Knowledge transfer and global R&D operations within MNC

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Knowledge transfer and global R&D operations within MNC

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ABSTRACT

With the development of globalization, increasingly more companies began to use worldwide resources to do product or service research and development. Multinational corporations (MNC) became to more rely on their subunits that located in different countries to conduct innovations. As a result, keep a good knowledge transfer between headquarter and subunits or among peer subunits is crucial for MNC to operate R & D activities. This study explores the relationship between knowledge transfer and R & D operations through two knowledge transfer mechanisms and three categories of R & D configurations.

By applying the qualitative strategy with a focus on four case companies (three are from Sweden, one is from China), we conduct a cross case analysis and the result shows that both expatriate management policy and communication frequency are very important knowledge transfer mechanisms for MNC to keep a good knowledge transfer in global R & D operations. In terms of expatriate management policy, it is very important for MNC sending engineers from headquarter to subunits or between peer subunits in order to transfer technology knowledge and facilitate R & D operations. Moreover, send top managers from headquarter to subunits could also help transfer process knowledge and keep overall control of subunits. In terms of communication frequency, if MNC employs a concentrated development in headquarter (or R & D center), it is very important to maintain a frequent communication between headquarter and subunits so as to keep a smooth knowledge transfer between them. And if MNC applies a dispersed research and development configuration, keep a frequent communication between peer subunits is crucial. In addition, this study also found certain connections between innovation process and R & D configurations.

Keywords: Knowledge transfer mechanism, R & D configuration, MNC
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1. Introduction

“The ability of multinational corporations (MNCs) to leverage their innovation competencies across globally dispersed subunits is an increasingly valuable source of competitive advantage (Ram, Susan & Pietro, 2007).” With the development of the globalization, many companies began to use worldwide resources to do product & service research and development. Moreover, multinational corporations became to rely on their subunits which are located in different countries. “This evolutionary process embodies increasing dispersion of resources within the multinational network (Ivo Zander, 2002).”

During the past 20 years, there has been a great interest among scholars in the importance of knowledge management in the organization and particularly in multinational corporation (MNC) (e.g. Eisenhardt & Santos, 2002; Ghoshal & Bartlett, 1988; Gupta & Govindarajan, 2000; Schulz 2001, 2003; Szulanski, 1996; Zander & Kogut, 1995). Recently, in the international business literature, MNC has been conceptualized as world wide networks of knowledge acquisition, transfer and integration across countries. The ability of transferring knowledge internally across borders is considered to be an important source of competitive advantage for MNC (Gupta & Govindarajan, 2000). This competitive advantage of MNC lies in their abilities to exploit locally created knowledge worldwide, and in their capabilities to transfer knowledge within organizational networks (Birkinshaw et al., 1998; Kogut & Zander, 1993; Schlegelmilch & Chini, 2003).

In addition, recently, the topic of varying subunit roles particularly with respect to R & D has attracted many researchers’ attention (Bartlett & Ghoshal, 1989; Kogut & Chang, 1991). Multinational corporations want to use the worldwide R & D capabilities to achieve competitive advantage. In order to fulfill this objective, they establish international R & D department worldwide. However, when MNC build many R & D organizations in different countries, they begin to face the problem how to control the different global R & D centers to get better use of their internal innovation network. In an important classification, Kuemmerle (1997) points out that, sometimes, subunit R & D is needed to adapt existing products to local needs. The subunit R & D orientation can be expected to have an impact on the relative importance of knowledge sources in the MNC network and the host country network.

Although there are a large number of scholars focusing on the knowledge transfer and R & D operations within MNC separately, only a few studies can be found that illustrate the interaction between these two subjects. In the few previous articles some lines of research could be found. For example, Schlegelmilch and Chini (2003) study knowledge transfer between marketing departments which is briefly connected to R & D. They conclude that knowledge transfer is likely to be affected by organizational and cultural distance. Bresman et al. (2010) found that communication, visits and meetings affect knowledge transfer in the context of acquisition. They do, however,
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not have a focus on R & D. In order to complement this theory gap, in this article we are going to explore the relationship deeply between knowledge transfer and R & D operations based on the previous knowledge towards this topic. According to Bartlett and Ghoshal (1989), Pedersen, Petersen and Sharma (2003), Miao, Choe and Song (2010), knowledge transfer mechanism within MNC is considered to be one of the major dimensions that influences the knowledge sharing with the parent and peer subunits. Expatriate management policy (Gupta & Govindarajan, 2000; Björkman et al., 2004) and communication frequency (Ghoshal & Bartlett, 1988; Ghoshal et al., 1994) are important knowledge transfer mechanisms that facilitate knowledge transfer within MNC. In addition, from the perspective of R & D, Li and Yue (2005) indicate four categories of R & D configuration: concentrated research and development, dispersed research and concentrated development, concentrated research and dispersed development, dispersed research and development. These different configurations directly influence the research and development activities and R & D transfer mechanism between headquarter and subunits.

