Workspace Optimization for Human Resource Management in Project-Based Organizations from a Managerial Perspective

Writers of Master’s Thesis:
Xiaofeng Yue (zsxiaofeng@hotmail.com)
Pei Liang (liangpei1986@hotmail.com)

Supervisor: Alf.Crossman

Master of Science in Business Administration
Strategy and Management in International Organisations
Spring 2011

ISRN No: LIU-IEI-FIL-A--11/01038—SE
Abstract

The importance of office physical layout has never been studied by scholars and entrepreneurs from the perspective of managing human resources in project-based organizations (PBOs) from a managerial perspective. This paper believes that office physical layout has great influence on organizations’ working efficiency in PBOs. With the increase of PBOs, it requires a new context for human resource management (HRM). The paper mainly focuses on the impact of office physical layout on communication and innovation in PBOs. In the literature review part, the paper collects together relevant researches, experiments, and theoretical studies on physical layout, PBOs, communication and innovation, and finds out the gaps between the empirical situations and current theoretical studies. Moreover, the relations between office physical layout, communications, innovation and organizational competitive advantage will be explored. The discussions and analysis are based on the premise that if people can maximize the opportunity of communication in PBOs through office physical layout, the possibility of knowledge transfer and knowledge integration, creativity and innovation will also be largely improved. To testify this premise, we spent five months research time and focused on four companies in Sweden and took interviews with their senior managers. The paper also does comparisons with the office physical layout in PBOs and in other organizations to find out whether organization’s natures will influence its working ways and their office physical layout. The implications of the work for both future research and practice are taken into our considerations. The result of this research shows office physical layout indeed has great impact on employees’ communication, innovation and working efficiency. However, different organizations should take into their empirical conditions into consideration when designing their office physical layout.

Key words: office physical layout, communication, innovation, HRM, PBOs
Acknowledgements

This present thesis has a two-year’s education background in the master’s program of SMIO (Strategy and Management in International Organizations) at Linköping University in Sweden. During these two years’ study in a challenging, ambitious, competitive, substantial international environment, we learned a lot of theoretical and empirical knowledge which is unique and valuable for our future career and development. Therefore, now it is the right time to give our great appreciations to everyone who has had a positive effect on our study and especially on conducting this research.

First of all, we would like to thank our supervisor Mr. Alf Crossman who comes from the University of Surrey. During the process of writing our thesis, he was always trying to encourage, direct, and correct us. He offered us many precious suggestions for the improvement of our paper. Thanks for his patience and effort!

Secondly, we also want to specially thank the following people who either help us to find respondents for our empirical study and interview or participate in the process of our interviews in four Swedish companies:
Marie Ferntoft, Stefan Jacobsson, Håkan Johnsson, Christer Kjellberg from Tekniska Verken; Carl-Johan Ydrevik, Anders Holmstrand, Jan Sellerberg, Kinga Ulman, Gustav von Sydow, Thomas Gotenstam from Ericsson in Linköping; Martin Källström from Twingly; Mats Berglund, Jan Sjunnesson from Combitech. Without the help from Marie Ferntoft, Carl-Johan Ydrevik and, Mika Perälä, Mats Berglund, we might unable to find so many respondents who make great contributions to our research.

Last but not least, we also want to say thank you to Jörgen Ljung and Peter Gustavsson for their great effort on organizing and arranging all master thesis related activities.

Xiaofeng Yue & Pei Liang
Linköping, Sweden
June 2011
# Table of Contents

1 **Introduction** ................................................................................................................. 7  
   1.1 Chapter Introduction ....................................................................................................... 7  
   1.2 Research Concepts ......................................................................................................... 7  
   1.3 Research Contexts and Target Groups ........................................................................... 9  
   1.4 Problem Area and Research Aim .................................................................................. 10  
   1.5 Research Questions ........................................................................................................ 12  
   1.6 Methodological Approaches ......................................................................................... 12  
   1.7 Limitation ...................................................................................................................... 13  
   1.8 Overview of Chapters .................................................................................................... 14  
   1.9 Chapter Summary ......................................................................................................... 14  

2 **Literature Review** ........................................................................................................ 15  
   2.1 Chapter Introduction ..................................................................................................... 15  
   2.2 Space Management and Office Physical Layout .......................................................... 16  
      2.2.1 Definitions ............................................................................................................. 16  
      2.2.2 Theoretical Development ...................................................................................... 17  
         a. Hawthorne Experiments ...................................................................................... 17  
         b. Continuous Development .................................................................................... 18  
         c. Open Space Office ............................................................................................... 20  
      2.2.3 Theoretical Importance ......................................................................................... 23  
         a. Strategic Asset ....................................................................................................... 24  
         b. Ergonomics ............................................................................................................ 26  
   2.3 Project-Based Organizations (PBOs) ........................................................................... 27  
      2.3.1 Background Information ..................................................................................... 28  
      2.3.2 Definition ............................................................................................................. 28  
      2.3.3 Strengths and Challenges .................................................................................... 29  
      2.3.4 PBOs and Office Physical Layout ...................................................................... 32  
   2.4 Communication and Innovation in PBOs .................................................................... 33  
      2.4.1 Why Innovation? .................................................................................................. 34  
      2.4.2 Why Communication? ........................................................................................ 35  
      2.4.3 The Influence of Office Physical Layout on Communication and Innovation ...... 37  
   2.5 Knowledge Exploration and Exploitation ................................................................. 40  
      2.5.1 Definitions .......................................................................................................... 40  
      2.5.2 The Influence of “Ba” on Knowledge Exploration and Exploitation .................. 41  
   2.6 Literature Review Summary ......................................................................................... 43  
   2.7 Chapter Conclusion ..................................................................................................... 44  

3 **Research Methodology** .............................................................................................. 46
3.1 Chapter introduction ............................................................................................................. 46
3.2 Research Problem ................................................................................................................. 46
3.3 Research Philosophy .......................................................................................................... 47
3.4 Data Collection Methods ................................................................................................... 48
3.5 Data Collection .................................................................................................................. 49
3.6 Sampling ............................................................................................................................. 51
3.7 Validity and Reliability ....................................................................................................... 53
3.8 Chapter Conclusion ............................................................................................................ 54

4 Empirical Studies .................................................................................................................. 55
4.1 Chapter Introduction ........................................................................................................... 55
4.2 Twingly ............................................................................................................................... 55
4.3 Ericsson in Linköping ...................................................................................................... 58
4.4 Combitech AB ................................................................................................................... 70
4.5 Tekniska Verken ............................................................................................................... 74
4.6 Chapter Conclusion ......................................................................................................... 83

5 Analysis ............................................................................................................................... 85
5.1 Chapter Introduction ......................................................................................................... 85
5.2 Open Space Office Layout vs Private Office Layout ....................................................... 85
5.3 Office Facilities ................................................................................................................. 90
5.4 Other Discoveries ............................................................................................................. 92
5.5 Chapter Conclusion ......................................................................................................... 93

6 Contributions and Limitations .......................................................................................... 94
6.1 Chapter Introduction ......................................................................................................... 94
6.2 Contributions ................................................................................................................... 94
6.3 Limitations ...................................................................................................................... 97
6.4 Chapter Conclusion ......................................................................................................... 98

7 Conclusions ......................................................................................................................... 100
7.1 Chapter Introduction ....................................................................................................... 100
7.2 Summarization ............................................................................................................... 100
7.3 Suggestions and Future Perspectives ............................................................................... 104

References: ............................................................................................................................... 107

Appendix: ................................................................................................................................. 117
List of Figures and Tables:

Figure 1.1: Correlations between office physical layout, communication, innovation and a firm’s competitive advantages…………………………………………..17
Figure 2.1: the emergence of competitive advantage…………………………………..36
Figure 2.2: “Ba” and knowledge conversion…………………………………………...43
Table 4.1: Respondents of Ericsson in Linköping……………………………………...59
Table 4.2: Respondents from Tekniska Verken………………………………………..75
1 Introduction

1.1 Chapter Introduction

First and foremost, this chapter will introduce the background information on office physical layout and build a common ground where establishes a sharing understanding between reader and writer on the issue of office space management and physical layout. The background information includes the research concepts, research contexts. Secondly, it will state the main problems in this area such as a condition of incomplete knowledge and understanding, so the consequences of the problem or the costs with the problem will also be discussed to convince readers that it is necessary to take the problem seriously. The problem motivates applied research, so furthermore the research aims and objectives, research questions, methodological approach will be briefly presented. A general response to the problem will be found but the specific response will be explored in the later chapters. Last but not the least, there will be an overview of all chapters in the introduction part in order to give readers a full picture of the thesis.

1.2 Research Concepts

What we are searching for is the influence of office physical layout on communication which spurs innovation in project-based organizations (PBO), and how to improve communication and innovation through office physical layout in PBOs. To have a better understanding on the research concepts, two real interesting cases are presented as successful examples of excellent design of office physical layout. As stated in ‘dak’ (2008), Google’s head office, located in California, is fulfilled with creative physical architecture designs which facilitate communication and innovation. Slides, for example,
connect upper and ground floors to speed up communications with different office floors, projects and departments. By this way, communication becomes interesting and entertaining. Moreover, employees are motivated to talk and communicate with others, and they become more active and passionate on work. The widespread whiteboards in Google Company also aims at exchanging ideas and encouraging creativity, and knowledge sharing and integration are achieved by using writing new ideas, suggestions, plans, confusions, feedbacks, experience, and recommendations on those whiteboards which not only make sure those impromptu ideas will not be forgotten but also let employees read and think about them. In addition, the company also creates communication opportunities for their employees by snack bar, coffee machine, cafeteria, rest rooms and so forth. Employees can also find comfortable seats and desks everywhere to discuss problem and questions whenever they want.

The other case, based on Allen and Henn (2007), is about BMW’s projecthaus which was opened in Munich in 2004. It is also a good case to show the paper’s research concept. According to Allen and Henn (2007), BMW use projecthaus to accommodate product development interdisciplinary team of up to 200 engineers and specialists working together, with a configuration of physical space that make sure the right people could meet at the right time, because they believe that physical space can promote communication, knowledge sharing and integration, and reflect the creative process for innovation. For instance, they use bridges to link different spaces, and offer employees good chances to encounter each other and inspire creative communications and they also use atrium for the visibility contact on the flow or move of people from floor to floor. Another special characteristic of the Projecthaus is the flexibility of the office space because the project team members can move agilely according to the needs of projects and human resources management. This unique structure of office physical layout, based on McGregor (2006), shortens the physical distance of the different locations in the company and gets the company’s 8,000 researches and developers close
to each other and more chance of communication.

1.3 Research Contexts and Target Groups

Office physical aspects have significant implications for the behavior of the people who come from the organizational community which is made up of the organization’s managers and employees, its customers and suppliers, the members of local communities, and also others who have to interact with or within the organization (Hatch, 1997). This paper mainly focuses on PBOs and mainly concentrates on studying how the office physical layout influences the behaviors of employees or project workers in PBOs. But, during the empirical study, we also gain useful information from some non-PBOs; even though they are not our main target groups, the information provided by them is valuable for comparisons and further studies.

The reason for using organizations rather than companies or firms when describing PBOs is because our focus is projects-based and the term of project-based organizations can be much more widely used than project-based companies. For example, PBOs can not only refer to a whole company but also refer to one department of a company, which is project-based. Considering the difficulty of finding a pure project-based company, the PBOs offer us a wider choice to study the influence of office physical layout on communication and innovation. In addition, the term of PBOs also includes public sectors and non-profit organizations, which are both not contained in the definition of project-based company. The purpose of the paper aims not to distinguish the difference between these two terms but to study how to improve employees’ work efficiency through office physical layout’s influence on communication and innovation.
1.4 Problem Area and Research Aim

For many decades, people were indifferent and unconcerned to the meanings of internal architectural form, either because they were opposed to them or because they still could afford to ignore them (Klotz, 1992). According to Klotz (1992), people’s main interest on the design of offices and the functional values are in the terms of cost economization and optimization of use. However, the work today is more cognitively complex, more collective and project-based, more dependent on social skills and personal relationships, more time-pressured, and needs more creativity and innovation capability. Therefore, team performance which relies on cooperative and collaborative efforts to achieve organizational targets and missions becomes a vital issue today. This phenomenon promotes organizations to offer a better office design to manage human resources, meet the needs of project team and enhance the opportunity of communication and collaboration within and cross different departments for finishing complex assignments, speeding up knowledge sharing, knowledge integration and collaboration, improving mutual understanding and finally reaching project goals.

Sometimes, the designers or architects of a company’s building have limited information about how the office space can be perfectly utilized. They do the designings by routines and they pay much attention to costs and the outlook of their buildings rather than functions. According to Hillier, Musgrove, and Sullivan (1976), they found that most architects have little detailed knowledge of the uses to which the building will be put. The communication between managers and office designers are always not sufficient or they even do not have any opportunity for communication under the condition of renting office building. In this case, it will be very difficult and costly to change when the project building has been done, and mangers will be in a passive situation to reallocate office space and manage working activities. Therefore, to realize and understand the importance of office physical layout is extremely crucial. To better
utilize their work space, managers’ communication with architects is supposed to be facilitated and improved. When planning to rent offices, it is also necessary to rethink about the instrumental function of office physical layout. However, not all architects and managers have a mutual help and sufficient communication for the plan and design of the office physical layout. A lack of awareness of the importance of office physical layout will lead to a poor working efficiency, so this paper aims to raise managers’ awareness to understand the desired patterns of office physical layout and its importance for facilitating communication and innovation. For instance, managers should actively create chance encounters which create the possibility for communication and inspiration.

What is more, the perspective of physical layout on organization strategic management is not a deeply explored research area in the organization theory. Even though some studies have conceptualized the design of office physical layout as an office environmental control on the issues such as employees’ work satisfaction, psychological wellbeings, working performance and efficiency, few studies have focused their attention to the impact of physical layout on communication and creativity in PBOs. According to what Kampschroer (2007, P.119) said, “there is little recognition in the organizational and management field of the business value of space.” Moreover, based on Foucault (1998, P.22), “space management may well be the most ignored and most powerful tool for inducing culture, speeding up innovation projects, and enhancing the learning process in far-flung organizations.”

The general purpose of this paper is calling for the awareness of office physical layout optimization and make managers realize the importance of office physical layout on communication and innovation, because the cost of neglecting the importance of physical layout will have significant impact on companies’ work performance and working efficiency. It might cause barriers to communication, low efficiency, time
wasted, inconvenient access, limited inspiration for innovation, difficulty of knowledge exploration and exploitation and so forth. This will be especially crucial for PBOs, and with the raise of flexible PBOs, the traditional office design might be challenged.

The paper also calls for a change and redesign of the improper office layout and providing a better working environment for projects workers. *The business week* published its 64th Anniversary Issue in 1994 with a title of “Rethinking Work: the economy is changing, jobs are changing, the workforce is changing…” It showed us a fast changing global business environment and asked people to rethink about how their works should be done to face the fierce competition and adapt to a new environment.

### 1.5 Research Questions

- Does office physical layout have influence on communication in PBOs?
- If yes, how does office physical layout influence communication and facilitate knowledge exploration and exploitation?
- Does communication have positive impacts on innovation in PBOs?
- If yes, how does communication promote innovation in PBOs?
- Is there any difference of office physical layout between PBOs and non-PBOs?

### 1.6 Methodological Approaches

This paper focuses on qualitative research to find out the answers for the above questions. During the process of qualitative research, interviews and observations are the main methods for data collection. Before formal interviews, specific interview questions were designed for exploring the answers of research questions.
interviewees from four Swedish companies have been chosen for interviews and office physical layout observations. Among the four companies, three of them are PBOs and the rest one is quite special, which has only one project based division and the other 6 divisions are all functional. The main purpose of including this company is for doing comparisons and finding out the difference between PBOs and non-PBO. These interviewees are mainly senior managers and CEO of these companies, for they are more experienced in project management and have decision-making rights which can influence on how work should be done in their companies. After interviews, site observations were also used for a deeper understanding and information collection. The empirical data will be presented, contrasted and analyzed in details in the chapter 4 and chapter 5.

1.7 Limitation

The limitation of this paper, generally speaking, is that the paper only focuses on managerial perspective without considering other perspectives. As stated in methodological approach, managers were involved in interviews in the empirical study part and only their opinions were analyzed. There might be possible that other perspectives such as employees’ perspective and customers’ perspective hold a different view with this paper. Therefore, we think it is necessary to clarify this limitation at the early part of the paper for eliminating confusions and misunderstandings. In the chapter 6, this limitation will be restated and other detailed limitations will also be discussed from an overall point of view.
1.8 Overview of Chapters

To begin with, the first chapter will offer a brief introduction about the main topic of this paper-office physical layout, and the introduction part also generally talks about the purpose of this paper, problem areas, research methods and research questions. In the second chapter, a literature review will be offered on physical layout, communication, innovation, knowledge exploration and knowledge exploitation, and PBOs. The relevant theoretical development trend, theoretical importance, and some hot debates will also be the key parts in the second chapter. Methodology will be in the third chapter which will provide more detailed information on which research approaches are selected and why are they selected. In the fourth chapter, the details of research samples, how are they selected, the contact ways and some other detailed empirical information will be explained. The fifth chapter is the analysis part which will connect the empirical study with the theory part, and the findings from the empirical study part will be analysed. The research contributions and limitations will be admitted in the chapter six. Last but not the least, a summary of the whole paper will be concluded in the chapter seven.

