiatives (O'Reilly and Tushman, 2004). Both organizational contexts and personal characteristics determines to which extent a manager is ambidextrous, and it also varies both within and across different contexts (Raisch et al., 2009) The balancing act and constant trade-off between conflicting goals creates a situation where managers must perform multiple and contradictory roles (Källa?). Furthermore, managers must be able to sense and act upon changes in the competitive environment. Opportunities and threats should be seized, by reconfiguring assets in the organization when necessary (O'Reilly and Tushman, 2011). The dynamic environment in the organization also creates challenges of managing complex routines such as decentralization, differentiation, and integration. Developing and managing these dynamic capabilities is an important task for the organization's leadership.

As stated earlier, organizational ambidexterity affects several levels in the organization, one of them the individuals at the unit/organization. Most literature in the field address the organizational level rather than the individual, although some researchers have emphasized the importance of individual influence and impact within the initiative of becoming and remaining ambidextrous (Raisch et al., 2009; Gibson & Birkinshaw, 2004). The importance of considering the different levels when analysis is captured by Raisch and colleagues (2009); most research describes

organizational mechanisms to enable ambidexterity such as formal structures. However, some studies suggest that ambidexterity is instead rooted in an individual's ability to explore and exploit. Therefore, Raisch and colleagues (2009) conclude that organizational mechanisms may be required for enabling ambidexterity at an individual level and by the same logic may ambidextrous individuals be vital to the usefulness of the organizational mechanisms established for enabling ambidexterity.

Traditionally, research has emphasized structural mechanisms as enablers to ambidexterity. Individuals have been seen as part of different structures or units, thus focused either on exploitation or exploration and have not been seen as ambidextrous themselves (Raisch et al., 2009). However, some studies have assumed that ambidexterity is rooted in an individual's ability to explore and exploit, creating a number of challenges for managers and leaders of ambidextrous organization (Raisch et al., 2009). The personal characteristics of the managers that succeed in taking on these contradictory roles are important to find and understand, although the answer is still unclear (Raisch et al., 2009). Both organizational factors and personal characteristics should be considered when explaining individual's ambidexterity.

According to the authors emphasizing the individual level of ambidexterity, members of the organization are clearly influencing the prevailing level of ambidexterity in the organization. However, Raisch et al. (2009) conclude that the sum of the members' personal ambidexterity is not necessarily the same as the organizational ambidexterity; it is not limited to the sum of individual ambidexterity. In most cases, ambidexterity is more than the sum of the individual activities, although it is likely to be a function of closely interrelated individual and organizational effects. The members of the organization are strongly influencing the ambidexterity at the organization, but the organizational context is also affecting individuals at the organization. Raisch and colleagues (2009) explain this further with the example that if organizational contexts provide managers with authority, this is likely to stimulate richer sense making and cognitive processes for the managers personally.

4 Strategies of ambidexterity

There are three main strategies for managing and achieving organizational ambidexterity described by researchers in the field. Two of them are dependent on structural solutions within the organization. This is done either by separating the activities by using different units, or by separating them by sequences. The third strategy proposes that an appropriate context within the organization will enable the individuals and groups to decide how to divide their time and resources properly.

When adopting the strategies to a project based organization context, and especially for organizations within the construction industry, there are little literature available. Therefore, the literature used for these sections below will be based mostly on the work made by Eriksson (2012).

Even though many scholars suggest that one of these strategies should be used within the organization, Eriksson (2012) suggests that a combination of the three strategies is most practical in reality.

The construction industry is characterized with many specifics, some of which is discussed in chapter one. Some more characteristics concerning the choice of appropriate ambidexterity strategies refer to the tendering processes and the payment processes.

4.1 Structural ambidexterity

Research has traditionally focused on how to achieve organizational ambidexterity by structural means. When using the strategy of structural ambidexterity, exploitation and exploration activities are separated by the use of different groups or business units for each activity, enabling differentiation between the tasks (Andriopoulos & Lewis, 2009; Eriksson, 2012). The subdivision of tasks into different units also enables each unit to develop an appropriate context for exploitation or exploration (Raisch et al., 2009; O'Reilly & Tushman, 2004). The separation of the activities into different units allows for different processes, structures and cultures (O'Reilly & Tushman, 2004). The unit for exploration is usually smaller, more decentralized and flexible compared the exploitation unit. Using this strategy, individuals are usually focused either on exploration or exploitation, in accordance with the unit within which they work and they are therefore not seen as ambidextrous themselves (Raisch et al., 2009).

When separating the exploitative and explorative activities into different units, there is a need to integrate the two in order to fully take advantage of the results (O'Reilly & Tushman, 2011; Raisch et al., 2009; O'Reilly and Tushman, 2004). The integration of subunits is difficult to undertake in a value enhancing way, but necessary in order to use the strategy of structural ambidexterity. O'Reilly and Tushman (2004) conclude in their study that successfully ambidextrous organizations using differentiated units also managed to maintain tight links across the units at the senior executive level.

Another obstacle of using this strategy is that it may be costly, especially in small organizations and groups, to split a unit into two and manage two smaller units for the separation of exploitation and exploration activities (Liu & Leitner, 2012).

The use of a Research and Development department, R&D department, is an example of structural ambidexterity. In the R&D department, exploration activities are taking place whilst exploitation activities are taking place somewhere else in the organization. The R&D-unit often are flexible and adopt a horizontal coordination in the organization (Liu & Leitner, 2012), influencing all aspects of the organization while acting separately.

When using structural separation in the construction industry context, one solution might be to perform exploitation in the regular project setting, whilst performing exploration activities in an R&D department, according to Eriksson (2012). However, Eriksson also mentions that a disadvantage of using an R&D department is that the innovations and developments reached in the department cannot be offered directly and independently to the market. Instead, they must be implemented and diffused through the regular projects. To do this, a strong integrating management mechanism that enhances exploitation of explorative knowledge is needed in order for this strategy to be successful, as mentioned above. However, it is argued that differentiation is an especially difficult task in the construction industry, due to the project-based nature. Therefore, Eriksson (2012) concludes that due to these difficulties, this strategy may not be the best alternative to use in an organization in the construction industry. Liu and Leitner (2012) further argue that another disadvantage of this method within a project based organization is that it bears the risk of missing out of the team follow-through from concept to execution, which is desirable in order to fully use and be able to re-use all the knowledge gained in the project.