The purpose of this research is to find out the relationship between knowledge transfer and R & D operations through two knowledge transfer mechanisms and three categories of R & D configurations. And the two main knowledge transfer mechanisms within MNC will be analyzed within the three categories of R & D configuration to see how these knowledge transfer mechanisms are configured in order to support knowledge transfer in global R & D operations within MNC. Based on this, we formulated our research question:

*How shall knowledge transfer mechanisms be configured in order to support knowledge transfer in global R&D operations within MNC?*
2. Literature review

2.1 Multinational Corporation and Network

In previous research, Multinational companies (or corporation) (MNC) have been analyzed from many different theoretical perspectives such as hierarchies, inter-organizational networks or internal markets (Perlmutter, 1969; Hedlund, 1986; Birkinshaw & Fey, 2000). According to Ghoshal and Bartlett (1990) “A multinational corporation consists of a group of geographically dispersed and goal-disparate organizations that include its headquarters and the different national subunits. Such an entity can be conceptualized as an inter-organizational network that is embedded in an external network consisting of all other organizations such as customers, suppliers, regulators, and so on.” During 20 years’ development of this theory, many scholars have improved and formulated their own conception of MNC. While there still cannot be a definitive or universally agreed upon definition of MNC. In order to find out the relationship between headquarters and subunits within MNC, we chose a network perspective to better understand the concept of MNC. In this paper, we are not going to focus on the external network of MNC. Instead of that, we will explore the network and interaction between subunits and headquarters to see how the process of knowledge transfer influences R & D disread between subunits and headquarters or among subunits.

From network view of MNC, it is a collection of differentiated units operating in different parts of the world, using various organizational modes (Ghoshal & Nohria, 1989; Marcati, 1989; Ghoshal & Bartlett, 1990; Andersson & Forsgren, 2000). Differentiation across units of the network allows the MNC to achieve the goals of efficiency, local responsiveness and innovation (Bartlett & Ghoshal, 1989). Forsgren et al. (2005) also conceptualized MNC as a differentiated network of headquarter and subunits connected by relationships or linkages. Subunits can develop their own external networks of customers and suppliers. These networks provide knowledge, resources, and power to subunits, and can become important contributors to overall corporation competence development. Meanwhile, the internal network also can facilitate learning through problem solving among subunits and encourage knowledge transfer between similar subunits. Moreover, the relationship between different subunits is both cooperative and competitive, which has increased the scope for intra-firm coalition building and bargaining. And the roles of subunits in terms of knowledge, action, and position of authority will vary over time and circumstance (Hedlund, 1993).

2.2 Knowledge transfer in MNC

In this chapter previous literature concerning knowledge, knowledge transfer, knowledge transfer within MNC and knowledge transfer mechanism will be reviewed. In the part of knowledge transfer mechanism, we figured out two main mechanisms
that facilitate the process of knowledge transfer within MNC, which are expatriate management policy and communication frequency.

### 2.2.1 Knowledge and knowledge transfer

Knowledge is defined as a dynamic human process of justifying personal beliefs as part of aspiration for the truth (Nonaka, 1994; von Krogh & Grand, 2000). When make a distinction between data, information and knowledge, then knowledge is a mix of framed experience, important values, contextual information, and expert insights (Nonaka, 1994). Knowledge, especially tacit knowledge, is considered as the most unique and inimitable resource that creates a firm’s sustained competitive advantage (Birkinshaw, 2001; Grant, 1996; Mahoney and Pandian, 1992; Spender, 1996). Knowledge cannot be copied well by other firms, like the other resources and capabilities that generate sustained competitive advantage. Because of this characteristic of knowledge, companies that possess specific tacit knowledge can achieve sustained competitive advantage by preventing external competitors from copying the knowledge easily (Barney, 1991).

According to Lee and Wu (2010), knowledge can be transferred in either or both of the following directions: from headquarter to subunit; from subunit to headquarter, and successful knowledge transfer results in the receiving unit accumulating or assimilating new knowledge. Szulanski (1996) points that knowledge transfer is a process of dyadic exchanges of knowledge between the source and recipient units consisting of four stages: initiation, implementation, ramp-up and integration. While the first two stages comprise all events that lead to the decision to transfer and the actual flow of knowledge from the source to the recipient, the latter two stages begin when the recipient starts utilizing the transferred knowledge. From this point of view, if the recipient does not use the new knowledge, the pure transmission of knowledge from the source to the recipient has no useful value. The underlying (original) knowledge is not the key element in knowledge transfer. To what extent the receiver acquires potentially useful knowledge and utilizes this knowledge in own operations are the most important elements of knowledge transfer. Knowledge transfer may lead to some change in the recipient’s behavior or the development of some new idea that leads to new behavior (Davenport & Prusak, 1998).