1.9 Chapter Summary

To sum up, this chapter introduces the whole thesis and mainly offers general information about research concepts, research contexts, research aims and objectives, problem areas, research questions, methodology approaches. Detailed information will be provided in the following paragraphs. This chapter also summarizes each chapter’s contents and shows a full picture of the whole thesis.
2 Literature Review

2.1 Chapter Introduction

This chapter focuses on literature review which mainly intends to provide a full understanding of the founding fields and its conceptual frameworks on office physical layout, communication, innovation, knowledge exploration and exploitation and competitive advantages. More detailed information will be provided such as key words definitions, theoretical development and theoretical significance. Moreover, the theoretical connects between physical layout and communication, knowledge exploration and exploitation; innovation will be deeply explored during this chapter. For some issues which have disputes, the different perspectives will be discussed and contrasted. This chapter will also cite some relevant experiments and studies to support some perspectives and announce some limitations of the current studies. The main purpose of the literature review is to build a systematic relationship between office physical layout and communication which can spur innovation in PBOs, and finally achieving competitive advantages. To better explain it, a model is presented as follows (Figure 1).
2.2 Space Management and Office Physical Layout

2.2.1 Definitions

According to Althusser (1971), space should be thought in the social aspect, because it has meanings and presences only when the space is filled with the persons’ activities from the past to the present, and the materiality of space has its social meanings’. Rosen (1990, P.69) also describes space as ‘the medium and outcome of the actions it recursively organizes: what space is experienced as being limits and enables the possibilities of further social construction within it.’ Thus, space is not an empty box without meanings but a medium for socialization and creating values through people’s interactions and social activities. Allen and Henn (2007) state people need space to organize things and to do their jobs within space, and the value of the space depends on how it is utilized by people. To be more specific, this space is workspace for doing jobs by gathering different people together in a common platform. According to Hatch
(1997), the workspace in organizations can be divided into different territories which are associated with different types of activities that are carried out within them or with specific people assigned into the workspace; for instance, functional departments and project team are two different ways to separate activities and divide territories. The project teams nowadays become one of the most popular ways of working and replace many traditional functional arrangements for dividing different territories in organizations.

2.2.2 Theoretical Development

a. Hawthorne Experiments

When talking about the theoretical development of office physical layout, people will never forget about the famous Hawthorne experiments. Based on Roethlisberger and Dickson (1939) and Mayo (1945), the experiments were conducted from 1927 to 1932 at the Western Electric Hawthorne Works in Chicago, and they were led by the Professor Elton Mayo from Harvard Business School by performing a series of field experiments to determine how changes in the physical setting of work affected workers’ productivity and working efficiency. One experiment of Hawthorne studies is to test the effect of light levels or illumination levels on worker productivity. According to Roethlisberger and Dickson (1939), this experiment was conducted by asking a group of workers to perform their work assignments in an enclosed office while researchers adjusted the light levels to measure workers’ productivity level. However, the results were quite surprising. They found that workers’ productivity increased with the lighting level but productivity continued to increase even when the light level was decreased. Under this situation, the researchers finally had to abandon their initial experiment purpose of testing the physical conditions on workers’ productivity, and they drew the
conclusion that the increased productivity was due to social effects.

According to Hatch (1997), Hawthorne studies are the evidence to prove that organizations’ social aspects prevail more than its office physical aspects. However, this conclusion of simply attributing productivity to social effect is rash and suspicious and the evidences are not sufficient to draw the conclusion that social aspects are more important than office physical aspects. Sociologist Homans (1950) reinterpreted Hawthorn study findings and he observed that the social effects in Hawthorne experiment were triggered by a change in physical structure, because the workers in Hawthorne studies were moved to a separated office space. Even though the illumination experiment finally had to be end without drawing any exact conclusions, it made people begin to pay attention to the functions of office physical layout and made people realize the illumination degrees have influences on workers’ performance and working efficiency. Therefore, the Hawthorn Experiments opened the door of office physical layout study.

b. Continuous Development

After the Hawthorn Experiments, the exploration of office physical layout never stopped. Sommer (1969) proposes activity or function based office physical layout that assumes that each employee’s has been assigned with different working activities for which a different workspace is needed. However, at that time, interdependence was not emphasized, and later studies paid more and more attention to the influence of office physical layout on interaction and people’s efforts on eliminating physical barriers during their work.

In 1976, many scholars such as Canter, Proshansky, Ittelson, and Rivlin had already proposed that there were some evidences that could prove that building design and
physical settings within a building did influence people’s interaction and relationships. For instance, Festinger, Schacter, and Back (1950) show that the rooms which located close to each other or with the common hallways and stairways typically increased employees’ interaction and communication opportunities, while the rooms that located farther apart or on separate floors had the opposite effect of reducing employees’ interaction and communication. Leibson (1981) also notes that engineers frequently get many of their ideas through face-to-face interactions with others, yet they are reluctant to walk a long distances from their desks to communicate with others and they dislike using phones or other virtual communication ways either. Hatch (1997) as well proves that office physical layout does affect the way individuals’ and teams’ communicate and coordinate with each other, especially for interdependent tasks. Several other researchers such as Gerstberger and Allen (1968), Allen and Fusfeld (1974), Szilagyi and Holland (1980), Allen (1997) also note a negative relationship between the office physical distance separating knowledge workers and people’s communication opportunities. Therefore, it is safe to say that office physical layout has great impact on office workers’ behaviors such as communication and interactions with others.

Besides activity or function based office physical layout proposed by Sommer (1969), Boutellier, Ullman, Schreiber and Nael (2008) on the other side also propose another quite common office design which is called as person based layout. According to the person based layout, the design is based on individuals and trying to offer a personal office environment for each person in a quiet and private room during their working time. According to Maeans and Yan (1989), this personal based office physical layout is a private closed office which is opposite to the open space office. Today, two streams of thoughts—one favors open space office while the other prefers the private closed office are still having hot debates on which one is better. The next paragraphs will offer more detailed information about the advantages and disadvantages of open space office.
c. Open Space Office

By doing literature researches, it is not hard to find that the environment influence on employees’ work behavior and performance has been studied extensively by Roethlisberger and Dickson (1939), Boje and Walley (1971), Oldham and Rotchford (1983), Allen (1984), Oldham (1988), Zalesny and Farace (1987), Sundstorm et al.,(1980), Fayard and Weeks (2007). With the accumulation of working environment studies, the traditional enclosed private office rooms are challenged by their high space costs and their disadvantages of isolating workers’ communication and interactions. In this case, it raises a hot debate on whether open space office is more efficient than private office room or not. The hot discussion shows people’s attention on the design of office environment, but until now there is still no consensus on whether open space office has positive or negative impact on employees’ working efficiency, and two groups of scholars hold opposite perspectives which both sound reasonable in certain aspects.

➢ Advantages

According to Davis (1984), open offices can facilitate interaction among organizational members, improve communication, and increase office efficiency and productivity because open space office works as a shared and common space where communication is improved. Ives and Ferdinands (1974) also provide supports for open space office layout and they found the opportunity of communication is increased in an open office environment. The same result has been found by Stryker (2005) who studies the effect of environmental impacts on face-to-face communication and finds a positive relationship between visibility and the frequency of communication events. What is more, open office, as a metaphor for transparency, shows employees that no decision can be made in isolation and individual or team performances are all open for supervisions and questions. The open space offices operate as symbols for encouraging open communication and interaction (Hatch, 1997). Light (1996) also states in studies
that people notice workers’ productivity increases in an open space working environments, and the primary reason is because people’s work performance is visible to the other people. This mutual supervision is another function of open space office, which promotes workers’ productivity.

One example based on Hargie (2009) is about the CEO of Continental Airlines who has an open house policy that welcomes all his employees to visit his office and communicate with him without any hierarchical limitations. This open house policy is an example of open office, which eliminates status barriers and offers each employee a chance of communicating directly with the top manager. It shortens the distance between the top managers and common employees and makes employees feel being respected.

From what has been discussed above, many people believe that open space office encourages communication, knowledge sharing, interactions and innovations because of its transparency, visibility, territorial convenience, and openness, so they are more productive and efficient.

**Disadvantages**

However, other studies do not support the views. Brookes and Kaplan (1972) report a decrease in organization member satisfaction because of the increased noise, loss of privacy, visual distraction, and perceived reduced efficiency caused by the open space. Clearwater (1980) also points the disadvantages of open space office and he finds out that organization members felt that communication deteriorated; they were both disturbed and distracted by the open office arrangement. Oldham and Brass (1979) compares the open space office with the traditional office rooms and he finds most of organizational members still prefer the conventional private office rooms rather than the open office arrangements. Communication is usually viewed as positive; however, too
much personal conversations in open space office, which are irrelevant with the work assignment, will be viewed as negative and even harmful for a company’s daily operation. Even though some conversations and talkings are important for their work, they cannot avoid disturbing the persons sitting nearby. In addition, Hatch (1997) as well shows some evidences about the negative impact of open space office on communication and innovation. As he says, some innovative teams complain that enclosure office rooms separate them from the rest of organization by building physical boundaries; and they believe the open space office facilitates the intimate relationship among workers and stimulates creativity and supports teamwork. Other scholar such as Sundstrom (1980) also show that organization members in their studies prefer a private, enclosed and invisible working space instead of working in an open space office.

Problems

By carefully analysis of the both two groups’ arguments, it cannot be denied that both groups reveal some characteristics of open space office, but the problem is neither of them explores the reasons why some people favor it while others are not. As a result, the problem are what factors indeed affect people’s chocie on private office room or open space office, and under what kind of conditions, one type of the two offices is more efficient than the other. For example, as Light (1996) proposes open space office allows more flexiblity; however, for some companies, flexibility is not much important and on the contrary, following routines and finish assignment step by step is more crucial. One more example is even though some scholars such as Davis (1984), Stryker (2005) and Hatch (1997) strongly agree that open space office boosts face-to-face communication, this communication is not most necessary for all companies.

Our aim is not for showing our standing on one side and arguing about which one is better than the other, but we want to try to explore the reasons and certain conditions that are important for choosing different office physical layout and offer different
companies some empirical advice on which type is more suitable for them. The above mentioned scholars might ignore to mention some empirical facts of why people prefer one type office room rather than the other and we assume that it is a company itself and its employees decide which office room is better for them. In the fourth chapter, the paper will conduct some interviews in different organizations in four companies and collect some empirical information for study.

2.2.3 Theoretical Importance

In reality, many people observe physical layout from the perspective of visual aesthetic for the different arrangement and placement of office suppliers can create aesthetic beauty such as cleanness and tidiness. According to Vischer (2007, P63), ‘the range of workspace types is proliferating such as open plan, team space, moveable furniture, personal harbors or personal environment modules, and gruppenraum (group office), to name just a few; all these; if well designed, they can also raise visual beauty’.

However, the aesthetics does not only refer to visual beauty, but also means bringing the best and the fast for organizations through the design of office physical layout. As Henn (2007) states, architecture does not only have an aesthetic discipline and simply divide the spaces where we live, work and doing other activities, but also plays a role on influencing how we live, work, and doing activities in those spaces. According to Kornberger and Clegg (2010), the explicit functional value of office physical layout is to support the performance of work and to optimize workers productivity and creativity.

Based on the model of multiple functions of artifacts proposed by Vilnai-Yavetz, Rafaeli, and Yaacov (2005), office design has three levels which contain instrumental, symbolic, and aesthetic functions. This model shows an overall framework of the feature of office
physical layout. Based on the model, the instrumental function refers to the two folders: the first is the function of improving performance such as efficiency, quality, and creativity; the second is the function of making sure about workers satisfaction which means workers can feel comfortable in offices and they are willing to stay within the organization. The symbolic function differs with the instrumental function, and it focuses on another aspect of office function. The symbolic function affects the cultures, identities of organizations, and identities and images of workers. Lastly, aesthetic function which is the most attractive consideration of architects and designers means the sensory experience of workers including both cognitive and emotional responses to the designs and decorations. Therefore, the significance of office physical layout should contain all these three aspects. However, this paper mainly concentrates on the study of instrumental functions of offices and discusses its roles on strategic assets.

### a. Strategic Asset

The significance of the workspace as a strategic asset can be reflected from a lot of articles. For example, according to Vischer (2007), it is necessary to take the integration of workspace considerations into core business decision making because of the growing knowledge about environmental effects on occupants’ productivity and morale; and he also says the more the knowledge and efforts are applied to the design of workspace, the more benefits the company will gain from its wise investment. Gagliardi (1996) also notes the great importance of office physical layout on human senses. Gieryn (2002, P.35) asserts that “buildings are a stabilizing influence in social life and are objects of (re)interpretation, with meanings or stories flexibly interpreting the walls and floors they describe.” What is more, based on Hatch (1990), prior studies of workspaces (Becker, 1982) and physical settings (Hatch, 1997) have showed how office physical space impacts workers’ interaction and its symbolic function. Elsbach (2007), as
mentioned before, also stresses the office physical layout’s influence on three aspects: instrumental function on performance, efficiency, and creativity, symbolic function on culture and identities, and aesthetic functions on sensory experience of workers.

In this paper, the space management mainly focuses on the influence of offices physical layout on communication and creativity for PBOs. Based on Hatch (1997), the office physical layout refers to the spatial arrangement of organizations’ physical objects and human beings, and it also includes the internal placement of objects, such as walls, office furniture and facilities, and the driving factor—employees. Moreover, Hatch (1997) also emphasizes that the key aspects of the internal layout of a building are the assignment of people to specific locations and groups to particular spatial regions. Davis (1984, P.271) defines physical layout as ‘the architectural design and physical placement of furnishings in a building that influence or regulate social interactions.’ In this case, the architectural design can be viewed as a permanent feature which is not easily changed by management; however, the physical placement of office furniture such as chairs and desks and other office facilities can be modified to facilitate communication which stimulates employees’ creativity and innovation, and finally improve their working performance and working efficiency. According to Allen (2007) the office physical space must augment and reinforce the matrix and help the right information flow to the right person and strength coordinations.

By doing research of the recent workspace management and office physical layout relative literatures, a growing number of workplace specialists are now realizing the strategic importance of workspace management and they are striving for developing new models and approaches to support the changing nature of work and organizational resources. For example, Hatch (1997) states that organization theorists have explored two different approaches to understand the physical side of organizations—the behavioral and the symbolic; The behavioral approach, on one hand, derives from the
modernist perspective which focuses mainly on the relationship of physical structure to interaction and other forms of activity within the organization and the symbolic approach, on the other hand, derives from the symbolic-interpretive perspective which takes the view that physical structures are rich source of symbols and an important channel for culture expression (Hatch, 1997). According to Hatch (1997), from the modernist perspective, the office physical structure can provide opportunities for and constraints upon the communication of information and ideas, and the coordination of interdependent activities. This paper focuses only on the modernist perspective especially about the influence of office physical on communication which promotes innovation in PBOs.

b. Ergonomics

The significance of office physical layout also presents on ergonomics. According to McCoy (2002) and Panek (1997), today, an increasing attention is paid toward the health of office workers. The definition of the ergonomist presented by the Board of Certification in Professional Ergonomics (BCPE) in its simplest form is that “ergonomists integrate knowledge about human function, structure and behavior for practical uses in the design process” (BCPE 1999: 1). Ergonomics is the study of the relationship between human beings and their working environments (Ellison, 2002) and according to Ellison it is about the adaptation of human beings toward office facilities and conditions to fit themselves so they can work at their maximum efficiency and the most importantly avoid injuries and illnesses. Furthermore, David Hallett of King Sturge (2008) proposes that ergonomics is not just about the office physical layout but about the overall design of the building.

To be more specific, the concept of ergonomics is represented in several aspects. Elliso
(2002) positively supports open space office in the perspective of ergonomics, because it optically correct lightings to protect eyes, breakout office areas and lounges, allow people to release pressure, feel relaxed, rest their whole body, take refreshment and stretch out. Therefore, ergonomics also shows its importance of physical environment on knowledge workers working efficiency. Even though ergonomics always focuses on some office equipments such as office chairs, tables, illumination, ventilation and other office supplies, they are all parts of office physical layout and have great impact on workers physical health and their working efficiency. Take office chairs and tables for example; they are extremely significant for workers because many workers spend a long time working on sitting their office chairs and using their office tables so the comfort of their chairs and tables might seriously influence their working conditions and physical fitness. Under this situation, if all chairs and tables in offices are standard, it will be no doubt that some people will have problems with their chairs and tables which might be too high or too low but unable to be adjusted. According to Elsbach (2007), ergonomists have devoted extensive researches for improving working efficiency through the design of lighting, furniture, noise control, and even ambient odor. Thanks to the development of ergonomics, today’s office designers are paying more and more attentions on providing a workspace which can offer workers physical comfort and convenience, adequate illumination, proper temperatures, fresh smells, clean air, noise isolation and so on.