In project-based organizations, structural ambidexterity is often achieved through the organization's project portfolio (Eriksson, 2012). This could be to initiate projects for exploitation and exploration, for example pilot projects and development projects, alongside the regular projects. However, there is a difficulty concerning knowledge transfer in order for this type of project to be successful for the organization. The knowledge gained from exploration projects must be transferred from the decentralized project to the centre of the organization, and also to other projects in the project portfolio, in order for them to be successful for the organization (Eriksson, 2012). This is a very difficult task, partly due to the characteristics of the construction industry, which makes Eriksson (2012) to question whether this strategy is the most beneficial for organizations within the construction industry. Even if the development project itself is successful, the specifics of the project often make it difficult to transfer knowledge and reuse it for other projects. Furthermore, if an exploratory project is to be undertaken, it is best achieved by allowing for the project group to act decentralized and without extensive control from management, which is rarely the case within these projects in the construction industry. They are often managed in the same way as exploitation project, control-focused, which hinders the innovation and possible outcome of the project.

Eriksson (2012) conclude that neither an R&D department nor development projects would by itself achieve the desired level of ambidexterity in a project-based organization. Instead, these two strategies in combination with exploratory activities within the regular projects would serve the purpose better.

4.2 Sequential ambidexterity

Another strategy based on structural solutions in the organization is to utilize exploitation and exploration in the same unit, but at different times (Andriopoulos & Lewis, 2009). The same people are working both with exploitation and exploration, however these are spatially differentiated instead of structurally, which is the case with structural ambidexterity. This strategy is especially suitable for subunits or projects with scarce resources (Eriksson, 2012), since the separation of one unit into two smaller ones is costly both to undertake and to manage (Liu and Leitner, 2012). It is also suitable in stable environments, whereas structural ambidexterity is preferred in fast-changing, dynamic environments where the organization must be prepared to respond to any changes in the environment (Eriksson, 2012). According to Raisch and colleagues (2009), sequential ambidexterity arises when organizations adapt to a dynamic and temporal sequencing between exploration and exploitation activities, which is suggested by several scholars in the field. Furthermore, the sequential strategy is beneficial for the organization due to the possibility of adapting to a changing environment. When boundary conditions are changing, the organization is forced to react and being able to switch focus between exploitation and exploration quickly.

In the sequential ambidexterity strategy, individuals are focused both on exploitation and exploration. Raisch and colleagues (2012) argue that sequential ambidexterity may be easier to achieve at the individual level compared to the achievement of simultaneous ambidexterity, an individual focusing on exploration and exploitation at the same time. However, the duration of the exploration and exploitation sequences could be very short, hours or even minutes.

In a project organization, sequential ambidexterity might be suitable since it follows the natural project phases (Liu & Leitner, 2012; Raisch et al., 2009; Eriksson, 2012). In the beginning of the project, there is often focus on exploration, e.g. find the best methods for the project execution. Later on, focus is typically shifted towards exploitation, in order to execute the chosen method as effective as possible. This is especially true for the construction industry, where each project is unique and thus requires a unique solution. In addition, it is often desirable to have the same team during the whole project, from concept to execution, in order to effectively capture any gained knowledge during the phases (Liu & Leitner, 2012), which makes the sequential strategy suitable.

When the same team are used during the whole project, and maybe even several projects, Eriksson (2012) argue that this may enhance exploitation but hinder exploration. A team consisting of people who are familiar with each other tend to enhance exploitation, since they can rely on experience and existing methods to increase predictability and reliability in the project. On the contrary, a homogeneous team usually focus more on exploration, where individuals have different experiences and associations, which enhances exploration in the team.

4.3 Contextual ambidexterity

Contextual ambidexterity refers to the features of the organizational context. In the contextual ambidexterity strategy, exploration and exploitation is pursued

simultaneously in the unit (Gibson & Birkinshaw, 2004). Scholars suggesting this structure emphasize the behavioural capacity to both explore and exploit simultaneously across an entire business unit, instead of separating the activities into structures or sequences. Gibson & Birkinshaw (2004) developed the concept of contextual ambidexterity, which emphasizes the importance of individuals and their influence on the organization, instead of structures and sequences as in the other strategies. With context, the authors refer to the systems, processes and beliefs that shape individual-level behaviour in the organisation. The level of ambidexterity within the organization is affected by the culture in the organization, which targets are set, risk management, recruitment and the incentives set for the organization (Eriksson, 2012; Gibson & Birkinshaw, 2004).

This theory is based upon the belief that ambidexterity is rooted in an individual's ability to explore and exploit (Raisch et al., 2009). Theories concerning this strategy argue that individuals should be able to make their own judgements of how to best divide their time between the conflicting demands of exploitation and exploration, in order to create a dynamic and ambidextrous environment (Gibson & Birkinshaw, 2004). To achieve this and make individuals act ambidextrously, a set of processes or systems that enable and encourage individuals to do so should therefore be established within the organization. Contextual ambidexterity arises from the supportive organizational concept built and developed by leaders in the business unit. Processes and systems that support individuals could for example include team-building activities, recognition and socialization (Raisch et al., 2009). Creating an organizational context that enables individuals and team to simultaneously pursue both exploitation and exploration, however, could be very complex and time consuming to develop (Gibson & Birkinshaw 2004).

Critics of the contextual strategy argue that ambidexterity is constrained when individuals are taking on both exploitative and explorative tasks (Raisch et al., 2009). Instead, individuals should be focused on either one of these activities to reach the best results. Since they rely on the same experiences, values and capabilities, it is difficult to carry out the two different tasks in a satisfying manner. Furthermore, the integration of exploration and exploitation may also constrain actors, due to the complexity and potential confusion that may arise during the pursuit of the contradictory forms of innovation (Andriopoulos & Lewis, 2009).

In the construction industry setting, using the strategy of contextual ambidexterity would mean that the phases and actors of design and construction should be integrated (Eriksson, 2012). The benefits of using this strategy would be that uncertainty and difficulties to forecast future occurrences would decrease, by the early involvement of the different actors in the project and the increase in flexibility, adaptation and coordination. Also, the joint project solving and increased possibility of knowledge sharing will facilitate explorative innovation within the project. Eriksson (2012) concludes that using the strategy of structural ambidexterity, i.e. joint problem solving and the integration of actors and activities, will allow a simultaneous focus on long-term exploratory design issues and short-term exploitation in efficient construction activities.

If any of the structural strategies were adopted in a construction company, it would be a good idea to complement and/or modify the strategy by also using the contextual ambidexterity due to the abovementioned industry specifics and positive outcomes of

the contextual ambidexterity strategy. This would allow for ambidextrous activities not only at SBU levels and project portfolio level, but also in a single project when integration of actors and activities is adopted (Eriksson, 2012).

5 Methodology

This master's thesis is based on a case study, partly performed in Hong Kong at the university of Hong Kong.

At first, a desk study to obtain knowledge upon the subject was carried out. This was done in order to become familiar with the subject and the terminology. The desk study included reading numerous reports and papers of interest within the subject and thereafter sorting the reports and papers in order to obtain the most suitable ones for the case study.

This case study includes four interviews, two interviews performed in Hong Kong and two interviews performed in Sweden. Two of the four interviews, were conducted together with contractors, each in Sweden and Hong Kong. Two similar companies were chosen and interviewed in order to compare the view from each country. The other two interviews were conducted together with clients, each in Sweden and Hong Kong in order to compare the countries.

Interviews were chosen in order to understand how companies of interest set themselves into their work towards innovation, both their daily work and future work. The structure of the interviews is designed along the individual's thoughts and is not representing the view of the company. The interviews were also designed to be comparable with the theory in order to come to a result and conclusions based on both theory and interviews.

5.1 The companies and the interviewees

5.1.1 Hong Kong housing Authority

Hong Kong Housing Authority acts as a client. They perform their own design but have limited resources for drafting work, which forces them to use consultancies. The company itself oversees the whole process of performance in their projects, in every stage of planning, design and construction. Structural design and building design are being outsourced to consultancies.

Hong Kong Housing Authority is divided into two divisions. The construction division is handling the planning, design and construction processes. The estate management division is looking after the houses after completion and handling maintenance and day-to-day operation. After construction is done and completed, the work is handed over to the management division.

Hong Kong Housing Authority does their own supervision. The whole chain of supervision within the company makes it possible to perform their own supervision instead of trust the variety of quality of the supervision from the consultancies.

The interview was conducted together with the chief and structural engineer of Hong Kong Housing Authority. He works as a coordinator of research and developments activities, and his work is particularly focusing on the innovative activities within the company.

5.1.2 Gammon

Gammon works as a large contractor company, and is active in Hong Kong, Singapore and China mostly, but has performed some projects in other Asian countries as well. Gammon provides one-stop-shop services to clients, including design, management and construction services in building, civil engineering, foundations, electrical and mechanical, infrastructure maintenance and operation. They are not involved in any of the early phases before the productions starts.

Lambeth Associates was established as an in-house consultant for the contractor company Gammon in 1976. Lambeth are playing a critical and strategic design role in the operations of Gammon and its joint venture partners.

The interview with Gammon was conducted together with the innovation manager of the company, who is involved in the engineering side of Gammon and Lambeth associate. There was also a participant from Lambeth, responsible for disseminate and share innovations issues and thoughts to employees within the company. The interviewees were employees at Lambeth, but they did also answer for the views of the whole organization.

5.1.3 Lokalförvaltningen

Lokalförvaltningen manages, adapts and builds facilities and accommodations for the activities of the city of Göteborg. Lokalförvaltningen has been working as an organization for almost two years. Before the organization was established there were two different types of organizations, one administrative organization and one performing organization. In order to come closer to the production, administration and service, the two organizations has become one.

Lokalförvaltningen manages the type of activity that involves providing a basis for decision making in order to manage design and production until the handover of the finished product.

The interview with Lokalförvaltningen was conducted together with the head of the department. This department works and collaborate around 90 people with the missions to perform all projects within the organization.

5.1.4 Skanska

Skanska is an international leading company of project development and construction related services and is active around the world. Skanska act as one of Sweden's biggest contractor with operations within building and civil engineering construction.

The organization is organized geographically in Sweden. They are following the typical structure of organizing a construction company. The organization is divided into different districts. Depending on the size of the district, each district is driving a number of projects, which are divided in terms of responsibility where each chief has the responsibility of several projects. Skanska is composed of a typical hierarchic structure.

The interview with Skanska was conducted together with the manager for innovation and development within the department for infrastructure. The manager for innovation and development is working within a team, who is working especially with questions regarding innovation and development. The focus of the department is to work with the organization way of perform their work on site, to develop and make the methods more effective.

6 Findings

In order to understand the strategies adopted for innovation activities, the interviewees' view of the construction industry and innovation in the industry are described. Which are the main barriers and incentives for innovation is also described using each interviewee's individual opinion.

The organizations have adopted several different strategies for managing organizational ambidexterity. This section describes their different initiatives in terms of whether they use Research and Development units, development/pilot projects, if they have a separate budget for these activities etc.

6.1 Strategies for innovation within the organizations

The reputation of the construction industry being non-innovative is a common view within the industry. However, not all interviewees agree with this view. Hong Kong housing authority states that they have a good reputation with new ideas and a good image within the industry. Skanska agrees with this statement but also disagree, Skanska states that there are developments within the industry, even though all efforts are not being seen from the outside. Comparing to what other industries are performing, Skanska thinks that the construction companies are not one of them who is being most innovative. Those companies who have global competition are those who are more innovative due to the force of improvement from the market. LF does not fully agree with the view of the construction industry being non-innovative. LF argues that they are working hard with development projects, technical requirements, and instructions, which are their way to decide how the buildings will be performed in order to pass the requirements.

6.1.1 Barriers for innovation

The most common barrier for innovation is the economic aspect, according to the interviewees at all four organizations. According to Skanska, the economic aspect is of great importance both when arranging pilot projects and also for the research and development department. Innovation and trying out new methods are associated with risks that might result in loss of money.

The interviewee at Skanska argues that the lack of innovations within the construction industry may depend on limited competition in the field. There is no need for development cause it is not necessary, you can succeed without developing to any large extent. In other industries, the competition is instead a large incentive that forces the organization to innovate in order to meet changing demands. However, the interviewee suspect that this will be a necessity in the future, since the global competition seems to be rising in the construction industry.