2.3 Project-Based Organizations (PBOs)
2.3.1 Background Information

Based on Larson (2004), the classic project organization literature proposes three organizational structures: functional organization, matrix organization, and organization by project. Nowadays, the rapid changing business environment requires companies to be more flexible to survive in the fierce competition. According to Hobbs, Aubry and Thuilli (2008), organizations have experienced a big change of competitions over the last decades, and they say now organizations are facing a new context with increased fierce competition, increased change and innovation rate of products, service and process and an increased emphasis on shortening the time to markets. Therefore, the use of projects as a work form is now widespread; organizations are becoming ‘projectified’ (Midler, 1995), because of their ability of fast changing and adaptation to the external environment, and innovations and change can be achieved by this flexible organizational form. Today, incredible profits created by project team. According to Bredillet (2008), a report from World Band data indicates that ‘21% of the world’s GDP is generated by project activities’, which shows the significance of projects to our today’s economy. However, Whittington et al. (1999) indicated that the increase use of PBOs also asks for a good HRM to support the work and development of this organizational structure.

2.3.2 Definition

Under this situation, PBOs have increasingly become the form of working in today’s many companies and organizations. Base on Bredin (2008, P.566), PBO has several characteristics: the first is privileging strongly the project dimension on core activities and carrying out most of core activities in the form of projects; Secondly, project work is a routine rather than exception in PBOs, and people are employed or hired by the
organization rather than individual projects; Last but not the least, the PBO is a permanent organizational framework embedding temporary projects.

By searching for the definition of PBOs, a similar term was found — the Project-Oriented Company (POC). According to Gareis (2000), a project-oriented company is a company: firstly, it defines management by projects as organizational strategy and applies temporary organizations for the performance of complex processes; secondly, it manages a project portfolio of different project types but has its specific permanent organizations to provide integrative functions; Thirdly, a project-oriented company applies a New Management Paradigm and has an explicit project management culture; Lastly, it perceives itself as project-oriented. By contrasting these two definitions, the paper holds the view that PBO and POC indeed share some similarities, although it is still hard to say they are exactly the same. The similarities lie in several aspects. For example, they both means that the organizations’ daily work is carried out in the form of projects; they use temporary projects in a permanent organizational design; projects are used to perform complex tasks and processes. Moreover, they also have similar characteristics such as knowledge intensity, cross-functionality, flexibility and so forth. Therefore, the paper will not focus on trying to distinguish the difference between these two terms, but treating them as talking about the same thing. Today, the project-based working method is widely adopted by many companies (Whittington, et al., 1999), and Whittington, et al. (1999) also gives empirical support to the increased use of project-based structures among European firms. Under this situation, Aubry (2010, P.328) points out that “project management has come to play a critical role in most fields of human activities in organizations.”

2.3.3 Strengths and Challenges
When considering about the strengths of PBOs, besides the above mentioned great contributions toward the world economy, numerous theoretical and empirical evidences have also showed the advantages of project-based organizational form such as focused attention, flexibility, adaptable, customer-oriented, enhanced coordination, and facilitated communication. For example, Lindkvist (2008) pointes out that projects can be used as experiments within trail and error based strategic learnings. Leonard (1995) also treats project organization as a recipe which makes companies immune to inertia and rigidities, so project organizations can always stay flexible and adaptable to a new environment. Moreover, according to Hobday (2000), projects, as the primary business mechanism, coordinate and integrate all the main business functions of the firm in project-based companies. Thus, it is undeniable that PBOs have some incomparable strengths and advantages which are not belonged to other organizations.

However, even though project management has a lot of advantages, the number of the failure cases of project management remains high and PBOs face challenges. By looking over some relevant literatures, we can summarize that the challenges are mainly caused by time pressure, communication and cooperation barriers, long-term competence development, stress, knowledge management, assessment and performance evaluation and so forth. For instance, Zika-Viktorsson, et al. (2006) has discussed about the problem of ‘project overload’ in his article. Packendorff (2002) also holds a similar opinion that projects cause high intensive work environment. Under this stressful working environment, the communication and competence development will be problems and knowledge workers will possibly run the risk of lacking enough time for thinking, reflecting, new knowledge capturing and sufficient communication. What is worse, the high project work stress might also cause some health problems for project workers. Desouza and Evaristo (2006) also attributes the primary reasons for many unsuccessful projects and projects failures to the poor knowledge management, poor communication
and information sharing practices and so forth. Jessen (1992) suggests that the problem of PBOs are caused by one-time nature of projects, which means that organizations learn quite little about their previous lessons including successes and failures because of the lack of efficient knowledge transfer and knowledge sharing from projects. In addition, it has been discussed in the definition part that in PBOs temporary projects are embedded in the permanent organizational framework, so the tension between temporary and permanent also causes some problem. Hobday (2000) points out that the PBOs lack of functional coordination and communication because there are no functional departments which can provide a common platform for the knowledge sharing of the same knowledge background workers in PBOs. This situation will be very dangerous for PBOs because knowledge workers in projects will lose the change of developing their own technique skills in the long term. As Lindkvist (2005) says, PBOs are much more like ‘knowledge collectivities’, which consists of diversity skilled individuals with highly specified knowledge and they get together temporarily for solving a problem or achieving a goal so they are less well developed groups even without a common language, rather than ‘knowledge community’, which is a tightly knit group or a cohesive community with relationships of mutuality and shared understandings, strong ties, mutual engagement, joint enterprise, and shared repertoire.

Various studies of PBOs and human resources management (HRM) such as Clark and Colling (2005), Huemann, Turner, and Keegan (2004) also prove that the traditional concept of HRM might not be able to serve the efficient operation of such project organizations. Begin (1993) has already proposed that different types of organizations need different patterns of HRM to stimulate employees’ motivations and innovations. In this case, how to solve these persistent projects management problems has to be seriously considered by project managers in PBOs. According to Bredin (2008, P.566), “the increased use of project-based structures requires not only developing the ability to organize and manage projects, but also developing the ability to handle HRM in a setting where individuals perform most of their activities and spend most of their time
in a series of temporary projects.”

Therefore, PBOs face the problem of lacking mutuality, intimacy, competence development and the most important—a common platform for knowledge sharing, learning and communication. How to deal with this problem? The paper aims to provide such a common platform by the design of offices physical layout and within this platform, knowledge workers can freely and involuntarily share knowledge and experience with encounters, and try to find out and eliminate the existing barriers for knowledge transmission and communication.

### 2.3.4 PBOs and Office Physical Layout

When considering HRM in PBOs, based on the projects’ special characters such as temporary, time limited, goal specific and personnel diverse, many issues have been discussed like the authority and responsibility of project managers (Fabi and Pettersen, 1992; Gaddis, 1959), employees wellbeing (Packendorff, 2002; Turner et al., 2008b), resource allocation (Engwall and Jerbrant, 2003; Eskerod, 1998), coping with project overload (Zika-viktorsson et al., 2006), stress (Aitken and Crawford, 2007; Gallstedt, 2003) and so forth. However, scholars may ignore that the PBOs have not only influence on how work is done, but also on the design of office physical layout itself and physical layout can influence project members working efficiency by creating a more convenient and comfortable communication platform.

Tonnquist (2008, P.170) states that “gathering project group in one location will quickly bring the project up to speed, keep the group together and develop effective team work.” Tonnquist (2008) also suggestes that project offices should be provided for project groups so the entire group can concentrate on working together and generating an
effective working atmosphere. Desouza and Evaristo (2006) also propose to use project management office (PMO) as a strategy to facilitate knowledge management and solve problems. The definition of project office according to Ward (2000) is an organizational entity for managing a specific project or a related series of projects which are led by a project manager. They says that a well-implemented PMO can help to resolve the most challenging project management problems by capturing and transferring knowledge in PMO, promoting cross-functional teams coordination, maximizing the opportunity of knowledge integration, and providing ownership and accountability for key efforts. However, they did not offer any explicit solutions and suggestions on how to efficiently utilize PMO to improve knowledge sharing and communication.

In recent years, researchers have become increasingly interested in the factors which influence projects’ effectiveness (Hyvari, 2005). Although organization and management scholars have indicated that the adoption of ‘managing by project’ (Gareis, 1990) as organizational strategy in a company should have fundamental effects on human resource management (Knight, 1977), project-based companies are struggling in aligning human resource management to the needs of project-based companies (Huemann, forthcoming; Turner et al., 2008a). According to Hyvari (2005), human resource management in project management is little researched; even though it is commonly admitted that project management effectiveness requires project managers to combine technical competency, there is still limited research showing how technical competencies from different project members should be combined. In the other word, the importance and influence of physical environment on knowledge combination and project efficiency are still not on a crucial agenda; furthermore, the positive impact of physical layout and external working environment on people’s working motivation and efficiency has been neglected for a long time.

2.4 Communication and Innovation in PBOs
2.4.1 Why Innovation?

Innovation works as life force and without fast change and adaptation to the external environment and customers’ demands, a company will doom to be a failure. According to Aubry, Hobbs, and Thuillier (2007), innovation plays an important role in projects and the growth of a firm is associated with the continuously renew of its product portfolio. Furthermore, according to Pettigrew (2003), the capacity of change, such as to change routinized working ways and organizational structure, has already been identified as a source of competitiveness. Conversely, within evolutionary theory, inertia has been viewed as a major constraint for organizations to succeed in a fierce competitive environment. “Innovation studies and evolutionary economics have widely explored the relationship between organizational characteristics and changes (at the organizational level) and knowledge management and technological innovation activities (at the population level)” (Massini et al., 2002, P.1134).

However, how does competitive advantage emerge from changes? According to Grant (2010), the emergence of competitive advantage comes from two aspects: external sources of change and internal sources of change. The internal sources of change refers to a firm’s creative and innovative capability, and a key source of competitive advantage is strategic innovation which means new approaches to do business, redesigned process and novel organizational design. Therefore, innovation becomes extremely vital for the emergence of a company’s competitive advantages which can make sure about their success in a fierce competition environment. However, the above model does not explain on the question how to cultivate this creative and innovative capability.
Figure 2.1: the emergence of competitive advantage (Source: Grant, R.M. (2010). *Contemporary Strategy Analysis (7ed.)*. Chichester: John Wiley & Son Ltd. P211)

### 2.4.2 Why Communication?

Luthans and Larsen (1986) find that communication is one of the most important activities in organization and they also find that ‘managers spend 60% to 80% of their working time to communicate with others’. According to Sunday Times (2006), a company called Barchester Healthcare which was ranked number 2 in the top ‘big companies’ in UK contributes their key success into their proactive communication, and they seize every possible opportunity to encourage face-to-face communication. It is not surprised to ask why they focus so much on communication.

First and foremost, communication has a positive relationship with innovation. Numerous previous researches have shown the great importance of communication towards innovation and creativity, and they explain how individual communications contribute to the research and development (R&D) which can be transformed into innovations and creativities. Kanter (1988) says that communication within and across departments in organizations is able to stimulate a high level of innovation and creativity. Allen and Henn (2007) answers the question of how to cultivate innovation by proposing that a critical success factor in innovation process requires interaction...
among people and the organization should be able to access, maintain, and transfer knowledge from person to person. Ancona and Bresman (2007) show that project teams have much more freedom of communication. However, Ancona and Bresman (2007) might ignore to say that if project teams work in isolation, they will also lose opportunities of cross-project communications.

Secondly, communication is also positive towards work performance. Pelz and Andrew (1966) and Allen (1970) all prove the positive relations between work performance with communication and they found that high performers communicate more frequently than low performers. Hargie and Tourish (2009) state the same view that internal communication helps determine an organization’s prospects of success. Allen (1970) also finds that high frequency and duration of communication contribute to high work performance. Based on Hargie (2009, P.4), the nature of communication is ‘the most basic and pervasive tool for all management activities in organizations’.

Although the importance of communication has been commonly admitted, the effect of communication in real organizations is not as good as it supposed to be. A survey of 2000 UK employees by the Chartered Institute of Personnel Development (CIPD, 2006) find that about only 46% of employees felt ‘fairly well informed’ about important organizational issues, which showed that the communication was relative effective; 29% said they received only ‘a limited amount of information’ and 13% reported that they received ‘not much at all’; and the rest had no idea about whether they were informed well or not. These figures, without more information on how the survey was conducted, had some limitations and might not be the most powerful and persuasive evidence of communication inefficiency, but they at least stated clearly about a common phenomenon that more than half employees in UK were not informed well or the communication and information transmission have problems. Therefore, how to effectively communicate with each other and successfully transmit important
information without omissions are still big challenges for enterprises. As Sirotal et al (2008) cites in the employee attitudes survey that the absence of adequate communication is among the most common problem.

2.4.3 The Influence of Office Physical Layout on Communication and Innovation

Allen (1986) divides communication into three types: communication for coordination, communication for information and communication for inspiration. According to Allen (1986), the communication for inspiration can stimulate creativity which is one of the fundamental bases of innovation. How to encourage such communication? Innovation requires a creative environment with specific characteristics (Turner and Keegan, 2004). To answer the question, a good external environment should be created and office physical layout needs to be designed to eliminate communication barriers, shorten communication distance, and offer more changes for communication. Allen (2007) indicates that the complex innovation process today depends upon getting the right information to the right person at the right time through face-to-face communication network but under the condition that physical environment enables such network. What is more, according to Varey (2006), the meaning of communication today is much more than merely sending and receiving messages as a copyable and distributable resource, but it refers more on the reproduction and transformation of socially constructed institutions by interdependent and joint actions. Nowadays, an increasing number of organizational communication scholars are trying to find out the dynamic relationships between organizational communication processes and human organizing system (Mumby, 2007).
According to Allen and Henn (2007), it is usually spontaneous and often occurs among people who work in different projects and have different disciplines, and the cross projects and cross disciplinaries communication allows the development of unusual combinations of ideas contributing to imagination and creativity. Kornberge and Clegg (2004) also hold the same perspective and they propose that good ideas spring from impromptu meetings, which means that good ideas are rarely created by people sitting at desks alone but during the creative encounters and conversations with other human beings. ‘Chance encounters’, base on Allen (1984), are a subgroup of short encounters which have positive influence on R&D productivity, because many great innovative ideas emerge during these encounter processes. Such encounter chances can largely promote communication and inspire innovation, for example talks among people who walk through the common corridors on their way to offices or other parts of their office buildings such as on their way to go to cafeterias, conference rooms, washing rooms, copy room, reception area, smoking rooms or communications at the place of using coffee machine. These rooms, according to Hippel (1978), are called as ‘interaction-promoting facilities’ which include washrooms, copying machines areas, cafeterias, laboratories, supply rooms, conference rooms and so on, where unintended communication can happen between the people from different subsystems and departments to generate more good ideas.

Furthermore, office physical propinquity also has great impact on the communication network. For instance, Hatch (1997) proposes that when locations are close, relationships can form through casual interactions that occur spontaneously communication, such as in the hallway or at the coffee machine. Allen (1977) also holds the same perspective and indicates in research results that the physical propinquity and the nearness of desk location of communicators, innovators, and other R&D professionals have a strong influence on the convenience of their work activities. Therefore, creating more opportunities of formal and informal communication and
interaction between knowledge workers is the key for new knowledge creation and innovation.

In addition, through designing some formal and informal communication space such as different sizes of conference rooms, coffee room, restroom, courtyards, corridors, lunchrooms and so forth to offer plenty of communication opportunities for the people from margins, where people who are normally separated exchange ideas and concepts by different projects, it can promote cross projects communication and encourage employees’ creativity; thus improve their work efficiency. This point is supported by Keller’s (1983, P.742) research result and it suggests that “allowing for the short distances to important information sources and enhancing informal meetings through the clustering of offices, common lounge areas, eating places, and so on can increase scientific and technological information diffusion throughout organizations.” Moreover, according to Elsbach (2007), office design can support knowledge work in organizations by facilitating collaboration and communication between groups because the space and objects created by office physical layout can facilitate or constrain social relations between groups, which can influence the performance of groups. Elsbach (2007) also cites the example of using whiteboards in an open office plan to support this perspective because whiteboards creates a shared platform for interaction, communication, inspiration, brainstorming, problem solving and creativity. Therefore, it is not difficult to find that office physical layout indeed has great impact on communication and innovation, and a good office design can promote communication which facilitates knowledge transmission, and finally contributes to the formation of organization innovation capability.

The communication in this paper mainly refers to face-to-face communication. It is normal that people might wonder why office physical layout should be designed to facilitate face-to-face communication and interaction rather than other communication
ways such as emails, Internet, telephones, or other digital communication ways. To explain it, we still believe that face-to-face communication is still most efficient way of communication which should be encouraged, in the aspects of promoting understanding and relationship, avoiding mistakes, and so forth, without considering distance, convenience, costs, possibilities and some other factors. According to Boutellier, Ullman, Schreiber and Naef (2008, P.372), “although digitally mediated communication has become a major part of organizational information transfer, face-to-face communication remains important for sharing information, building up reputation, leveraging and creating tacit knowledge.” Therefore, how to utilize office physical layout to facilitate face-to-face communication, knowledge sharing and knowledge integration, and innovation is still significant which should not be ignored in today’s society.

According to Allen and Henn (2007), to encourage communication which spurs innovation, two tools should be taken into consideration—organizational structure and office physical space. To be more specific, both organizational structure and office physical space can influence the interaction patterns among people, which contribute to innovation and creativity. This the paper focuses on PBOs as target groups, so the organizational structure will be projects based. In this case, the paper concentrates only on the study of the influence of office physical space towards people’s interaction patterns and innovation.

2.5 Knowledge Exploration and Exploitation

2.5.1 Definitions

According to Grant (2010), there are different types of knowledge processes within an
organization: on the exploration side (knowledge generation), it includes knowledge creation and knowledge acquisition; on the exploitation side (knowledge application), knowledge integration, knowledge sharing, knowledge replication, knowledge storage, knowledge identification and knowledge measurement are included. However, what is the fundamental condition for knowledge exploration and exploitation, where happens knowledge creation, and how to improve knowledge sharing and knowledge integration?

2.5.2 The Influence of “Ba” on Knowledge Exploration and Exploitation

Today, many organizations have tacit knowledge which is hidden in individual persons’ experience and memories, so it is hard for codification and transferring. Under this situation, cross functional collaboration and understanding will be a problem especially for project team members, each of whom has own specific knowledge. In response to this project team problem, many studies and researches have tried to find solutions and ways to better manage these teams. For instance, Hoegl and Gemuenden (2001) propose that communication and its key role in facilitating team working and knowledge management will be at the core of solving this problem. However, Hoegl and Gemuenden ignore the question of how to manage communication in facilitating teamwork and knowledge management.

According to Nonaka’s SECI model (1994), knowledge is created through four steps: socialization, externalization, combination, and internalization; during this process tacit knowledge which is highly personal, is transformed into explicit knowledge which can be expressed, shared, and transmitted, and then transformed back into tacit knowledge.
again and become organizational knowledge. Based on Nonaka (1994), these four steps happen on “ba” which is a shared place as a foundation for knowledge creation and emerging relationships. Nonaka divided “ba” into physical ba such as office, business space, virtual ba such as e-mail, teleconference, and mental ba which refers to shared experience, ideas, and ideals. The office physical layout can be categorized into the physical ba where exchanges and transforms knowledge and promotes knowledge exploration and exploitation. The figure 3 shows how it works. It works as a medium or platform, on which individuals, working groups, and project team make knowledge creation comes true. According to Foray (2004), “individuals, groups, departments, but as well rooms, floors and buildings with their employees are knowledge islands, capacities capable of storing tacit and explicit knowledge.”

Kampschroer (2007) states that the design of office space is not only about an arrangement of spaces, but also about programming the relationships of space between people and relative departments. According to the SECI model, the first step of knowledge creation is socialization. However, communication is a basic requirement for socialization (Berger and Luckmann, 1966), understanding (Weizenbaum, 1966) and promoting knowledge sharing and knowledge integration. Nonaka (19980) also agrees that socialization needs face-to-face communication which is also the key to the conversion and transfer of knowledge. Therefore, communication is essencal for socialization and knowledge creation.

PBOs are also knowledge based organizations, so knowledge exploitation and knowledge exploration are extremely vital. Workspace management and office physical setting act as a medium to facilitate knowledge exploration and knowledge exploitation. For example, Boutellier, Ullman, Schreiber and Naef (2008) agree that socialization between different disciplines in a company, is facilitated by communication and thus by the office physical layout. Socialization is also the first step mentioned by Nonaka,
which facilitates the sharing of tacit knowledge individuals, direct interaction, joint activities such as being together, spending time, and living in a same environment. Wroblaski (2010) also says that in an office environment, working well with others does not only depend on workers’ personality traits but also depends on whether an office building is set up well to facilitate knowledge integration and knowledge sharing. Therefore, office physical layout works as a “physical ba” has its unignorable function to manage communication, facilitate teamwork and knowledge management. The following figure 3 offers a vivid picture of how the physical ba works.

![Figure 2.2: “Ba” and knowledge conversion](Source: Nonaka and Konno (1998), The concept of “Ba”: Building a Foundation for Knowledge Management, California Management Review, Vol. 40, No. 3, P. 44.)

### 2.6 Literature Review Summary

By summarize those literatures, they have different focuses and few articles connected them together. For instance, Allen (2007), Hatch (1997), Kornberger and Clegg (2004),
Sundstrom (1980) and other scholars paid much attention about the significance of the design of office physical layout on employees’ work performance and communication; Huemann, Hobday, Keegan, Lindkvist and others concentrated on human resource management in project-oriented companies; Kampschroer explored socialization which is facilitated by the design of office physical layout; Mayo, Homans, Ellison, Brookes and Kaplan studied much on office environmental factors’ influence on employees’ work satisfaction and efficiency, and those environmental factors include lighting, noise, privacy, visibility, working facilities such as tables and chairs and so forth; Grant, Massini, Allen and Henn mainly discussed innovation and knowledge creation by the design of office physical layout. However, this paper will try to bring them together and emphasize on the influence of office physical layout on communication which encourages innovation, knowledge sharing and integration, and finally reach competitive advantages.

The broad research questions will be: whether the importance of office physical layout has been paid attention or not in reality? Does office physical layout have influence on communication and innovation especially for PBOs and if yes, how does it influence it? Is there any difference of office physical layout between PBOs and non-PBOs? Are there any implications for the senior managers?

2.7 Chapter Conclusion

This literature review Chapter provides a review of relative theoretical information, such as the conceptual frameworks of office physical layout, communication, innovation, knowledge exploration and exploitation and competitive advantages. It explains the connections among them. The terms’ definitions, theoretical development and theoretical significance are offered as details. During the explanation process, some
relevant theories and empirical facts are mentioned, and different perspectives are discussed and contrasted. Lastly, the existing theoretical vacancies are indicated and the research questions are also presented.
3 Research Methodology

3.1 Chapter introduction

Bryman and Bell (2007) state, research methodology is a general approach for researchers doing research projects. It tells readers how authors carry out their research and dictates particular research tools selected by researchers. Hessler (1992) says research methodology is a science of how to conduct research decisions, and it provides an opportunity of practicing evaluate whether a good or bad decision made in the course of doing research. According to Hessler (1992), “methodology is the body of knowledge utilized in deciding how worthy the decisions are.” In this chapter, we will display the method that conduct our research and the reasons why we choose the method.

3.2 Research Problem

The research problem of the thesis is how office physical layout affects employees’ communication which spurs innovation in PBOs.

Office physical layout does affect employees’ communication and innovation according to relevant books and literatures, but few researches clarify that how does office physical layout affect employees’ communication and creativity. That is the main reason why we want to explore further in this area from office physical layout’s strategic function instead of aesthetic value. In this research, we narrow down our target group to project based organizations which call for intensive communication and knowledge sharing. We intend to find meaningful implications for managers of PBOs when they take office physical layout into a part of consideration in management process.
3.3 Research Philosophy

Research methods can be classified into two categories: quantitative research and qualitative research. The former one aims at figure out relationships among measured variables for explaining. The latter one is focusing on analyzing complex nature of phenomena with purpose of explaining phenomena from participants’ point of view (Leedy & Ormrod, 2009). The typical feature of quantitative research is ‘ratio’ which relates to hard data collection, operationalisation and so forth. In contrast, the most important characteristic of qualitative research is ‘intuition’ which calls for deeply understanding, collected data from senses, theoretical background and so forth (Leedy & Ormrod, 2009).

We decided to use one of qualitative research methods as the research approach in this study. At the beginning, it is necessary to clarify the necessity of using qualitative research in the study. The reason why we choose qualitative research is based on several considerations from Leedy & Ormrod (2009); firstly, qualitative research focuses on phenomena that occur in natural settings; secondly, it involves studying those phenomena in all their complexity; thirdly, it rarely tries to simplify what is observed; fourthly, it recognizes that there might appear many dimensions and layers. Our research matches above features which lead us to choose qualitative research as our main research method. Moreover, effect of physical layout in management is quite hard to be concluded through quantization as it is a subjective issue; therefore mirroring the impact of physical layout by concrete data is a big challenge in the study. Additionally, we try to find relevant data about physical layout, but we failed to access them as the ambiguity of physical layout effect. Based on the statement above, qualitative research is quite appropriate for this research.
### 3.4 Data Collection Methods

According to Leedy and Ormrod (2009), several major qualitative research methodologies are listed as followings:

- **Phenomenological study:** it refers to respondent’s perception of meaning of certain issues and it based on long interviews (1 to 2 hours) with selected candidates (5 to 25 individuals) who have great experience about the issues.
- **Case study:** confined individuals, events, or program is studied in depth of defined period of time.
- **Action research or participative enquiry:** researchers need to carry out research with people rather than research on people.
- **Projects and development studies:** it has clear targets and time limitation. The features are problem based, target-oriented and participative.
- **Content analysis:** establish patterns by systematic study of contents of particular body of material.
- **Ethnography:** it is a site-based fieldwork.
- **Grounded theory:** start by theory development based on data analysis instead of theoretical framework.
- **Hermeneutics:** it is originally concerned with interpreting ancient scriptures.

We attempt to use interviews and observations as the research method in this research after carefully comparing with the futures of different data-gathering techniques of qualitative research. Based on Leedy & Ormrod (2009), the interview is different from the method of observing social activities or influential behavior and interview is ‘an analysis of conversation regarded as the initial point for a discussion of the principles underlying the sociological interview’. It is a method that interprets respondent’s personal perspectives about meaning of an event and it attempts to understand a particular situation or respondent’s perceptions. Researchers can summarize some
generalizations through analysis of different perspective by interviewing. It is more useful for some certain research issues and almost usefulness for some other issues. Interviewing is not necessary more valuable than other research methods, such as questionnaires, observation, and so forth. However, interviewing is the most sociological technique among all the research methods because it based on intensive interaction between the interviewer and the respondents. Live words and comments are exchanged during an interview, and the meaning of those words and comments are captured exactly through interviewing. Interviewing is not only unlike other research methods, but it is uniquely sociological as a one-on-one relationship between the interviewer and each respondent in which rapport and trust have to be established if interviewing is to be conducted. There is no other research method calls for such tied interpersonal relations as interviewing does (Hesser, 1992).

3.5 Data Collection

The methods of collecting data are various. Observations, interviews, and questionnaires, case studies are some of the most popular ways. Considering their strengths and weaknesses, we admit the limitations of each research method. For example, observation and interviews need time and close interactions with the target companies to get the results, even though it is the most direct way to get the first-hand information; therefore the information collected from direct observation and interviews will not be sufficient with limited time, resources, capitals and relevant information. Questionnaires are a good method to overcome this weakness and it is an efficient way for collecting a large number of individuals’ information. However, questionnaires also have some unavoidable weaknesses. According to Hayek (1941), questions in questionnaires represent opinions rather than facts, so they are subjective personal perspectives, memories, and feelings. In the case, the reliability of questionnaires will
be easily challenged.

After comprehensive analysis, we decided to use observations and interviews in this research. According to Leedy and Ormrod (2009), “qualitative research is to explain complex nature of phenomena through analysis respondents’ point of view and the typical feature of qualitative research is intuition which aims at achieving deeply understanding.” Moreover, qualitative research requires collecting data from senses, interpretation, feelings and so forth (Leedy and Ormrod, 2009). Furthermore, the study of office physical layout is cognitive study, which requires direct on-the-spot investigation rather than secondary sources’ study. That is why case study is also excluded in our research. Under this situation, in order to get the first hand and reliable information, observation and interviews are chosen as our main research methods.

We took interviews for senior managers in four Swedish companies. One-to-one and face-to-face interview is the most frequent way we conduct the interviews. Each interview lasts 2 hours by semi structured interviewing technique which according to Hessler (1992, P.121) “might have specific topic areas that need to be covered but the exact wording of the questions or the order in which the questions are asked is left up to the discretion of the interviewer.” The structure covers all particular topics, but it is less structured. Simply speaking, the order and the way of asking questions are uncertain in semi structured interviews.

Summarization is another way to collect data in this research. According to Hessler (1992), summarization is the most effective technique for checking the quality of interview. The way of summarization is simple; interviewers stop and summarize respondents’ answers to make sure the accuracy of the answers. The purpose of summarization has two folders, firstly it can avoid misunderstanding raised by interviewers; secondly, it may trigger respondents to reflect more about the questions
(Hessler, 1992). We summarized messages given by respondents and checked the accuracy through confirmation of the respondents. After turning the messages into words, we sent our draft of each interview to relevant respondents for checking the accuracy of the messages in order to make sure there were no misunderstandings.

Interview questions for them are classified. First of all are the introductory questions which are mainly open questions and free talking of the general information about the companies or the thesis’s main topic for stimulating their spontaneous descriptions and sending us some important information from their personal opinions and experience. Secondly, some follow-up questions are offered to extend the topic and explore much deeper and relevant information. These follow-up questions will be more direct questions related to the research questions. Thirdly, more specified questions are asked, which include more examples and experience to get more precise descriptions. During the interview, some significant or repeated words will be a good chance to continue and go further about the topic. Last but not the least, some personal attitudes and suggestions toward future improvement are asked.

### 3.6 Sampling

In this research, the respondents of the interviews will be targeted to project managers and CEO, because they are the most influential people who have decision-making rights and are also responsible persons to improve employees’ working efficiency. During the research process, we mainly focus on four companies: Twingly, Ericsson, Tekniska Verken, and Combitech AB. Three of them are PBOs while Tekniska Verken is not. In Tekniska Verken, 7 divisions only one division is project based, and the other 6 divisions are functionally organized. However, we still took 3 interviews with managers from Tekniska Verken, including one interview with the manager from the only division
which works in projects. The main purpose is to do the comparisons with the office physical layout in PBOs and non-PBOs. Through these comparisons, we want to know whether organizational structure and company’s work nature will influence its office physical layout or not.

The 11 senior managers involved in the interviews, five of them are project or line managers from Ericsson Linköping. One is CEO of Twingly, which is dynamic and growing IT Company. One is senior business developer of Combitech, one of Sweden’s leading technology, development and management consultancy companies. The other four interviewees are from Tekniska Verken which is a regional company aims at create a sustainable community environment.

All the respondents belong to senior management group and they have rich experience in their area. According to the method of interviews, it based on long interviews with selected sample of participants (from 5 to 25 individuals) who have direct experience of phenomenon what is being studied (Leedy and Ormrod, 2005).

Unfortunately but true, we received many rejections of interview requests from managers of other companies. Therefore, we finally decided to use the eleven managers who accepted our requests as our interviewee group. Even though the number might not be big enough, we still believe their rich experience can help us to draw a clear picture about our topic and offer us a great opportunity to explore something new which has never been covered before.

Moreover, within time and geographical limitation, we have to select companies in Linköping. Through searching for company categories of Linköping through internet, we got companies’ general information one by one and try to contact their chief managers by emails and phone calls. Finally, we narrow down our respondents from
Ericsson, Twingly, Combitech and Tekniska Verken. During the selection phase, some of the managers were carefully selected through searching their background information through internet while some were strongly recommended by our social contacts. However, at least, the candidates have to meet the requirements which discussed in previous section; otherwise they would not be taken into our consideration.

After interviews, we visited all these companies in person for observations and collecting useful information. All these interviews were carried out separately and each interview lasted averagely two hours. We spent totally five months starting from contacting these companies to take interviews and observations, summarize the main collected data and finally do analysis.

### 3.7 Validity and Reliability

Hessler (1992) states the very fact that interview is difficult to learn and hard to put into sociological practice, and he also admitted that good interviewers are rare. According to Hesslers, a pre-study about interviews is not only necessary but also mandatory for us. For achieving a reliable and scientific way to conduct the interview, we started by reading through literatures and books about how to carry out an efficient interview which has to think carefully about conversation skills, interview structures, interview techniques, special circumstances and so forth.

Learning about the background of these four companies is crucial before starting an interview, and only through this way, we can establish some relevant connections between office physical layout and the companies. An interview will be carried out after carefully designing the interview questions. Each interview lasts about 1 to 2 hours in a way that the interviewees talk by following the interview questions.
After the interviews, the data will be analyzed through several steps as followings:

1. Identify relevant statements about workspace management and communication
2. Group statements into ‘meaning units’
3. Look for different perspectives
4. Composite all the information.
5. Generate a description of communication within workspace management.

Finally, a research report starting from problem definition and ending to discussion is edited after finishing the interviews. Due to the condition of few financial support and geographical limitation, the scope of the respondents is small; therefore it is hard to describe office physical layout of companies in a general manner. However, the validity and the reliability are convincible as the high requirements to candidates and carefully selected innovation driven companies.