Another important barrier is the limit of time available for innovation and development thinking within individual projects. When starting a project, LF states there is a time limit set from the beginning, which means there is no spare time for thinking of new ideas and better solutions during the time of the project. Pilot projects are therefore implemented in the organizations and its purpose is aimed for focusing on new ideas and solutions that later can be implemented in regular projects. Gammon

also agree with the lack of time in projects, after being accepted to build, there is no time left for thinking of new better solutions. This also has to do with the late involvement in project, which is something many interviewees mention as a barrier. When design is already decided upon and the time available is limited, there is no room for innovative thinking.

The limit of resources, time and money, is also resulting in the lack of staff within the construction industry, which is another barrier for innovation. Gammon states that the employees at the projects do not have time to innovate and to come up with new solutions. They implement new easy things, but if the ideas are too complicated they do not have time to learn it and to implement it in projects. The best solution is to have a centralized unit working with innovation that has time to concentrate on only finding and implementing new ideas.

Gammon states that another barrier for innovation is the cultural aspect. The employees may feel like they are demining the seniors within the organization when suggesting improvements and trying to change the working methods. However, as more young people are included in the management team, this is starting to change. According to Gammon, this traditional view is however starting to change a bit, and the “you are under me” mentality is not as strong within their organization as it has been before.

The governmental regulations are a barrier mentioned by the interviewees at Gammon. The regulations in Hong Kong are very tight and rigid, according to the interviewees at Gammon. This makes it really difficult to bring in new techniques in todays work. Furthermore, Gammon states that the government in Hong Kong has too much money, which results in no pressure to innovate from the government. Therefore, they use the same methods as they have done before to get the same outcome. The most important incentive, money, is not a concern and therefore no actions are taken to save money. Also, this way the risks are minimized and any possible negative outcomes are hindered. They also mention that the government could take on the role as enablers of more innovation, if they would support innovative thinking with for example funding of innovative projects or promising ideas.

The time from innovation until the actual results is reached is very long, often several years, within the construction industry. The interviewee at Skanska argues that this is a barrier since the organization wants improvements to be profitable right now and the long time span may hinder the improvement from being profitable for the organization. However, often there are processes or methods that are being improved during the project, which can be shared to ongoing and future projects. This is, however, one of the biggest challenges brought up by the interviewees. It is very difficult to transfer knowledge from one project to another and to adapt new methods or processes when the members in the team have not used these before.

Transferring knowledge and experiences between projects is, therefore, one of the biggest barrier and challenges within the construction industry. This challenging barrier is discussed among all the interviewees and the organizations are daily struggling with the challenge in order to seize development possibilities and increase innovation. The strategies of this are further discussed below.

6.1.2 Innovation focus within the organization

Hong Kong housing authority is focusing on innovation for procedures and processes, both existing and new ones. They are focusing much on improvement of the quality of products and have a lot of free hands and no rigid procedures. They state that they have a good reputation with new ideas and a good image within the industry.

Gammon states that they focus more on today's issues rather than tomorrow's opportunities. Although, the biggest challenge in this business, except for BIM which today is really embedded in the company, is to focus more on tomorrow's issues and how the industry can change within 15 years, rather than on today's smaller issues.

When it comes to what type of innovation that is most appropriate, LF states that they are working both with improvement of existing methods but also with development of new unproven methods. Thus, to improve existing methods but at the same time has a good thinking of innovation and how to come up with better solutions.

Skanska states that it is a much clever choice to improve already existing methods and processes instead of develop new ones. Not only improve them, but also share the best upcoming solutions to other among the organizations. It is better to raise the organization and work in the same way with the best possible solutions instead of develop new ones.

6.1.3 Budgets and strategies within the organizations

Hong Kong housing authority have adopted an organizational strategy where the innovation activities undertaken in the organization is dependent upon individuals in charge of the different areas of the organization. This strategy is chosen due to the view that one single department cannot be in charge of the innovation undertaken in the whole organization, consisting of ten areas. Instead, HKHA are trying to mobilize each of the executives in charge of the different areas into performing innovation within their projects. This gives them the possibility to try out their own ideas, which they find suitable, within their projects. The individuals in charge of the different areas are more qualified to find improvement possibilities and new methods than an R&D department would be, according to the interviewee. Furthermore, the people on site have the opportunity to decide which methods should be implemented or developed according to their experiences and opinions. Furthermore, this strategy is also used due to the view that the division of people into different groups that are either good at exploring or exploiting is not an effective method for the organization. Everyone should have the opportunity of coming up with new ideas and share these within the company. Before, HKHA had an exercise for innovating, in order to increase the thinking of innovation among the employees of the housing authority. The organization was also giving out money for academic research, but according to the interviewee at HKHA, it did not work well enough. Most of the research was delayed and not useful. Today the company is still giving out money to help with research, but they are not setting up contests to increase the thinking of innovation.

Gammon has a budget of 2 million Hong Kong dollars per year for strategic innovations. This is not benefiting a special project directly. Instead they might be used on a group of issues. Money is also allocated to project managers, so that they can use the money in the way they think are needed in their project to create value.

Gammon is also using an R&D department for innovation activities within the organization. The main responsibility of the R&D-department is to do regular visits to sites in order to see what problems they might face and how they can work to improve the situations on site.

The interviewee at Lokalförvaltningen states that the company works hard with development projects, technical requirements, and instructions, which are their way to decide how the buildings will be performed in order to pass the requirements. The city of Gothenburg has three sustainable perspectives; economic, organic and social. The organic and economic perspectives are controlling in that way right materials are being used both environmental, durability wise, energy wise and technically. LF also has groups where development of departments is being improved, for instance ventilation and electricity work. Further, they work as a team in development questions, project managers do not work in their own way, and all involved in the company work as a team and operate after a joint standard. LF does not have any budget for innovation activities themselves. However, the government can allocate money for a special idea if LF can present and argue for the benefits and potential of that specific idea. However, the interviewee states that it would be beneficial to have a specific budget within the organization for innovation activities. Furthermore, in order to work successfully with innovation and development, the interviewee states that he thinks it is a requirement for a research and development department. Furthermore, the interviewee at LF thinks there should be more employees working more centrally within the organization near to the management department in order to together work towards developments and researches by examine other organizations and industries and their processes and methods. One of the thoughts about innovation within LF is to have a steady and thorough research and development plan. This plan should contain descriptions of the potential cost of the development and research. But before it is possible to do such calculations one need to decide what type of innovation that may be of interest for the organization. Unfortunately, today it is still the coincidences that make us hope for some developments more than others, we still does not have a thorough innovation plan. Furthermore, LF works together in order to find a common solution for a joint construction process. This common process is based upon thinking for development and improvement of processes and methods within the organization. They also work for an opportunity for feedbacks in order to make further improvement of already improved processes. The long-term goal of the organization is environmentally construction where focus is to think about the environment during construction.