3.8 Chapter Conclusion

In this chapter, it briefly displays which research method will be conducted in this study and the details about research implementation. The research is carefully designed; however it may produces bias more or less due to the subjective limitations as mentioned previously.
4 Empirical Studies

4.1 Chapter Introduction

The chapter 4 concentrates on offering empirical information of the four companies-Twingly, Ericsson, Tekniska Verken, and Combitech AB, and summarizes detailed information about the interviews’ contents. They are all empirical facts or interviewees’ personal opinions and experience collected from the ten times interviews with 11 interviewees. All information provided below are permitted and checked by these interviewees themselves. However, the analysis and comparisons will not be discussed in this chapter, and they will be deeply explored in the chapter 5.

4.2 Twingly

Twingly is a blog search engine company in Linköping Sweden, with its own professional definition, according to Twingly (n.d.), says that “the company features a spam-free, faceted, social search for the global blogosphere.” Through the interview with its CEO, we learnt that Twingly is a very young company and the company was first launched on February 2007 which was the same day as the two largest Swedish newspapers DN. se and Svd. se began to use Twingly Blogstream to link back to blogs writing about their articles.

Today even though it is still a small-sized company, it has been very successful. Most of their activities are carried out in PBOs. By searching the company’s information on its website (www.twingly.com), we learnt that “the company is good at driving change in European media, connecting mainstream media with blogs”, and today, “the Twingly
Blogstream has become a huge hit in Europe and in only one year over 40 Twingly partners have started to use their blogstream Widget, which is tailor-made for easy integration into ‘traditional’ media publishing systems.” Their main product is Twingly Blogstream which is a moderated trackback function for large websites, and it can provide measurably higher visitor engagement and greater attention in the blogosphere. Based on Twingly (n.d.), “it currently serves 25M+ search results per month and twingly blogstream is used by 50 newspapers, magazines and television channels in 8 countries to get more attention from bloggers, generating 200M+ monthly widget views’ and ‘the company’s aim is to nurture Twingly.com to be the best blog search engine in the world.”

The interviewee is Martin Källström, the owner and also the CEO of Twingly. According to his introduction, his team members are located in three departments: management department, technical department and sales department. The CEO Mr. Martin hiMs.elf is also responsible for finance.

Through observations and Mr. Martin’s descriptions, the office physical layout of Twingly is quite efficient and simple. The office is not designed according to the company’s need and when the company was founded in 2007, the office had already been there, where is located in the center of the city Linköping. Even though the communication with architects or office designer was lacked, the office physical layout suits very well for the company’s operation. It has three separated big rooms for each department and one cafeteria and one conference room (see figure1 in appendix for the office physical structure of Twingly). The office physical layout has the following characteristics:

- Open space office

The design concept is to create open offices with walls but without doors. Mr. Martin
said that ‘the consideration of the office design is to encourage communication between different departments and make workers feel not isolated or enclosed.’ However, Mr. Martin also thinks that private rooms are also needed for their work, so they keep walls between different departments for eliminating noise and distraction. Moreover, each worker has a headphone to avoid disturbing and concentrating on their own tasks; if a worker put on the headphone, it means that he or she is busy with jobs right now and does not welcome for talking.

- **Quadrate office desks**
  The company uses quadrate desks for sales department and technical department and locates four workers in each direction of the desk. The main purpose of this design is for facilitating coordination and communication among workers in the same department and this closeness makes them feel more like working in a team rather than working independently.

- **Whiteboards everywhere**
  The company has five-meter long whiteboard in each department and also in the conference room. According to Mr. Martin, ‘the whiteboards are very helpful for their daily work’. People can just write down about the sudden ideas and share their knowledge with others so creativity and innovation are also improved by this way. Everyone is encouraged to share their comments on the whiteboard. Those whiteboards are also used for keeping some important information. In addition, Mr. Martin also offers an example of selling blog data about how these whiteboards make their work efficient. The first time that they received a phone call for consulting about selling their company’s blog data, they did not have any experience on how much to charge for the price, so after that they began to write down the prices for every deal on the whiteboard for remembering, contrast and price analysis. Through this way, the work became smooth and today they have already owned 14 customers.
Cafeteria for socialization

The cafeteria or rest room has coffee machine, a big table and sofas. It is located between the sales department and technical depart and it is a main place for informal communication during the break time. The company has Monday breakfast at 9 o’clock and Friday fika which starts at 3 pm and lasts for half an hour. The cafeteria offers a place that people can sit in sofa and chat with each other during the break time. What is more, it provides an opportunity of cross departments talking.

4.3 Ericsson in Linköping

According to Ericsson (n.d.), ‘Ericsson is a world leading provider of telecommunications equipment and related services to mobile and fixed network operators globally and today, over 1,000 networks in more than 175 countries utilize our network equipment and 40 percent of all mobile calls are made through our systems’. Through interviews and by searching information on its official website, it is not difficult to find it is a company focuses very much on communication which they believe communication is a driving force in changing the way people work and live. Based on Ericsson (n.d.), Ericsson is also a company with great innovation capability and now they have more than 25,000 patents. They have great passion for innovation and they believe technology is the heart of their business. Ericsson has numerous innovation centers all over the world and recently it won the “Global Telecoms Business (GTB) award” for wireless network infrastructure innovation. Ericsson in Linköping is a main site for 2G mobile services.

In Ericsson Linköping, five managers are involved in interviews and each of them has a separated interview with us. Their names and positions are listed as follows with permits according to the order of interviews but some of them asked for anonymity so
only their positions and responsibilities are showed below.

<table>
<thead>
<tr>
<th>Name:</th>
<th>Anonymity</th>
<th>Anonymity</th>
<th>Gustav von Sydow</th>
<th>Kinga Ulman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position and responsibility:</td>
<td>Line Manager or Section Manager</td>
<td>Project Manager; Evo Controller</td>
<td>Line Manager; Function Tester; Design Manager</td>
<td>Project Manager; R&amp;D</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Male</td>
<td>Male</td>
<td>Male</td>
</tr>
</tbody>
</table>

### a. Anonymity

This manager wanted to be anonymity in the research; He is a section manager at Ericsson Linköping. There are 18 to 20 subordinates with diverse skills work in his department. All the subordinates have achieved bachelor degree at least, such as computer science, telecommunication and so forth. The manager stated that specialized knowledge his subordinates learnt from universities was not sufficient to support their career and they must acquire detailed specific knowledge fast in practice after they started working in Ericsson.

In his section, he has sub-projects and people are assigned to different team in terms of different requirements. Each team has one team leader and about 6 testers. The way they carry out projects is concurrent engineering. A lot of time can be saved by advancing
different part of the project concurrently (Tonnquist, 2008). Mechanic devices can be constructed while electronics and software are built simultaneously. The duration of each single coding testing project depends on the complexity of each project.

There are two sites of Ericsson Linköping, one was restructured 5 years ago which contained open areas and isolated offices; the other site is an old building which locates in the opposite side of the same road and also contains open area and old isolated offices. The manager is working in the former one and has very good impression about its physical layout compared with the old one. The reason why he prefers the former one is that open area has a big space which allows the people who sit around to join in others’ conversations spontaneously and enables the company Ericsson to create a problem collectively solving environment. Furthermore, it is flexible and easy to relocate people and office facilities in an open space office.

The reasons why Ericsson restructured its workspace were based on two folders from his opinions. The first folder was economic factor, because the site could accommodate more people and save office space through restructuring the whole building, which would save a lot of money compared to rent more workspace. The second was that PBOs required more open space offices for frequent communication and knowledge sharing.

Generally speaking, employees had positive responses toward this change according to his reflection, because ‘people felt not lonely at work anymore, and they became more socialized since they could be involved in more conversations for problem solving and information sharing’ said by him.

As he recalled that for every 100 hours/person of estimated work they used to do, they today manage the equivalent of 130 hours/person in open space office with the same
other conditions. Besides, the faults detection was increased approximately 20% to 25%. However, they are still not sufficient enough to attest the improvements are attributed to the change of office layout, and people might argue that it is other factors contributing to these improvements. They probably would have managed it even without restructuring, but thanks to the open space offices, they did make their work easier. The reason might be that workings in such open area, employees feel less stressful, and they can improve quality of the deliverables. Therefore, it would be too easy to say that open space office has positive influence on working efficiency, but the manager believed it at least helped a lot.

According to him, face-to-face communication is the most important for every company. As he said ‘the significance and the usage of FTF largely depend on what kind of jobs people dealing with’. From his perspective, face-to-face communication is more important for a PBO and especially vital during project developing phase, because project members have to cooperate and coordinate with other members who share different specific knowledge backgrounds in order to finish assignments and even innovate.

When talked about the office facilities, firstly he thought highly of the significance of whiteboards toward his job. According to his descriptions, two big whiteboards are in his private office and the people working in open space office have their own whiteboards beside their bookshelves. They also have whiteboards in conference rooms and small phone rooms for sharing important information and ideas. Secondly, he agreed with the function of coffee rooms for socialization and informal communication during break time, and some creative ideas are encouraged by this way.

When asked about his considerations and suggestions for future improvement, he proposed that the number of people and size should be limited in open space offices, as
it will be more comfortable to work with a small group of people instead of working in a crowded area. Moreover, noise can be decreased by reducing employees in open area. In open space offices in Ericsson, there is roughly sixteen employees working together in each one open office, and it is better to reduce the number of people. Additionally, using flexible materials for construction is also needed to be paid attention to, because it will cost less and easy to create more space for new employees. As he said, the new site accommodated about 200 more new employees after the site was restructured.

b. Thomas Gotenstam

The second interview in Ericsson is with Mr. Thomas who is a project manager for Evo controller in Ericsson Linköping. According to Mr. Thomas’s introduction, he is in charge of several sub-projects which include design, system and I&V (integration and verification) and so forth, so the whole big project group has approximately 200 workers spreading all over the world, some of whom never meet each other, but they have integrators and testers to connect different functions and make sure about the whole quality. However, Mr. Thomas only directly manages and communicates with sub-projects managers by once a day meeting with part or all sub-project managers rather than all these 200 workers. Therefore, to narrow down the big project group, Mr. Thomas has a close contacted project group which is comprised of 10 sub-project managers.

When talking about the office physical layout, Mr. Thomas admitted that he does not know much about it theoretically, but empirically he thought the physical layout in Ericsson was very good and efficient. Based on his presentation, he has two offices including one open space office and one private room. The open space office room is shared by 20 people. To be surprised, Mr. Thomas’ project members do not sit in the
same open space office. The workers sitting around Mr. Thomas are other project managers who are responsible for other projects. However, not all projects are separated in Ericsson; on the contrary, many projects share great similarities and experience can be shared to save time and avoid making the same mistakes, so such office physical layout provides good opportunities for cross-projects learning. According to Mr. Thomas, this arrangement is efficient and helpful for problem solving, and ideas come through such impromptu cross-projects conversations or even overhearing.

When asked about the preference towards private room or open space room, Mr. Thomas agreed that both forms of office layout have their own advantages. According to Mr. Thomas, ‘an open space office is easier to join in communication and knowledge sharing while private room is more professional for work and to some degrees, is more relaxing and convenient to do private things’, but he also admitted that the private office wastes space and money. When we mentioned that open space office might be noisy and had bad effect on people’s concentration on their work, Mr. Thomas agreed with the noise but he did not think it had much negative effects because Ericsson has many available small conference rooms or phone rooms for speaking, and moreover he thought Swedish people were quiet, so no one spoke aloud in office.

We also learnt from the interview that there was a trend of changing private rooms into open space office in Ericsson these years and the main reason was from the financial considerations for saving money and maximization of the work space utilization. Mr. Thomas stated that ‘the majority of workers supported this trend, but of course not everyone favored this change’. The reason might be inertia or uncertain about the effect. When asked about the reactions of these people who did not support the change, Mr. Thomas said that even though they did not prefer it, they did not against radically or wanted to leave the company because of this change. Mr. Thomas also pointed out that it was possible that some people who especially interested in private rooms might be
over 60 years old and they hoped to focus much more time on private things.

Mr. Thomas also offered an important information that Ericsson has work space survey once a year and this survey investigates employees’ satisfaction towards numerous aspects of their working environment such as heating, illumination, ventilation, noisy, chairs, stress, conflicts and so on. According to Mr. Thomas, the results of the survey were quite good. Finally, Mr. Thomas said he personally thought the office physical layout in Ericsson now was quite good, so he would not make any change of it.

Mr. Thomas also offered us the structure figures of office physical layout in Ericsson, which shows the office structure of three areas in the second floor (see appendix figure 2, figure 3 and figure 4).

c. Anonymity

The manager has been working in Ericsson Linköping for 16 years. He works as a function tester and R&D design managers. He admitted that he did not know much about office physical layout. He thought the physical layout of Ericsson was acceptable. He used to work in his individual office, but now he has moved into an open space office. When discussed about private offices and their relevant advantages and disadvantages. The advantages and disadvantages of private offices, based on his statements, are listed as follows:

- Advantages :
  - Employees can concentrate on their jobs.
  - Employees can have more privacy, such as private conversation, private phone call and so forth.
Disadvantages:

- Employees will be disturbed by others easily.
- It has less opportunity to join in conversations and share information with others.

The manager also told us about his personal experience and he had worked in one site of Ericsson in England for 2 years. The open space offices in England were quite noisy. However, he became used to working in such kind of noisy surroundings after he figured out how to work in noisy workspace and treated noise as background sound, but he felt uncomfortable after he returned back to Ericsson Linköping where had a quiet working circumstance, because the slight noise could be more disturbing compared with the background noise.

Now, he works in open area with other main project managers who involved in the similar projects as him. He said that ‘the open space office is more convenient to ask questions directly’, because he found it was easier and more efficient to communicate with the managers in the open area about some similar problem and experience. Through this way, time was saved and the same mistakes were avoided.

We also discussed about the difficulties of shifting aged employees to open area as they may concern more about their private life. However, the manager did not think age would raise the problem of shifting employees to open space area, but personality could determine their willingness of working in open area or not. ‘I never heard some people dislike open space office’, said by him.

The manager also argued that the importance of face-to-face communication was depended on many factors, such as organization culture, distance, type of job and so forth. He also mentioned that FTF communication played a very crucial role in acquiring knowledge, because it was the most efficient and direct way of learning and
sharing knowledge.

Finally, we discussed about the relationship between organization culture and office physical layout. In his opinion, physical layout was much less important than organization culture, even though physical layout played an important role for working efficiency in enterprises. From his perspective, organization culture was the most decisive element which had great impact on communication, innovation, knowledge sharing, knowledge integration and so forth, and it also had ability to influence a company’s office physical layout. Moreover, it was quite important to gather right person together, which meant sitting close to people who worked in the same team was more important than well designed physical layout. Additionally, he thought office physical layout should be flexible as it would be much easier to move employees to other sites if needed.

d. Gustav von Sydow

Mr. Gustav, having five years’ working experience in Ericsson, is a project manager being responsible for GSM system. During the beginning of the conversation, he also admitted that theoretically he did not know much about the office physical layout. He has a team of 40 people. Previously, he had his own private room, but now they have work place design, in other word, open space office, so now he sits with his project members who are five team leaders. The main consideration, according to Mr. Gustav, is the financial consideration that standardization can save money. However, he told us that this arrangement will be changed soon and he will be arranged to sit close with other project managers while these five team leaders will stay with their own team members for better communication.
When talking about distinguish of the open space offices and enclosed private rooms, Mr. Gustav pointed out that an open space room is good for socialization and people can join in each others’ communication so it is easier to spread ideas. The main disadvantage of the open space office, according to Mr. Gustav, is too noisy. He stated that ‘even though they have many phone rooms, many people dislike like it because the phone rooms are too small and without windows’; therefore, they are not comfortable. Moreover, he also explained that ‘open space offices are extremely noisy for the people who sit beside corridors, and these people are more easily distracted from their work’. However, although open space office has disadvantages, most of people are still optimistic about the trend of changing private rooms into open space offices. Based on Mr. Gustav, he does not hear anyone dislike the change, even though some people complained about bad seats near corridors. In addition, Mr. Gustav considered that managers might need more privacy than others and frequent visitors of managers have negative influence on the normal work of the people who sit around. He also gave us an example of one senior manager who asked for a private room and finally got it.

When talking about office facilities, Mr. Gustav agreed that they have many positive aspects on communication, innovation and working efficiency. Firstly, he mentioned about coffee room with its inside facilities such as coffee machines, sofas, desks were beneficial for socialization and some creative ideas came from this way of communication. What was more, he also agreed face-to-face communication was the best way of communication. Secondly, he also highly thought of ventilation system and illumination. Mr. Gustav expressed his own preference of sitting near windows, which has better visions, lighting, and ventilation conditions. Furthermore, whiteboards are widely used during their daily work and play an important function on communication and records keepings. Last but not the least, they have adjustable desks and from ergonomic consideration, they offer some special chairs for workers who ask for them.
When asked about the relationship between office physical layout and culture, Mr. Gustav did not hold the view that culture can influence office physical layout. Ericsson, as a global company, has numerous branch offices spreading in Europe. According to Mr. Gustav, all Ericsson offices have the same or similar layout design in different countries in Europe; therefore, even though they have different cultures, they share the same office layout.