The interviewee at Skanska states that today there are increased demands from the market to be more innovative within the organizations. One way to develop is to think more process, to use the fact that the organization is almost doing the same thing at several places, to recycle and take advantage of those experiences and knowledge from previous projects into new projects and continue to improve them. To innovate, Skanska is using both a small R&D department and development/pilot projects. Managers on site also have the leverage to try out new ideas and methods in the regular projects, in the case that this is actually better than existing methods within the company. This is decided by responsible individuals at different units of the company. Skanska has a budget specifically for innovation activities, however, it is stated by the interviewee that this budget is very small compared to other industries. Compared to the Swedish construction industry, the interviewee states that even though he thinks they need to innovate more, they are still one of the most innovative companies. The

role of the R&D department is mostly to stay updated within the field, external environmental monitoring. The small department is consisting of around 10 people, who are attending exhibitions and fares as well as participate in peer groups to examine the market in order to find potential development possibilities.

Skanska also has a common platform describing their way of working and perform, including their code of conduct. All employees within the organization can read about the organizations relative contribution to valuation issues. And more important, their way of perform their work, for instance how to handle meetings, contracts and how to schedule the projects. However, there are no guidelines in how to actually build, there are no strict regulations on how to use a specific machine. That type of daily work is a management system rather than a book of guidelines.

6.1.3.1 Pilot/development projects

Pilot projects, or development projects, is widely used by all four organizations to try out potential new methods or ideas before they are diffused and used within the whole organizations. The interviewee at HKHA states that the organization has performed several successful pilot projects within their company. Similarly to HKHA, Gammon also believes that pilot projects are the key to learn more about innovation and to promote the benefits of it. To come up with a pilot project, which is dealing with issues that the business is facing and that is common in ordinary projects, and to succeed with that project is the best way of promoting innovation, according to the interviewee at Gammon. LF uses pilot projects in the organizations for the purpose of focusing on new ideas and solutions to problems, that later can be implemented in the regular projects.

In Skanska, pilot projects are quite strictly managed by the organization. When executing a pilot project, Skanska has a structure that must be followed including a purpose, budget, risks etc.

In order to use new ideas within projects Gammon perform pilot projects to test their innovation ideas, then the organization talk to the core members in the project in order to be able to apply it on site. They use the platform to present and share their ideas of the projects. The most effective way, according to the interviewees at Gammon, to implement new ideas is to talk to the core members. If they like it they will apply it. Of course there are discussions about price, but it does not work as a barrier for the new ideas.

6.1.3.2 Transferring knowledge between projects

However, as stated by the interviewee at HKHA, the bigger challenge is to transfer the knowledge to the centre of the organization and to other projects. This is a view that all interviewees agree with and the companies have developed certain strategies to overcome these difficulties. HKHA uses the strategy of cross communication. During monthly meetings, executives from the different areas can share ideas and bring with them to their projects. Ideas raised that may be of interest for the organizations can be tried out in order to determine if they are useful for the organization. Furthermore, HKHA has a centralized forum where stakeholders can be invited on regular meetings and workshops in order to explore new ideas and discuss potential new methods.

To transfer knowledge, Gammon organizes meetings in order to involve the whole organization. The employees of Gammon are positive to meetings where ideas and developments are being discussed. The organization also organizes seminars every two months where speakers sometimes may be invited to speak about a special method, technology or process. Staff members who have tried out the new technology or processes are invited to present how useful the technology or process was for the company. But it is very difficult to implement the thoughts into the employee's daily work, and there is a risk that employees return to their office space and continue with their daily work without managing to include new insights and innovations within their daily work.

LF will work harder on taking advantage of experiences and knowledge from earlier projects. There can be more time for communication within the company and to share ideas in order to improve the work. The organization learns from communication and experiences from earlier projects if anything went wrong and what type of processes those were successful.

Skanska takes advantage of learning between projects due to their well-developed management. They have a working structure within the organization. However, as mentioned before, the biggest challenge is to learn between projects and to transfer experiences and knowledge from one project to another. It is a challenge due to every project uniqueness, every new project look different. Even though it is a difficult challenge, Skanska put a lot of effort in transferring knowledge between projects, compared to what the construction industry has been doing before. Skanska see their specialization, their area of working, like their type of development, which they believe in. In order to share knowledge and their procedures of working within Skanska, they tape their performances on site. Along with these record exists job description, following a specific structure, where the employees in detail can learn more about the procedures and recycle the same method or their site in their daily work. When procedures are being taped, that method is the best solution to perform the work, and therefore it is the one to be followed and learn from. If one would like to perform it in another way, this can only be done if it is a more effective method. There are always opportunities to improve methods and to share new ideas. If experiences and knowledge are coming from a previous project, there might be new solutions to perform methods, which should be analyzed and discussed within the organization. If this is a smarter and more effective method to perform, then it should be taped and spread to all members. This is one procedure in working with development and to learn from and between projects.

6.1.4 Individual effects on innovation within the organization

Within Gammon they encourage innovation using internal competition, both annual and monthly. A lot of platforms help employees to share ideas, read articles within the industry, share calculations and documents and to discuss developments. The monthly competition focuses on job innovation challenges within projects with particular issues. Prizes are awarded in order to engage everybody within the company in the competitions, not just the engineers. The competitions mainly contribute the technical departments but also the financial. The competitions are used both in order to recognize good ideas, to encourage individuals but also to create a corporate image.

LF thinks that in order to be able to work effective with innovation and development within an organization, there must to be an entrepreneurship, a mindset for innovation and opportunities within the organization. It is not difficult to come up with new ideas and solution; the problem might be to implement them into the system. There also need to be an impulsion and a willingness to develop and innovate and not only put all effort and energy in order to build as cheap as possible. In order to innovate as effective as possible, there need to be some form of feedback to recycle new ideas and solutions.