Finally, Mr. Gustav offered some specific suggestions for the future improvement of office physical layout in Ericsson and these suggestions are listed as follows:

- First of all, for the consideration of reducing noise, open offices should be small areas (6 to 8 people in one open space will be better).
- Secondly, seats beside corridors should be eliminated, or if it is possible, use isolated corridors to minimize distractions and noises.
- Moreover, lighting and ventilation system are important so seats near windows are preferable because of better ventilation, illumination and visual enjoyment.
- Office decorations are also worth mentioning, such as some flowers, sculptures, paintings, and some other art works. It will be enjoyable to have some of them in corridors.
- Lastly, it will be more convenient and ergonomic to change the shape of the tables in conference rooms. In some big conference rooms, sitting around a long table is troublesome to watch the whiteboard, PowerPoint or projector in front of the conference room. A triangle shaped table, one hypotenuse facing the whiteboards but without seating people, will be more efficient and people sit around other two hypotenuses can be more easily switch their attentions.

e. Kinga Ulman
Ms. Kinga, a project manager in Ericsson Linköping, is responsible for product introduction and works with Ericsson’s customers. Her project group has daily job mainly focusing on four aspects—developing, testing, integrating and delivering. According to Ms. Kinga, the nature of her job decides that she has to spend almost half time in conference rooms, approximately 10% of the time on virtual communication such as phone, emails, Internet and so forth, and the rest of the time in her open space office. However, she still believed that face-to-face communication is the best way of communication for better understanding and avoiding misunderstandings.

Ms. Kinga’s attitudes toward the trend from private office rooms to open space offices are also positive. She mentioned one possible weakness was noise, but she did not think all distractions were harmful for work. According to Ms. Kinga, as a project manager, ‘overhearing is crucial for understanding problem and updating information’, so she prefers working in open space office for a better management controlling. Now she works in an open space office and people working there are other project managers. This arrangement is based on projects functions and aims for facilitating cross-projects communication. They also have daily communication with their own project members. However, not everyone welcomes the change from private rooms to open space rooms. Ms. Kinga admitted that for some jobs, a quiet and enclosed office was better than an open space room. To be more specific, Ms. Kinga thought open space office was more proper for project managers while private office rooms might be more efficient for line managers, so the office arrangement should depend on different roles. When asked about the reasons for this change, Ms. Kinga was not quite sure about it, but she guessed it might be from economic considerations. Furthermore, she admitted that she was not sure about whether this change has positive influence on working efficiency or not. From her perspective, technology plays a more significant role on improving working efficiency.
The same as previous interviewees, Ms. Kinga also mentioned their adjustable tables, ergonomic chairs, mouse pad to protect their shoulders, necks, cervicales and wrists. In addition, she also provided other information on the company’s ergonomic considerations for employees. They have exercising trainings during lunch time every day, and they have gymnastics, yoga, dances for employees’ health care. For other office facilities, Ms. Kinga also agreed that impromptu meetings in coffee rooms were quite beneficial for their work. Besides coffee rooms, they also have three catering divisions in Ericsson and offer prepared food for employees. In their open space office, they use shared illuminations, but Ms. Kinga did not think it had any problem. The ventilation was also good according to Ms. Kinga, even though the windows on the first floor are not allowed to open for security reasons. When asked about the relationship between office physical layout and culture, Ms. Kinga did not believe there were any causal relations between them.

Finally, Ms. Kinga proposed to use small open space office in the future, which was same as what Mr. Gustav suggested. What was more, Ms. Kinga believed it was necessary to carry out some measures to protect the privacy of the people who were sitting close to corridors. However, she also felt sorry because she had no authority to change the office physical layout.

### 4.4 Combitech AB

According to COMBITECH (n.d.), Combitech AB, a Swedish private company owned by SAAB, was founded in 2000; it has more than 800 employees in total and approximately 300 employees are in Linköping. Based on COMBITECH (n.d.), the
company has local presence in 20 locations in Sweden and it is also represented in Belgium, Germany and Norway; the company mainly operates as a technology, development and management consultancy company and focuses on construction and development of integrated systems, process support, training, verification, validation and testing, and according to COMBITECH (n.d.), it offers consultancy services and technical supports for a variety of customers such as government authorities, ministries, defense industry, and telecommunications sector in the areas of environmental management, training and communication, and environmental studies, logistics, mechanical engineering, information security, system development and integration, system security, customer adapted solutions, and collaboration.

Mr. Jan jointed Combitech in 1990, and before that he worked in Ericsson. Now he works as a senior business developer or consultant in Combitech, being responsible for management consulting and projects through offering solutions for technical development.

Generally speaking, he likes the office physical layout in Combitech very much because it is comfortable, and he never heard anyone who dislikes it. The office building is rented by them, but they have authority to rebuild and redesign the offices. Mr. Jan works in his own private office which is mainly for managers, but they have projects team in open space areas. Mr. Jan is satisfied with this arrangement as he spends most of his time on telephone, meetings and thinking, so he does not want to disturb others or be disturbed by others. From his perspective, managers need more privacy, but it does not mean managers do not need communication. Mr. Jan stated that he had close conjunctions with his team and they had short daily meeting. He also showed that
managers had to observe how projects were carried out and be sensitive about any change or problem.

When he described his experience in Ericsson in 12 years ago, he said at that time all offices in Ericsson were private rooms. Compared with Ericsson in 12 years ago, he preferred the project working way in Combitech. The reasons were listed as follows:

- Combitech has open space office for project. The size of open space office varies according to the project size and normally 5 to 10 people. It offers a good atmosphere for communication and brainstorming by letting project members sitting together.
- Combitech has a more professional way to do projects. They use “sprint backlog” to list project tasks first, draw project process on whiteboards including planning, ongoing and ready assignments, demonstrate to customers, and finally retrospect projects. During this process, whiteboards play an important role on recording their schedule and visualizing project progresses. They also use “burn down chart” to track their working processes and compare with their predicted routines. By these ways, the working efficiency is enhanced.

According to Mr. Jan, the disadvantage of open space office is the noise which disturbs workers’ concentration on their jobs and the bearing degrees depend on different people. However, he agreed that open space is more flexible and more economic because it saves work space.

According to Mr. Jan, communication and innovation are keys for the success of Combitech and the consulting jobs require employees to explore their potential of creativity because they always need to figure out new effective solutions for customers. Under this situation, the company has to offer possible conditions to encourage
employees’ creativity. Providing a good working environment and facilitating communication become not only necessary but also mandatory. Mr. Jan sited an example of a chaos report from an American organization, which listed abundant causes to the failure of a project by accumulating thousands of project failure cases. Based on the chaos report, the most significant reasons were not because of technical problem but because of lacking communication which leaded to misunderstandings. Mr. Jan suggested that using open space to solve this problem might be effective since it worked as a common place where people could discuss together and clear about the situation when problem showed up.

Concerning for employees’ feelings toward office facilities, the company also has an investigations every year to collect information from their employees. From Mr. Jan, we learnt that most of their office tables were adjustable, and they also owned very modern chairs. He also agreed that ventilation and illumination were important for work performance and efficiency; he also emphasized the importance of ventilation system for open space where was more crowded and with less fresh airs. In addition, people in Combitech have coffee breaks twice per day. Mr. Jan consented that coffee areas afforded a good place for relaxation and informal communication which stimulated the generation of some great ideas by impromptu meetings.

Finally, Mr. Jan advised that ‘the office physical layout should be flexible and efficient for redesigning’. The cost of this change should be too high. He also expressed that to make sure about the success of projects misunderstandings should be minimized through providing more opportunities of communication.
4.5 Tekniska Verken

According to TEKNISKA VERKEN (n.d.), Tekniska Verken (TV), owned by Linköping community, is a public Swedish regional company in Linköping, whose products and services are mainly electricity, water, district heating, district cooling, waste management, broadband and biogas. The company focuses on regional markets, but it also has some plants in other areas. It has around 1000 employees and half of them work in headquarters. Based on TEKNISKA VERKEN (n.d.), ‘TV has around 280,000 private and corporate clients who are benefited by its products and services’. The main operation activities are to generate green energy from wastes, purify water, provide services for infrastructure, offer renewable electricity for green market, provide clean vehicle fuel and so forth. All these, according to the company, aims to create an efficient and sustainable community in a long term.

The four interviewees are all from TV’s headquarter in Linköping. Even though we realised TV cannot be classified into PBOs after the first interview with Mr. Stefan Jakobsson, we still continued the other interviews in TV for doing comparisons with PBOs’ office physical layout and collecting useful information. The contents of these interviews are summarized as follows.
**Table 4.2: Respondents from Tekniska Verken**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Stefan Jakobsson</th>
<th>Håkan Johnsson &amp; Lars Karlsson</th>
<th>Christer Kjellberg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position and Responsibility:</td>
<td>Manager of Business Development</td>
<td>Håkan: Property and supporting department Manager Lars: Engineer and Administrator, working with environment and quality</td>
<td>Manager of the Project department</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Male</td>
<td>Male</td>
</tr>
</tbody>
</table>

### a. Stefan Jakobsson

Mr. Stefan, the manager of business development in TV, is mainly take charge of internal consulting for business development and sometimes also for technical consulting. He has 25 years working experience and according to him, he has experienced in different office layouts. What is more, he also had 4 years working experience in Ericsson before. Compared with Ericsson, Mr. Stefan told us that projects in TV are not as many as Ericsson’s and theoretically speaking, TV cannot be categorized into PBOs because most operations and activities are carried out functionally and only one division use projects as their daily working way.

Based on Mr. Stefan’s introduction, the office buildings of TV were built by the company itself in early 90s and the design of these offices mainly takes the consideration of visual aesthetics, economic factors and flexibility for remove and new arrangement. Mr. Stefan also said 15 years ago the company got a reward for the
Most of offices in TV are private and enclosed offices. However, these separated individual offices are transparent. According to Mr. Stefan, he thought highly of his company’s office physical layout, and he also said people in his division did not like open space office, so they prefered private and individual office rooms which are quiet and easy to concentrate on their work. What is more, their work nature decides they do not need to communicate every day because their jobs mainly focus on writing, reading and analysing. However, they also have open space office which is for R&D department. In R&D department, innovation is important. This arrangement mainly considers to encourage communication and brainstorming for problem solving and also stimulate workers’ creativity; thus noise is unavoidable in open space office. As a manager in TV, said by Mr. Stefan, it is better to have a private office. He said that ‘some companies he heard had tested the work efficiency in open space offices and the result is not good.’

Even though few open space offices are in TV, it does not mean they do not pay attention to communication. According to Mr. Stefan, communication is extremely crucial for a company; although nowadays computer can deliver information conveniently and rapidly, it can not replay fact-to-face communication. Everyday in TV, they have two times for fika (coffee break), one in the morning at 9 o’clock and the other in the afternoon at 15 o’clock in coffee areas. People come out of their offices and talk with other people. Mr. Stefan admitted that through this informal way of communication, knowledge is shared, information is spreaded, and many ideas come out by this impromptu meeting. Besides of the informal communication, they also have formal communication mainly in conference rooms which have different sizes and are easy to book and get.

About the office facilities, Mr. Stefan pointed out the great importance of whiteboards
for sharing and remembering information. In TV, they have whiteboards both in open space rooms and also private rooms. Mr. Stefan said he hoped to have a very big whiteboard in his office because he thought the whiteboard in his office was too small. Moreover, he also agreed that illumination, ventilation, heating were significant for working efficiency and workers’ physical fitness. When asked about the tables and chairs in his office, Mr. Stefan told us they were the normal ones, but he also said workers could get adjustable tables and special chairs if they needed. Learnt from Mr. Stefan, TV takes care of its employees’ physical fitness and they have health test every year.

In addition, Mr. Stepan also indicated that culture can influence the office physical layout. He took the view that generally speaking, people working there were conservative and it might be one reason why they prefer private rooms. Last but not the least, when asked about the future improvement, Mr. Stefan did not say much about it because he was quite satisfied with his company’s office physical layout right now. Only one thing would be better he suggested was the whiteboard and he wanted a bigger one, but he also added that it was not a big problem because it would not be difficult to change it if he asked for it.

b. Håkan Johnsson & Lars Karlsson

The second interview in TV was with Mr. Håkan Johnsson and his colleague Mr. Lars Karlsson. Mr. Håkan was a builder and constructor before and joined the TV company 16 years ago. Now he is working in supporting department and responsible for office construction which includes checking, repairing, facilitating office facilities. He has 15 subordinates working in his department and Mr. Lars Karlsson is one of them. Mr. Lars joined the company in 1996. He is working as an administrator who is mainly in charge
of rents and also as an engineer working with environment and quality such as ISO 9001 for both his department and the whole company.

As experts in the area of construction and environment, they provided us with a lot of valuable information. According to Mr. Håkan Johnsson and Mr. Lars Karlsson, the company had many questions and discussions about how to design offices when the building was built in 1993. The hottest debate focused on open space offices and private office room. From their statements and descriptions, the company had all offices beside windows, and in the middle of the building were ventilation systems, coffee rooms, toilets, dressing rooms, technical equipments, and storage room. However, the situation has been changed with more people and limited space, so the company plans to better utilize the space in the middle and arranges new offices there.

Based on Mr. Håkan and Mr. Lars, the company has some open space offices. For example, in their department, they have a 4 people shared open space office. These people are outdoor workers so they spend only one hour per day in their open office. The reason why they still have an open space office is because they need a place to stay when they are not working outside and their computers, office documents, personal stuff also need a place.

However, most of the offices in TV are private individual rooms which are about 12 to 13 square meters, and some managers’ office rooms are even larger. In Mr. Håkan’s department, they also have other people who work in private office rooms but these office rooms are quite close to each other. Besides, office rooms use glasses on the side of corridor so they are transparent. Under this case, even though people sit in separated office rooms, it is still convenient and easy for communication. We also learnt from Mr. Håkan and Mr. Lars that people in TV do not like open space office because it is noisy and disturbing, and most of the employees’ daily job focuses on documents; therefore,
they prefer staying in a quiet and private rooms

Mr. Håkan and Mr. Lars also pointed out that even though people were all happy about their own private office rooms, the cost per person was extremely high for the company. They cited an example of Göteborgs Energi Company in Gothenburg, which does the same jobs as TV and has the same company size with TV. They did a comparison with these two companies from the year of 2010 to 2011 and found an interesting conclusion that TV had a better quality while Gothenburg has a better cost efficiency. The following data offered by Mr. Håkan shows the difference between these two companies in the aspects of office size per person and cost per person.

Table 3: the Comparison of Office Cost and office Size between Göteborgs Energi and Tekniska Verken

<table>
<thead>
<tr>
<th>Companies:</th>
<th>office cost per person:</th>
<th>office size per person:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Göteborgs Energi</td>
<td>28000kr</td>
<td>17m²</td>
</tr>
<tr>
<td>Tekniska Verken</td>
<td>47000kr</td>
<td>38 m²</td>
</tr>
</tbody>
</table>

They also measured the value of the service they delivered by doing survey and asking the same questions for both companies’ managers, and used the number 1 (the lowest) to 5 (the highest) to estimate their value of services. They got the result that Göteborgs Energi valued 3.11 while TV valued 3.79. According to Mr. Håkan, the difference 0.68 was big and it was extremely hard to get 4. However, people might ask even if TV delivered higher service value than Göteborgs Energi, it was hard to say that this high value was contributed by office physical layout rather than other factors. To answer this question, Mr. Håkan admitted that it would be too cursory to say office physical layout was the only reason affects TV’s and Göteborgs Energi’s service value; however, from the perspectives of employees from both companies, office physical layout played an
irreplaceable role on their work performance. What is more, Mr. Håkan and Mr. Lars also told us when the employees of Göteborgs Energi visited their company, they were all very jealous about TV’s private office rooms. For employees, but when TV employees went to Göteborgs Energi, they felt sorry on their crowded and noisy open space offices.

When asked about the office facilities, Mr. Håkan and Mr. Lars indicated that the standards of illumination, ventilation, heating system and so forth are all designed by following the rule of some professional companies. For other office facilities such as tables and chair, they use standard ones, but it is easy to get an adjustable table and special ergonomic function chair if people ask for them. Additionally, Mr. Håkan and Mr. Lars also showed us the company offered special glasses for protecting their eyes, and special keyboard for employees’ physical fitness. All these, sounds trivial but cannot be ignored when considering their high work performance. Besides, they also mentioned about the coffee area for relaxation and communication which spurs new ideas.

Culture or tradition, based on Mr. Håkan and Mr. Lars, is also decisive for office physical layout. For example, it will be very difficult to move into an open space office for the person who has worked in private rooms for a long time.