According to the interviewee at Skanska, their success is dependent upon that people with an entrepreneurship spirit works within their organization, who always think one step further and work in a creative way in order to solve upcoming problems at site. They do not always have to wait for instructions, but finds solutions for problems and possible development opportunities themselves.

6.1.5 Team setup and collaboration between organizations

The interviewee at LF states that working in project teams is an advantageous. Working in teams, where skills and experiences can be picked up from different companies, means that the exactly right persons for the project can be chosen to participate. Expertise and knowledge can be chosen from earlier projects with similar type in order to perform in best possible way.

HKHA does not always choose contractor after lowest tender, they are instead focusing on choosing contractor after quality. It is of great importance that the contractor can deliver good and safe quality and can perform well. They also think that they are doing it in the most budgeting way, like normally they do not using expensive materials. Instead they are trying to focus on doing it in the best way and with good quality without using expensive materials and methods. The idea of partnering is very good according to the contract team of Hong Kong housing authority. Hong Kong housing authority holds workshops to invite all involved people in the project. It is a good platform in order to get to know each other and see who are working in the same project.

Gammon mention that they, as a contractor, are being involved into projects rather late in order to bring innovative thinking into the technical solutions. They cannot influence the construction work, even if they state that the construction is the stage that should innovate more. If Gammon would chose, they would like to rather be involved from the beginning, in the design phase in order to put their opinions and ideas into the project. But unfortunately, their work is to tender the project and award it, but there is no dialogue generally, so there is no influence from the company. To be involved earlier in projects is the value of influence.

It states within the construction industry that lowest price is one factor that is non-innovative. However, according to Skanska there might not be so due to growing foreign competitors within the industry. Competition against lower price force our organization to find new, better solutions and methods in our work, which in our view can be seen as some kind of innovation, to build same things as before but to a lower price. Skanska rather works with improvement of already existing processes, as mentioned earlier. Lowest price lacks innovation due to the fears of taking risks and to

try out new methods. Basically, the competition from the market is the best thrust for innovation and development within organizations.

Skanska is working with partnering, but not to that extent that it should be linked to development and innovation. Partnering is being used with stakeholders more than with the suppliers. However, partnering is not that relevant within Skanska as it is in other construction companies, but they remain active against the issue of partnering. Sometimes it is a well-functioning system, but it also means that the organizations need to share their ideas and publish their information, which sometimes makes companies seen partnering skeptically.

7 Analysis and discussion

7.1 Interviewees view of the construction industry

The views of whether there is too little innovation within the construction industry are varying between the interviewees. Both Skanska and Gammon believes that the innovation activities within the whole industry and within their companies must increase. HKHA and LF have a somewhat different view, they both states that they are continuously working towards improving their innovation activities and that the companies reputation within the industry is good.

The view by Skanska and Gammon is correlating with the situation described in the literature in the field of innovation. According to Harty (2008), the construction industry is lagging behind other sectors when it comes to innovation. Skanska and Gammon both have clear strategies for their innovation activities, and have introduced activities and departments within their companies that are working with innovation daily. On the contrary, HKHA and LF have a strategy that is dependent upon individuals within the company to innovate when they find opportunities for this. The differences in strategies of how to include innovation in the organizations could be a reason as for why the interviewees' views of the construction industry as non-innovative are different. Skanska and Gammon are actively trying to improve the situation, and they also focus towards staying updated on the field by their external environmental monitoring. Their external monitoring and their awareness of the situation might be a reason as for why they have a more realistic view of the situation, which is correlated to the view of scholars within the field.

A possible explanation to the low innovation within the industry is described by the interviewee at Skanska as the lack of competition within the construction industry. As for now, there is little global competition and thus this driver for innovation is not currently improving the industry to a large extent. This is in line with the reasoning by Gann & Salter (2000), who states that the competition among different construction firms is an important driver for innovation.

Common for all four organizations is that they are focusing more on improving upon current methods, rather than trying to come up with new ideas. The focus seems to be more towards exploitation than exploration in the construction industry. Exploration is often towards improving on materials, which is an area that is exposed to global competition.

7.2 Strategies in the companies

7.2.1 Structural ambidexterity

The companies have adopted different and sometimes multiple strategies in their work with innovation and exploitation. Following the structural ambidexterity strategy, R&D-departments are used by both private owned organizations, Skanska and Gammon. However, this department are not working with innovation in the sense that the literature is describing – finding innovations while differentiating their unit from the rest of the organization. Instead, these departments are working with monitoring the external market and keeping up with changes in the industry.

All four organizations also used pilot or development projects, another method described in the structural ambidexterity strategy, in their work towards achieving ambidexterity. They all believe that this is a good way to try out new ideas and methods before deciding if these should be diffused and used in the whole organization. However, the interviewees described the same difficulties to those stated in the theoretical frame of reference. The processes of integrating knowledge gained in decentralized and separated units with the whole organization is crucial in order for the organization to be able to properly take advantage of the results (O'Reilly & Tushman, 2011; Raisch et al., 2009; O'Reilly & Tushman, 2004). However, to transfer the knowledge gained into the whole organization and the separate projects is also one of the biggest barriers to overcome (Eriksson, 2012). In line with this reasoning, the interviewees have stated that this is a difficult task due to the specifics of the construction industry. The projects are highly or one-off customized, which makes it difficult to apply and reuse knowledge in the projects (Hobday, 1998). The interviewee at Skanska did also bring up the difficulty of moving the knowledge from one individual to another. Not having anyone at site who have actually tried out the new method and knows how it should be done is something that hinders innovation.

Even though the organizations have developed routines and strategies of how to overcome the difficulties of transferring knowledge, they state that this is still a difficulty and something that must be improved. It is likely that this difficulty is something that characterizes the construction industry and will not be solved anytime soon. Rather, the findings from the interviews have contributed to the reasoning by Eriksson (2012), who states that neither an R&D department nor development project would by itself achieve ambidexterity. For the organization to be successful in their struggle towards ambidexterity, the structural strategy must be used in combination with other actions or strategies.

7.2.2 Sequential ambidexterity

Sequential ambidexterity is not used to any large extent in any of the interviewed organizations, even though it is argued to be a suitable strategy for project based organizations due to the natural sequencing between project phases (Liu & Leitner, 2012; Raisch et al., 2009; Eriksson, 2012). The phases in the project does proceed as described in the theories of sequential ambidexterity, the design phase where exploration is in focus is followed by execution where exploitation is central. However, the phases consist of different teams, i.e. the same people are not involved in both processes. To have the same people working on both design and execution is desirable in order to effectively capture any gained knowledge between the phases (Liu & Leitner, 2012).

As stated by the interviewees at Gammon, they as a contractor are involved in the projects rather late in order to be able to bring any innovative thinking into the technical solutions. The interviewee also states that even though the construction stage is in need of more innovation, they cannot influence the construction due to their late involvement. By this argument, adapting to the sequential strategy where the same team are responsible both for the phase of design and construction, they would have much bigger possibilities to influence and bring innovation into the construction phase. Furthermore, here the tendering processes are also a hindrance. Gammons, and other contractors, work is to tender a project and award it, generally there are no dialogue between the designers and the contractors. In line with this reasoning, the

interviewee at Skanska also states that the lowest price tendering is a hindrance for innovation. Their task is simply to tender and award a contract, by offering the lowest price for the execution. There is no room for exploration due to the risks involved and the low margins for profitability. However, this is a factor that may change over time according to the interviewee at Skanska, who can sense a change in the competitive environment and predicts that in order to be able to survive the growing competition, organizations must take these risks to lower the prices. As stated in the theoretical frame of reference, the economy is both a barrier and an incentive for innovation (Gann and Salter, 2000; Barlow, 1999), which is further verified by the findings from the interviews.

Using the process of partnering, which would allow for earlier involvement and more collaboration between the project phases, is not widely used by the interviewed organizations. According to the interviewee at Skanska, partnering is sometimes well functioning. However, it means that the organizations must share their ideas and information, which is not always desirable. HKHA states that they are working with partnering, however, their description of this process is not equal to the definition of partnering. Instead, what they seem to be doing is to arrange workshop for the teams to get to know each other and be able to cooperate in a good way, rather than sharing information across project phases.

7.2.3 Contextual ambidexterity

Individuals and their personality, their so-called entrepreneur spirit, largely influence innovation activities within the organizations, according to all interviewees. Therefore, it is clear that the organizations must create a context in which individuals are encouraged by different incentives, corporate cultures and targets set for the organizations, in line with reasoning by Gibson & Birkinshaw (2004) and Eriksson (2012). In short, the strategy of contextual ambidexterity involves creating a context in which individual thinking and their influence is encouraged by for example systems, processes, and believes. This is something that all organization has included in their work towards achieving both exploration and exploitation.

It is obvious that individuals working at the projects and in the organization largely influence innovations within the construction industry. For example, HKHA have adapted a strategy where individuals perform all innovative thinking in the organization. The other interviewed organizations also rely largely on individual thinking even though they have adapted other strategies as well, such as R&D-departments. Therefore, it is very important to create possibilities for individuals to act upon their ideas and improvement possibilities, in line with reasoning by Eriksson (2012) and Gibson & Birkinshaw (2004). In other words, the contextual strategy is suitable for organizations within the construction industry. Many of these companies have tried to achieve such an encouraging context, through different initiatives. At gammon, for example, they encourage innovation by organizing internal competitions, annual and monthly. Even though the interviewee states that the competitions and their focus towards innovation is partly to create a corporate image, it will increase the spirit and mind-set of individual thinking and continuous improvement in the organization. This is a good example of how to encourage this sort of behaviour through incentives and recognition, which is in line with the views of Gibson & Birkinshaw (2004) and Raisch et al. (2009).

The process of creating a context must be actively on-going in the organization. As captured by the interviewees at Gammon when discussing corporate culture, the fear of demining senior executives might hinder the employees from suggesting improvement possibilities and develop an entrepreneur spirit. This is something that may be due to organizational or geographical culture. However, this view is beginning to fade, but in which case this is a good example both for what the culture in companies as well as the culture in a country or region may affect the daily work in an organization, in this case the exploratory and exploitative activities.

Another view of contextual ambidexterity within the construction industry is that it would be achieved by the integration of the phases and actors of design and construction, as stated by Eriksson (2012). As mentioned above, this is something that the organizations have not adapted to any large degree. Even though they partly agree about the benefits and minimized risks, there are also negative sides to it as well, as discussed above.

The findings points at the same result as that of the study made by Eriksson (2012), the use of structural solutions should be complemented by the contextual strategy. The findings have made it clear what great importance individuals within these four organizations have on the exploratory and exploitative activities undertaken in the organizations and in different projects. This may be more directed towards exploitation than exploration, since this is mostly smaller improvements or solutions to problems.

7.3 Drivers and barriers for innovation

The largest barrier for innovation within the construction industry is the economic aspect, according to all interviewees and also in line with reasoning presented in the theoretical frame of reference. Barlow (1999) states that the economic barrier includes risky investments, since trying out new technics, processes or methods may end up being more costly than ordinary methods and the stakeholders may loose money.

Another economic aspect, mentioned by the interviewees, is the lack of money that their company have allocated for innovation purposes. Being innovative costs money, and as mentioned by the interviewee at Skanska the construction industry is generally not putting enough money into this area. At LF, they do not have any money allocated for this purpose at all, and instead the government can donate money if LF can argue for potential innovation activities. For these reasons, it is reasonable to believe that not many of the developments or innovation ideas is tried out in the organizations.

Described in the theoretical frame of reference, Gann & Salter (2000) argue that the competition among different construction companies is the most significant driver for innovation. To survive on the market, organizations must succeed in achieve new orders and deliver good products. Also, the demand for new buildings, structures and technologies must be responded to, according to Barlow (1999). When the market is changing, the organization must develop in the same rate in order to stay competitive. Described by the interviewee at Skanska, there is a lack of competition within the construction industry in Sweden today partly because there are few global actors on the market. Instead of being a driver for change, the lack of competition is instead acting as a barrier for innovation. Competition would force change and innovative thinking in the companies. In other industries, surviving on the market is only possible

when innovating to meet changing demands. However, the interviewee senses a change in the Swedish market and predicts that the global competition will rise and force the construction industry to being more innovative. Building on these arguments, when the market is more competitive, construction companies will be forced to find new methods that will cut prices and include more innovative thinking into their operations.