For future considerations, even though Mr. Håkan and Mr. Lars are both satisfied with their company’s office physical layout, they said ‘people can always do better in the future’. To be more specific, they proposed to reduce the cost. They took the example of heating system and complained that it cost too much. They also suggested decreasing the size of some big private office rooms, in order to save much more space and reduce costs. Last but not the least, Mr. Håkan added that the importance of office physical layout on facilitating communication depended on whether it could gather the right
people to the right places.

c. Christer Kjellberg

Mr. Christer has been working in TV for 8 years and now he is a manager of the project department. In this project department, he has been in charge for 4 years. From his personal introduction, we learnt he used to work for SAAB before he joined in TV. In the department, he has 13 subordinates who are all engineers. About 30 percent of his workload is contributed to projects which relate to hydropower generation, plants, biogas, and other technical projects and investment projects. His responsibility mainly focuses on planning and his subordinates spend more than 95 percent time on executing projects.

General speaking, he admitted that he did not have much knowledge on office physical layout, but he was quite satisfied with his office layout because he thought it was a big and bright place with high quality construction materials; Compared with SAAB, he preferred the office physical layout in TV. As he remembered, he worked in an open space area of SAAB before and he did not like the open area as the reason of constant noises raised by phone calls, chartings, and footfalls. Now in TV, he is extremely happy about his own private room.

For the office facilities, he mentioned about the window between two offices which are next to each other, by which way offices can borrow sunshine and have more light through windows. Additionally, the sunshade which is called “Markis” in Swedish, is installed above every window and it can adjust automatically according to the light of sunshine. According to Mr. Christer, satisfaction to workspace is quite important and low satisfaction may raise some problems. Some receptionists in TV complained about
the air-conditioning as they did not have. Moreover, some employees do not like the offices in the middle section of the block as they do not have enough sunshine and light. But, generally speaking, Mr. Christer thought the design of the company building was brilliant and he also said that ‘when you are satisfied with something, you will not think much about it’. For the company’s ventilation, illumination, ergonomic office facilities such as adjustable chairs, screen glasses, he all showed great satisfaction, so he never though anything wrong about them. Moreover, he also talked about the nice restaurant and fresh bathrooms in the building. But, when talking about whiteboards, he has no whiteboard in his office as he thinks whiteboards installed in office are too small so they are useless; he prefers big whiteboards to small ones; however, they have big whiteboards in conference rooms; therefore it is unnecessary to have one whiteboard in his own office.

Mr. Christer stated that the main consideration of building the new block as headquarter which cost three hundred million Swedish Kronas was to locate all the employees together as they worked in separated sites before. Nearly all the employees working in the block had their own offices. Christer preferred to work in a private office instead of open space office, because he felt interrupted by the noise in open area; contrarily, in his private rooms, he can concentrate on his work and has more privacy. When asked about whether this office physical layout was a barrier for communication, he did not agree. The glass of his office on the corridor side makes his office transparent, which also creates an open space for others. His project members all have their own private rooms, but they also have temporary open space office for communications and discussions, so private office provides a good place for concentration while open space office encourages teamwork, and the balance of these two contributes to the success of many projects.

Concerning about the importance of face-to-face communication, Mr. Christer said
‘face-to-face communication is a high efficient way for knowledge sharing and innovation’. From Mr. Christer’s opinion, coffee area is important, because people can talk to each other face to face and share their knowledge and information. According to Mr. Christer, ‘this spontaneous conversation offers a good chance to discuss ideas’. Furthermore, through observation, we found Mr. Christer’s office was quite close to a coffee machine. For this location, he thought it was convenient and it offered more opportunities for meeting with other people. What is more, he thought innovation was crucial in TV and innovation could be affected by office physical layout and communication, because creativity and innovation need to be facilitated by a good external environment. But, he also admitted that some creative people were born as creative.

With the increasing number of employees, Mr. Christer claimed that it would not affect his work efficiency if his office was downsized, but the problem was that the offices were quite hard to restructure every single office as the windows were fixed and the economic efficiency could be decreased as the high cost of restructuring. But as he suggested, one more floor could be added to the top of the building based on its original layout design. The design of each office is standardized, but employees can apply new facilities or small changes as they need. For example, Mr. Christer said ‘there is an 18-month investigation called ‘motivated employees index’ spreading among all the employees by asking 114 questions’. The purpose of this investigation is to study employees’ satisfaction on the company, working environment and their personal opinions of managers.

### 4.6 Chapter Conclusion

This chapter mainly records the processes of the ten interviews with 11 interviewees
from 4 companies: Twingly, Ericsson, Tekniska Verken and Combitech AB. The companies’ general information and the contents of these interviews are listed above. In the following chapters, the collected information will be analyzed and compared, limitations will be admitted, and conclusions will be drawn.
5 Analysis

5.1 Chapter Introduction

In chapter 4, detailed information about empirical studies has been provided. This chapter will reflect about the above messages and relate them to the theoretical part to see whether the research questions have been answered. By clearing up the above separated information from different organizations, it is also necessary to explore more on the relations and differences. This chapter focuses much on rational analysis which is the preparation for the conclusion chapter.

5.2 Open Space Office Layout vs Private Office Layout

Through interviews, even though many of the respondents admitted that they did not know much about the theoretical knowledge about office physical layout, they agreed that office physical layout was significant for their work based on their long-term working experience, and they had already realized that office physical layout’s great influence on communication and working efficiency.

In the theoretical part, the paper mentioned two tools—organizational structure and physical space for facilitating communication. By doing research, all respondents agreed that communication is important for their work, regardless of which kinds of organization they come from, PBOs or non-PBOs. Among different types of communication, they also admitted the great significance of face-to-face communication.
for knowledge sharing, encouraging innovation, and most obviously avoiding misunderstandings. Even though some of them mentioned that the significance also depends on different types of jobs, nobody thought it could be completely replaced. According to Hatch (1997), “even though the birth of new methods of electronic communication reduced the limitation of physical locations, face-to-face interaction is still considered superior to all other forms of communication.” Therefore, designing a good office physical layout and maximizing the utilization efficiency of office space for better communication are not outdated and the importance cannot be ignored.

However, through interviews both in PBOs and non-PBO, it is not difficult to find that different types of jobs do have great influence on office physical layout. The most salient characteristic is the different choices toward open offices and private offices. It is also safely to say that private office room is more suitable for the people whose daily job is documentary and focuses on reading, writing, and independent thinking and analyzing. For employees in non-PBO such as Tekniska Verken, ‘most of them preferred private rooms because most jobs were individual jobs which did not need frequent communication with others’, said by Mr. Stefan. Open space office, works as a common physical ba or platform for workers’ communication and knowledge sharing. Under this situation, project teams and project managers favor more about open space office for better coordination and brainstorming to solve a common or similar problem, and people become more creative and innovative through this way of working. For companies such as Ericsson, Combitech, Twingly which have numerous project works, people prefer sitting close to their project members because they have a same target which connects their efforts together. Therefore, the office physical layout in different organizations differs according to their different work types.

Besides work types, personality and age also possibly decide workers’ preference towards open space office and private office. For example, during the interviews, Mr.
Jan from Ericsson said that ‘personality plays a key role on people’s choice of open space room or private room’. Mr. Thomas and Mr. Gustav both mentioned about the age problem. Mr. Thomas held the view that the reason why aged workers preferred private room was they focused much more on private life rather than their jobs; Mr. Gustav also cited a real example of his senior colleague who asked for a private room. Moreover, Mr. Håkan and Mr. Lars also said that ‘it would be really hard to accept change for those who have always spent their previous working time in a private room’. Thus, the reason why people enjoy staying in a private office varies.

However, no matter what reasons people prefer open space office or private office, some realities push the change from private offices to open space offices. First of all, no company can afford to ignore the economic or financial factor. Every company tries to minimize its costs and enlarge profits. According to Light (1996, P.41), “open offices allow more flexibility than those with built-in walls and, and without walls, more people can work in allotted space making the economics of site rental pertinent.” That is also the reason why Ericsson now is changing the office layout into open space rooms and breaking down walls between offices. Many managers also admitted that economic factor was the first consideration when they built or rented the offices. Mr. Stefan from Tekniska Verken said ‘when the building was built in early 90s, none of the offices were in the middle of the building and all offices were private individual rooms which all had windows’. But, with more and more employees joining in the company, office rooms were not enough anymore, so the company had to rethink about how to make better use of the limited office space. That is why now they begin to explore the space in the middle of their company building and redesign some big individual office rooms into open space offices. In Ericsson, reducing costs is not the only consideration. The trend of the change from private offices into open space offices is based on their project needs of communication and coordination. What is more, the majority of employees in Ericsson Linköping are enthusiastic and active about this change.
Although Ericsson, Combitech and Twingly can all be classified into PBOs and open space offices are widely used in each company, they still have differences toward whether project managers should sit with their project team or not. For example, in Combitech, the management team has own floor and each manager has his or her individual private room; in Twingly, management team is also separated but all management team members share an office; but in Ericsson Linköping, project managers always sit with other project managers and line managers for cross-projects communication and coordination. The reasons for the difference might be complicated. Through interview with Mr. Jan from Combitech, he thought that managers needed more privacy for phone, meeting, and other confidential business information. For Twingly, a small sized new company with only three top managers; it is not difficult to understand why they arrange all managers in one office. For Ericsson Linköping, the majority of managers enjoy open space offices because of its high efficiency of communication with other project managers who have similar projects.

But, one reply is the almost the same when respondents were asked about the disadvantage of open space office. All the 11 respondents pointed out it was too noisy in an open space office and it was easily disturbed from their jobs. In this case, Mr. Gustav and Ms. Kinga both proposed to use small open space offices to minimize noise. Mr. Jan contrasted his previous working experience in Ericsson England and Ericsson Linköping. In the open space office in Ericsson England was extremely noisy and he could even treat the noise as background sound. In Ericsson Linköping, open space office was not as noisy as in England and he had two reasons to explain: firstly, they had many available phone rooms for telephone and conversations and secondly, he thought Swedish people were quiet and were not talkative. However, based on what has been discussed above, generally speaking, open space offices are noisy, even though they have many incomparable advantages. As the workplace specialists Morgan Lovell indicated, a badly designed open space office can lead to under-performing staff and
also the resentment from them due to the lack of privacy and constant interruptions, even though open space office has some undisputed advantages such as work efficiency, improved communication and a better team culture.

To summarize the advantages of open space office, all respondents agreed that it was more convenient for communication and cooperation. 7 of them especially talked about the importance of overhearing which was not only crucial for managers’ controlling, but also for problems solving and knowledge sharing. For some project managers who shared a same open space office with other project managers, they indicated that this arrangement was beneficial for cross-project communication which facilitated experience sharing and improved working efficiency by avoiding making same mistakes and saving time for problem solving.

In addition, open space office also saves a lot of office space. Mr. Stefan, Mr. Thomas, Mr. Gustav, Mr. Håkan and Mr. Lars and other respondents all came up with the problems that private rooms took up a lot of office space and it wasted a lot of money. Many respondents from Ericsson Linköping, they attributed the trend of changing private offices into open space offices to economic considerations. The comparison figures between Tekniska Verken and Göteborgs Energi offered by Mr. Håkan and Mr. Lars also showed the great cost differences between open space office and private offices. These figures inform us that open space office does help companies reduce costs and make better use of offices’ space for more employees.

Considering the advantages and disadvantages of both private offices and open space offices, it will be good to combine them together and keep a good balance between individual concentration and teamwork cooperation. As Tekniska Verken, their project department is doing a good job by using both offices and maintain a balance. Mr. Gustav also proposed a good way by using small open space office room for keeping a
relative balance for individual concentration and project team communication.

### 5.3 Office Facilities

For office facilities, respondents mainly focus on whiteboards, office tables and chairs, illumination, heating and ventilation systems, coffee machines, and their functions on communication, innovation, relaxation, and ergonomic impact for employees.

First of all, almost all respondents referred to the great help of whiteboards toward their daily work. Comparing PBOs and non-PBOs, whiteboards are all used in both types of organizations, even though they play different functions. However, generally speaking, whiteboards are more widely used in PBOs. Twingly, Combitech, and Ericsson Linköping, whiteboards are indispensable both in open space office and private office. By visiting these companies, it was common to see whiteboards were used for records keeping, information sharing, project process tracking, descriptions, reflections, responsibility distribution and so forth. As Mr. Martin from Twingly said, ‘Whiteboards play an extremely important role for communication and innovation in my company’. In Tekniska Verken, although they do not have projects as many as PBOs, whiteboards still work well. For example, Mr. Stefan from Tekniska Verken thought the whiteboard in his office was not big enough, so he hoped that he would get a bigger one to make his work smoothly.

Coffee machines and coffee area are another hot discussion during interviews. Besides providing a good place for relaxations and resting, all respondents agreed that coffee areas offered a place for socializations and informal communication, and many respondents such as Mr. Håkan and Mr. Lars, Mr. Gustav, Mr. Jan from Ericsson, Mr. Martin and so forth also admitted their experience of raising new ideas during coffee
breaks by charting with other colleagues. According to Fayard and Weeks (2007, P.605), ‘individuals are more comfortable interact formally’, so these office facilities facilitate employees’ informal communication and interaction. Through contrasting with PBOs and non-PBOs, no great difference was found about their coffee areas. Averagely speaking, each company has twice a day coffee break which they call ‘fika’ in Swedish. This might be caused by the Swedish culture. Twingly, Combitech and Tekniska Verken also have own cafeteria preparing food in the lunch time. Ericsson has several caterings offering prepared food for employees. All these sites, including other places such as dressing rooms, restrooms, and copy rooms, provide a good platform for informal communication.

In addition, most of respondents also thought highly of ventilation, illumination, and other office facilities such as office tables and chairs. Although they are not the decisive factors for work performance, they do more or less influence employees’ working efficiency. For example, Mr. Jan from Combitech pointed out that feeling comfortable was very important for high work performance and ventilation system especially in open space office could not be ignored. Many respondents also appreciated their special office facilities such as adjustable table and chair, which had ergonomic considerations and took good care of their physical fitness. Mr. Håkan and Mr. Lars from Tekniska Verken showed us their specially designed office glasses which aimed to protect their eyes, and special keyboard to prevent long time typing tiredness. Even in some company such as Tekniska Verken, most of the tables and chairs are standard; it is not hard to get a special one if someone asks for it. Comparing office facilities in PBOs and non-PBOs, there is no big difference and it seems these four Swedish companies all paid much attention to the wellbeing’s of their employees. Mr. Håkan and Mr. Lars also expressed that ‘Swedish companies have to care about their employees because if they got sick, the company need to pay much more than buying high quality office facilities’.
Therefore, it is not hard to find that economic consideration also exist towards office facilities. Tekniska Verken use standard office tables and chairs in order to narrow down the purchasing costs. But fortunately, it is not the only consideration. From the cases of the four companies, ergonomics is never neglected.

5.4 Other Discoveries

In interviews, several respondents mentioned about organizational culture. However, there is no agreement on this issue of whether office physical layout can shape organizational culture or culture decides organizational culture. Many respondents’ arguments made us believe that it was too simply to say who decides whom, and even though they have some mutual influences on each other, they are not the only decisive factor. At least, from the 11 respondents’ answers, it was not difficult to find that economic factor also has priority than any other factors. Respondents all directly and indirectly referred to the economic consideration for office physical layout and the redesign of office physical layout. The case of Ericsson Linköping, even though their organizational culture did not change their office physical layout was changed from private rooms into open space offices. The reason, according to many respondents, was based on their work nature and workspace limitations. Tekniska Verken, facing the increasing number of employees, is also trying to redesign their office physical layout to locate more people in their office buildings. These examples, both tell us that office physical layout is changeable under certain conditions, but compared with office physical layout, culture is relative stable for a company.
5.5 Chapter Conclusion

This chapter analyzed the empirical information from the chapter 4, and mainly focused on two aspects: the first was the comparison of open space offices and open space offices in PBOs and non-PBOs and the second one was about office facilities’ impacts on people’s communication, innovation, and physical fitness. Other information was also studied such as people’s awareness of the importance of office physical layout on their daily work, how office physical layout affects people’s communication, innovation and working efficiency, the reasons of redesigning office physical layout, the advantages and disadvantages of open space office and private office and so forth. It puts theoretical knowledge into practice and tests whether it works well or not. In the following chapter, the limitations and contributions will be discussed before drawing any specific conclusions and suggestions.
6 Contributions and Limitations

6.1 Chapter Introduction

This chapter will summarize the contributions and limitations of this thesis. The contributions are mainly discussed from two perspectives: the theoretical perspective and the empirical perspective. The discussions will relate with the literature reviews and announce some new discoveries which are not found in the existing literatures. The limitations are also admitted and we hope future scholars will overcome them.

6.2 Contributions

- Theoretical Contributions

First of all, the major theoretical contribution of this thesis is to gain a better understanding of the underling implication of office physical layout within project team. For future researchers, our findings contribute to office physical layout theoretical development within the fields of human resource management and project management, which is still a “blue ocean” in current academic areas. According to Foucault (1998, P.22), “space management may well be the most ignored and most powerful tool for inducing culture, speeding up innovation projects, and enhancing the learning process in far-flung organizations.” What is more, Klotz (1992) also states that people’s main interest on the design of offices and the functional values are in the terms of cost economization and optimization of use. Under these situations, this paper will wake up people’s awareness on this area and call for people’s attention on office physical layout optimization for improving communication and creativity, especially for PBOs. In addition, the paper also proves the correlations between office physical layout,
communication, innovation and a firm’s competitive advantages, which shows a new logical way of the influence of office physical layout on workers’ daily activities.