The low focus for innovation within the construction industry can also be explained by the unwillingness of changing already well-functioning methods and processes. According to Barlow (1999), this is one of the biggest barriers for innovation. This can be seen in the organizations by their low budgets for innovation. Clearly, there is no willingness by top management in the construction industry to innovate to any large extent. If that were the case, more money would be put into development purposes and research and development departments. According to Barlow (1999), the organizations response to innovations is influenced by the structure and culture of the organization. Based on the arguments presented in literature and theoretical frame of reference, the culture in the construction industry is not encouraging any large changes or innovation thinking. It is mentioned in the interviewees that the culture within the organization may hinder innovation ideas because of hierarchical reasons as well. Employees may choose not to share innovation ideas because of the risk of seniors feeling undermined.

The government has an important role as both driver and barrier for innovation within the construction industry, based on the results from interviews and presented theories. Mentioned in the interviews is that the regulatory framework in Hong Kong is sometimes too rigid, and acting upon innovation ideas may be hindered because of this. Bringing in new techniques in todays work is therefore difficult, resulting in less innovation within the organizations. This is also in line with reasoning by Gann & Salter (2000), which mentions in their article that both regulatory and procurement policies have a strong influence on the work within the construction industry. Demands are influenced by governmental requirements and are limiting technical developments, ideas and processes that are being explored within organizations. In LF and HKHA the government has a different role, as owning these companies. The government is responsible for the innovation budget within the companies. As mentioned by the interviewee at LF, the government can allocate money for innovation purposes when LF can present and argue for the benefits and potential for that specific idea. In this case, the government may act either as a driver or as a barrier depending on their decision. ((When describing the role of the government, it is also interesting to bring up the question of who decides if an innovation idea is good enough for investing in. Are these positions filled by people that are daily working with the construction industry or is it rather political reasons that decides if there are money that can be spared for these purposes)). The interviewees at Gammon also brought up another governmental aspect for driving or hindering innovation. They mention that the government in Hong Kong has too much money, resulting in no pressure to innovate from the government. If the government would be interested in driving innovation within the construction industry they could allocate money for these purposes, such as subsidizing innovative ideas and projects.

Also, partly, a result from governmental regulations is the procurement policies used in the construction industry, as mentioned by Gann & Salter (2000). This influence, too, is two faced and may act either as a driver or as a barrier. On the one hand,

procuring projects by lowest price-tender hinders innovation by this being too risky since the economic results may vary and leave the organization with no profit. On the other hand, as mentioned by the interviewee at Skanska, being forced to find ways to cut prices by performing the same results to a lower price is also a form of innovation, which is driven by the need of winning projects by presenting the lowest price.

Building on procurement principles and contract forms, other barriers and drivers are formed. Normally, design and execution of the projects are separated, and often the design is already planned when the project is procured. The interviewees argue that when starting the execution of the project there are no possibilities for innovation and development thinking because of strict time schedules and economical resources, and also limited staff resources. This also has to do with the problem of late involvement in projects, also discussed above.

Furthermore, a barrier is the large time span from idea until the actual results can be seen in the organization. As mentioned by the interviewee at Skanska, this may hinder innovation because the organization may feel discouraged to put money into ideas, which will lead to profit several years later. This is also in line with reasoning by March (1991), who describes the difference of exploration and exploitation in terms of time between actions and actual results. Therefore, more focus is on exploitation in construction companies, where results are seen almost instantly.

Furthermore, transferring gained knowledge between projects is a large barrier in the construction industry, mentioned by all interviewees. The uniqueness of each project leads to the difficulty of adapting and reusing existing knowledge. The knowledge may stay within certain individuals that have actually tried out the new method, instead of being moved to the centre of the organization. This is a problem of moving decentralized knowledge to the centre of the organization, where the knowledge can be exploited and diffused into different projects.

8 Conclusions

A conclusion drawn in the study is that innovation activities are too low within the construction industry. The interviewees are aware of the situation and they all have established various strategies within their companies to increase innovation. However, the resources spent on these initiatives and the encouragement of innovative thinking within the organizations is varying. One conclusion common all four companies is that individual thinking is essential for innovation within these organizations. Most knowledge about the daily operations and activities exists within individuals, rather than in the centre of the organization or in the R&D-departments. The willingness of these individuals to innovate and suggest development possibilities where these can be found is crucial for these organizations. Also, being able to obtain the knowledge and ideas resting within individuals, transferring it to the centre of the organization, diffusing it to the project portfolio, and manage to adapt and reuse the knowledge within the single projects is both a barrier and necessity for these organizations in their struggle towards increasing innovation.

All three strategies are important and useful in order to work with innovation. In reality, all of them are used at the same time in the organization and a balance must be found between them. However, due to the importance of individuals within the companies, another conclusion drawn is that the strategy of contextual ambidexterity is especially important for project-based organizations within the construction industry. Establishing a context, including culture, incentives, processes, and targets etc., that are aimed towards encouraging these individuals to act upon their ideas is crucial. Also, this context is important to establish in order to keep and encourage a mind-set in individuals where development possibilities are noticed and not drowned in routines. Furthermore, the contextual strategy would be advantageous to mix with an R&D department, in order to balance both exploration and exploitation. Innovation performed by individuals within the projects is mostly focused towards exploitation, and mixing the contextual strategy with an R&D department would help balance the two activities.

Routine work and a mind-set of individuals that includes settling with old processes and methods, without either the risks of failing or the possibilities of succeeding are, unfortunately, common within the construction industry. Old methods that are certain to work and which does not include any unknown variables or risks is something that is still a barrier for innovation. Changing the mind-sets and becoming more open towards improvements is something that should be a priority in any organization within the construction industry, that are interested in developing their organization and the industry. Investing more money into innovation initiatives is a good way to start. This will probably be necessary in order to survive on the market in the future, partly because of the increasing global competition. The mind-sets are also too focused towards short-term economic goals and focus must be changed to also include long-term goals. Right now, the distant results from exploration activities makes innovation less prioritized.

To make any further conclusions, further studies and more interviews must be made on the subject. For example, the culture in the organizations is largely influencing innovation activities as well as the contract and payment forms. This, among other aspects, is something that must be studied further.

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