Secondly, through the empirical study, the papers supplement the some theoretical vacancies. The comparison of PBOs and non-PBOs tells us the difference of office physical layout in these two organizations. According to the theoretical part, many scholars have a hot debate on which office physical layout is the best way for companies, open space office or traditional private office rooms; Open space offices have been a hot debate for more than 40 years, but no consensus has been achieved on its impact on its general benefits between the scholars on environment and behavior (Boutellier, 2008). Facts prove that no size fits all and the best office physical layout in one company might not suit the others. That is also why it is so hard to generally judge which office layout is the best without specific conditions. This paper distinguishes the office physical layout in PBOs and non-PBOs and points out different work types influence the office physical layout. For example, as mentioned in the literature review part, one group of people such as Davis (1984), Ives and Ferdinands (1974), Stryker (2005) and so forth strongly support with the open space office, while the other group such as Brookes and Kaplan (1972), Clearwater (1980), Burt and Kamp (1980) hold an opposite opinion. The paper insists that this division without considering the concret company situation is not fair enough and there are at least three conditions having impacts on whether to choose open space office or private office: job type, employees’ personality, and age. During interviews, many respondents also mentioned about organizational culture. Even though no agreement was achieved, it would be too perfunctory to say they could not influence each other. Therefore, the paper offers a more detailed consideration factors on how to design office physical layout.

- Empirical Contributions

Finally, the interviews in 4 Swedish companies with 11 interviewees provide readers
empirical information about how office physical layout is arranged in developed
country and how communication and innovation are improved through their office
physical layout. As we all know, Sweden is a country with great innovation capacity, so
there must be some successful experience that people can learn from Swedish
companies. The empirical successful experience and lessons about some excellent
designs of office physical layout provided by these 11 interviewees can be borrowed by
other companies who also want to improve their office physical layout. These 11
respondents also offered some valuable recommendations for solving the existing
problems. Light (1996, P43) said ‘many New Zealanders haven’t yet learnt suitable
behavioural etiquette for the open office; some speak too loudly, phones ring for too
long and people are distracted by the immediate-response demands of phones, emails
and faxes.’ However, these problems are not only for New Zealanders but also for other
people who also use open space office. This paper offers some empirical solutions for
solving these problems. For example, some of interview respondents suggested using
small open space offices to keep the balance of open communication and maintaining
certain privacy; others also proposed to use small phone rooms for conversations,
headphones for minimizing distractions and so on. All these are good methods to
overcome the biggest disadvantage of open space office and minimize noise.

Moreover, it may also inspire managers to reevaluate the importance of layout design
and invest more resource to improve the design. Firms investing in project organizations
often do so in order to be more flexible, adaptable and customer-oriented (Lindkvist.L,
2008). To be more specific, PBOs, especially those who produce high-technology, high
cost and made up of many interconnected, often customized or personalized products or
solutions, should pay attention to their workspace management to better utilize human
resources in a flexible and creative way. In addition, good experience has no barriers, so
it is not only valuable for PBOs, but also for other organizations which also hope to
optimize their office physical layout.
6.3 Limitations

However, we also confess some limitations. In the first place, most of the information collected from observations and interviews was interviewees’ subjective feelings and opinions, and personal experience. It is beneficial to know others’ perspectives and experience; however, without supports of some exact figures, it is not safe to draw any conclusion or attributed any results to some causes. For example, although Mr. Håkan Johnsson and Mr. Lars Karlsson offered some useful data about the comparisons between Göteborgs Energi and Tekniska Verken, and these data showed that Tekniska Verken did offer better quality and value compared with Göteborgs Energi in 2010 to 2011, it was still too perfunctory to say the conclusion that open space office was the cause without further information. Other reasons such as better employees, higher compensations, close market, new policy, and special year are all possible to contribute good performances. Mr. Håkan Johnsson and Mr. Lars Karlsson themselves also admitted that it was hard to exactly say office physical layout was the only reason. They only stated that it was their and other employees’ feeling.

In the second place, even though today the increasing different types of communication ways are greatly aided via the Internet, telephones and other information systems, this paper mainly focuses on traditional face-to-face communication and interaction rather than virtual communication, because it believes that office physical layout plays little influence on virtual communication and virtual communication, without denying this great significance, still cannot replace face-to-face communication. In this case, the paper did not touch the relationship between office physical layout and virtual communications. However, it possibly be quite interesting to explore more on how new communication ways will affect office physical layout.

Additionally, with the limited time and resources, one country, four companies and 11
interviewees are not sufficient and representative for a bigger picture of office physical layout. This might also cause a narrow conclusion. What is worse, Tekniska Verken is the only non-PBO for doing the comparison with PBOs, and the collected information from only three interviewees cannot represent all non-PBOs. In the theoretical part, the paper mentioned two tools—organizational structure and physical space for facilitating communication and promoting innovation; however, except PBOs, there are still different types of organizational structure such as functional structure and matrix structure. According to Clark & Wheelright (1992), even project teams can be divided into functional team structure, lightweight team structure, heavyweight team structure and autonomous team structure. In this case, whether office physical layout in these organizational structures differs is still a question that this paper does not answer.

Last but not least, as said in the introduction chapter, the paper is only based in a managerial perspective. The reason is that the managers of the organizations selected by us are normally working with subordinates from different projects; therefore they know the general situation about the impact of workspace on employees and they can help us to grasp the essence of how office physical layout influencing employees’ communication. Nevertheless, it would be better to listen to basic employees’ opinion to acquire a more sufficient evidence to verify the reliability of the managers’ response. The final result might have some variations if we enlarge our research scope which can include both manager group and basic employee group. Under this situation, it causes another limitation of missing other perspectives. For example, it is common that employees’ perspective can be quite different with managerial perspective.

6.4 Chapter Conclusion

This chapter mainly focuses on the contributions and limitations of this thesis. It
objectively states about the contributions from theoretical and empirical perspectives, and meanwhile it also honestly describes three limitations of the research. By reflecting these, the conclusion will be presented and some suggestions for the future will also be listed in the last chapter.
7 Conclusions

7.1 Chapter Introduction

This is the final chapter of the whole paper. The main purpose of this chapter is for summarizing all significant information mentioned in previous chapters and drawing the conclusions of the whole paper. During this chapter, further suggestions and future perspectives will also be provided.

7.2 Summarization

In this paper, we committed ourselves to studying the effect brought by office physical layout to communication and innovation in PBOs which are the most dynamic organizational form in today’s world economy. In fact, communication is one of the most frequent activities in organizations and managers spend 60% to 80% of their working time on communication (Luthans and Larsen, 1986). Especially in PBOs, communication plays an extremely crucial role for creativity, innovation, knowledge exploration and exploitation, and finally achieving their competitive advantages. Many scholars have already claimed that office physical layout has impact on employees’ face to face communication and proofs have been given to support their views. Through empirical study and interviews with eleven respondents, we generalize our research findings by answering the research questions posted at the beginning of our studying.

In order to answer the research question of how does office physical layout affect employees’ communication which spurs innovation and creativity in PBOs, we find out that office physical layout influences employees’ communication and innovation
through many ways after a series of interviews with the 11 managers or CEOs from four companies.

Firstly, open space is a most commonly used office design in PBOs and it facilitates employees’ work in different aspects.

- **Problem solving and working efficiency**
  In open space, employees have great opportunity to interact with others directly. Through our interviews, we found that workers in PBOs were arranged to sit next to the people who involved in same project or sit closely to other relative project managers, in order to fastly communicate and share knowledge or experience. This arrangement is easy to create a problem collectively solving environment and encourage brainstormings, for employees often overhear other’s conversations which might give solutions and advices to their own problem or employees can also overhear other people’s discussions which might be the problems they have already solved so they can borrow and share experience to save a lot of precious time.

- **Knowledge sharing**
  Some projects can be very complicated; thus, knowledge sharing is required within PBOs. In open space offices, employees can share their knowledge with others efficiently. Moreover, tacit knowledge is hard to tell by virtual communication, such as webcam, telephone, email and so forth, but open space office offers employees a platform or ‘ba’ where people can talk face to face with each other within a very short distance and get an answer as soon as possible.

- **Creativity and Innovation**
  As we Chinese often says, ‘many hands make light work’ or ‘strength in numbers’. Communication and creativity go together, and they both depend on intrinsic and
extrinsic factors (Amabile, 1996). Open space office provides workers a good extrinsic atmosphere for creativity and innovation by communicating in a common office environment. Within this common platform, brainstorm is promoted and many great ideas emerged through frequent communications.

However, open space office has also undeniable weaknesses. The biggest problem with open space office is noise which makes knowledge workers easily distracted and disrupted. This can seriously influences workers’ working performance. Under this situation, many organizations choose enclosed private office rooms. In these quiet individual rooms, workers can easily focus on their work with less noise and distractions, but they also become a barrier for convenient and direct communication. What is worse, precious office space is wasted by this office design. Through interviews, more discoveries are found. For example, the preference towards open space office or private office room is related with workers’ work type, personality, age and some other factors such as culture. To be more specific:

- Private office rooms are better for documentary work which consumes time for reading, writing, reflecting and independent thinking while open space offices are more suitable for project and group work which needs cooperations and coordinations to solve complicated problems.

- In PBOs, most of the respondents agree that project manager or team leader should stay in open space office with their team, so they can better understand about the whole project situation and better control about the whole process. However, most of the respondents from non-PBOs hold the view that managers should have their own office rooms because managers have more confidential information, more frequent meetings and phones. Private individual rooms offer these managers and
top managers a quiet and particular environment that they can freely arrange their time schedule without disturbing others or being disturbed by others.

- The adoption of open space office or enclosed office also depends on the economic consideration. Through our interviews, most interviewees claimed that companies need to accommodate more and more employees by restructuring private workspace into open space offices as the cost for building open space is much cheaper than renting a new one.

- Some people pointed out that old aged employees favored private office room more than open space office because they were near retired age so they did not want to focus on their career anymore and individual enclosed office was easier for doing private things.

- Culture is another disputing factor of influencing the preference towards open space office or private office. If a company holds a company culture of encouraging communication and teamwork such as Ericsson, there will be no double that open space office is more befitting for their culture. Furthermore, it is hard to accept change to open space office for a person who has spent a long time and has got used of being in an individual office room.

Secondly, office facilities influence employees’ communication and innovation as well. These office facilities include coffee area, rest rooms, cafeterias, copy rooms, dressing room, available small tables and chairs, small conference rooms and so forth. They increase impromptu communication opportunities among employees, by which information is disseminated and many new ideas generate.

Other office facilities such as illumination and ventilation systems, adjustable office
tables and chairs, computer screen glasses, special keyboards, headphones and other ergonomic consideration office facilities all play a crucial role on employees’ work performance and working efficiency. What is more, they are also vital for employees’ physical fitness. Today, an increasing number of companies are paying attention to employee care to either show a company’s care for employees and win high reputation or save the high costs and losses of paying for employees’ illnesses and absences, and keep a good company operation.

7.3 Suggestions and Future Perspectives

Finally, we provide some suggestions and future perspectives for the paper.

- **Balance of office physical layout cost and working efficiency in PBOs**

Through interviews and the collection of empirical information, especially from Mr. Håkan Johnsson and Mr. Lars Karlsson’s comparison of office cost and office size between Göteborgs Energi and Tekniska Verken, private individual offices are more costly than open space offices and a lot of precious of office space is wasted by privated office rooms. Under this situation, is it means that private office rooms should be restructured into large open space offices for the economic consideration? The answer is obviously ‘no’. Open space office has a biggest disadvantage—noise that cannot be ignored. Even though large open space offices save a lot of office space and money, the nosie and other open office problems will definitely reduce working efficiency. Therefore, some respondents proposed to use small open space office to balance the both advantages and disadvantages of open space office. We think it is a good suggestion for PBOs and it helps some organisations avoid only focusing on one side.
Balance of individual concentration and teamwork/Balance of maintaining privacy and offering platform for communication and interaction

With no doubt, workers will be more easily focusing on their independent jobs in private office rooms for reading, writing, thinking and reflecting. However, independent work for knowledge workers especially in PBOs is not enough and they usually need brainstormings, group discussions, or sometimes working together to solve a problem or finish a project on time, so either always staying in private office rooms or full time working in open space office is good for balancing individual concentration and teamwork. Using small open space might also be a way to keep this balance. Besides, it is also beneficial to learn from the company Combitech, mentioned in the empirical study part. The project team has its meetings in conference rooms every day and project members spend the rest of time working alone in their private offices. Additionally, it is also important to protect employees’ privacy for open space office might lack the barriers of privacy protection.

Improving office facilities

Some office facilities promote communication and interaction; others provide a good working environment for employees. What is more, the quality of them largely decides employees’ working conditions and their physical fitness. Therefore, it is extremely important to reconfigure some improper facilities at the first time when people discover some problems. In addition, a good control of the office temperature, illumination, ventilation, air quality is also vital for companies.

Considering multiple functions of office physical design

Moreover, office physical layout design should also consider its multiple functions such as aesthetic, instrumental, symbolic functions. As Henn (2007) states, architecture does not only have an aesthetic discipline and simply divide the spaces where we live, work and doing other activities, but also plays a role on influencing how
we live, work, and doing activities in those spaces.

Today, people are advocating green office buildings or sustainable office buildings which are known as high efficient buildings that are not only environmental friendly, but also productive. There is a growing evidence of utilizing these offices to reduce a company’s running costs, encourage communication and innovation, increase employees’ physical fitness, and improve work performance and working efficiency.

Although we achieved something meaningful for workspace design of both PBOs and non-PBOs, the limitations mentioned in previous chapter called for an improvement of some details, which requires more convincible evidences and other future scholars’ deeper exploration. On end this paper, we hope you have found it enjoyable and useful for the further study about the organisational physical layout design.
References:


Festinger, L. S., Schacter, S. & Back, K., (1950), Social pressures in informal groups. Stanford, Cal.: Stanford University Press,


- Grant, R. M., (2010), Contemporary Strategy Analysis (7ed.). Chichester: John Wiley & Sons Ltd.


- Kampschroer, K. Heerwagen, J. & Powell, K., (2007), Creating and testing


• Strati, A., (1990), Aesthetics and organizational skill, in B.A. Turner (ed) Organizational symbolism. 207-222.

• Sunday Time (2006), The 100 best companies to work for, Sunday Times, Special Supplement, 5 March.


Conversation, London: Lawrence Erlbaum Associates Ltd.


Appendix: Interview Questions

Interview questions for them are classified. First of all are the introductory questions which are mainly open questions and free talking of the general information about the companies or the thesis’s main topic for stimulating their spontaneous descriptions and sending us some important information from their personal opinions and experience. The introductory questions are listed as follows:

- Would you mind first briefly introduce yourself and your company?
- Generally speaking, how much do you know about office physical layout, both in theoretical and empirical aspects?
- How about your company’s office physical layout?
- When designing your offices layout, what you think is the main consideration for your company?
- Is office physical layout important for your daily work?

Secondly, some follow-up questions are offered to extend the topic and explore much deeper and relevant information. These follow-up questions will be more direct questions related to the research questions. Such follow-up questions are the listed as follows:

- Do you think communication is important for your company and why?
- Do you think innovation is a key for your company’s success?
- How do you think about the office physical layout will influence your employees’ daily work?
- Do you think office physical layout has great impact on project workers’ communication and innovation; if yes, in which ways does the office physical layout affect project workers’ communication and innovation?
Thirdly, more specified questions are asked, which include more examples and experience to get more precise descriptions. During the interview, some significant or repeated words will be a good chance to continue and go further about the topic, for instance,

- Can you give us an example about how office physical layout encourages communication, knowledge exploration and knowledge exploitation, and stimulate innovation for project groups in your company?
- Do you have any experience of generating good ideas by impromptu meetings and conversations?
- Do you think face-to-face communication is the most efficient way for knowledge sharing and knowledge creation?
- Which office would you prefer, open space office or enclosed and separated office? And why you prefer it?
- Have you ever noticed that the physical layout of office facilities such as illuminations, tables and chairs have ergonomic impact on employees’ physical fitness and working efficiency?

Last but not the least, some personal attitudes and future considerations are involved and the questions are as follows:

- Do you like or satisfy with your company’s office physical layout?
- Have you ever considered about to change your current office physical layout and how to change it; if possible, why do you want to change it?
- Do you know is there anyone who dislikes your company’s physical layout?
- Why do they dislike it?
- Do you know any one leave the company because of the bad office physical layout?
- Do you have anything else to mention?
Figure 1: the office physical structure in Twingly

Figure 2: the office physical structure in Ericsson Linköping
Figure 3: the office physical structure in Ericsson Linköping

Figure 4: the office physical structure in Ericsson Linköping