### 2.2.2 Knowledge transfer mechanisms

Knowledge transfer mechanism within MNC is considered to be one of the major dimensions that influences the knowledge sharing between headquarter and peer subunits (Pedersen, Petersen & Sharma, 2003). Subunits may have accumulated a large amount of useful knowledge for headquarter and other subunits. However, due to the poor communication and lack of incentives, knowledge could not be transferred and utilized efficiently within MNC. In order to improve this, effective knowledge
transfer mechanisms should be introduced to facilitate the process of knowledge transfer among headquarter and subunits (Gupta & Govindarajan, 2000; Björkman et al., 2004; Miao, Choe & Song, 2010).

Go through the previous theory, many researchers have written about knowledge transfer mechanism. For instance, Gupta and Govindarajan (2000) argue that formal integrative mechanisms and corporate socialization mechanisms are very important to facilitate knowledge flow between headquarter and subunits. Björkman et al. (2004) promote three more mechanisms which are the use of expatiate subunit managers, specification of performance evaluation criterion and subunit management compensation. When we go through these mechanisms we found that both performance evaluation and compensation are mechanisms that used after the process of knowledge transfer. While, expatriate management policy and communication frequency are mechanisms that conduct during knowledge transfer process. Since in this paper we are going to analyze the mechanisms more deeply during the process of knowledge transfer, that’s why we choose to focus on expatriate management policy and communication frequency and examine their performance during knowledge transfer process.

Another reason for choosing these two mechanisms is that we consider they are the basic effective transfer mechanisms that can facilitate the transfer and utilization of knowledge between headquarter and subunits. Firstly, expatriates have been extensively studied in the MNC literature during the past years (e.g., Edström & Galbraith, 1977; Boyacigiller, 1990). And expatriates are considered to have much stronger and longer-tenured social ties that connect the managers at headquarters and in other MNC units (Gupta & Govindarajan, 2000). Secondly, communication is considered to be a basic and crucial tool that used to facilitate direct contact between managers in different subunits so as to encourage knowledge transfer (Bartlett & Ghoshal, 1990).

**Expatriate management policy**

Expatriating managers to the foreign subunits is a very important factor that facilitates knowledge transfer within MNC (Gupta & Govindarajan, 2000; Björkman et al, 2004). Expatriate managers can share their work experience and culture with headquarter managers and other workers from the home company, which could help form informal communication networks within the MNC organization (Bartlett & Ghoshal, 1990; Scullion, 1994). In addition, during the process of sharing business experience and culture, the absorptive capacities of all parties can be enhanced in terms of inter-unit knowledge transfer in MNCs (Gupta & Govindarajan, 2000). From the motivation perspective, expatriate managers are more concerned with the performance of the entire MNC organization than locally hired managers do, which can also help knowledge transfer within MNC (Zeira, 1976).
Communication frequency

According to Ghoshal and Bartlett (1988), maintaining a frequent communication between subunit managers and headquarter managers is very important for the transfer of innovations from headquarter to its overseas subunits. Frequent contacts between managers from different subunits within MNC network can facilitate communication and inter-unit knowledge transfer (Ghoshal et al., 1994). Recent researches also show that social interactions served as knowledge channels can promote knowledge flows significantly (Monteiro et al., 2008; Noorderhaven & Harzing, 2009; Corredoira & Rosenkopf, 2010). In addition, frequent communication can not only increase the absolute quantity of knowledge and information being exchanged (Allen, 1977), but also help the recipient to receive continuous support from the knowledge provider (Nonaka & Takeuchi, 1995; Bartlett & Ghoshal, 1990). This support from the knowledge provider is crucial in the process of knowledge transfer, especially when the knowledge is difficult for the recipient to understand (Tushman, 1978; Szulanski, 1996).

2.3 MNC’s global R&D operations

Relying on the global R & D operations, multinational cooperation has a great advantage to handle knowledge transfer. However, the recent research has shown that it is very difficult to transfer knowledge across networks in terms of subunits and innovation partners (Lööf, 2008). Lööf (2008) also points out that “recent studies on MNEs and spillovers have shifted and focus from hierarchical links between headquarters and subunits to formal and non-formal arrangements with various partners linked together by complex organizations across regions and nations”. So the most important thing for MNC is to build the international coordination network to speed up the technology innovation and improve R & D efficiency.

2.3.1 Types of MNC’s global R & D operations

In order to achieve faster revenue growth, higher profits and increase shareholder value, MNC invest much money and time in global R & D. “According to a November 2006 Economist Intelligence Unit Survey, 65 of the top 300 global companies outsourced at least some of their R & D (Kar, Subramanian & Saran, 2009).” Nohria and Ghoshal (1997) found four typologies of innovations in terms of the communication patterns and innovations between headquarter and subunits. Local-for-local innovations emphasize on the communication within the subunits. Local-for-global innovations focus on the high-density communication both within and among subunits. Centre-for-global innovations put more efforts on the communication between headquarters and subunits. Global-for-global innovations require on the large scale communication: within subunits, among subunits, and between headquarters and subunits. From the recent research, the high level of inter R & D communications among subunits can make them more effective in creating
innovations.

2.3.2 The structure of MNC’s global R & D

“Traditionally, MNCs operated with a centralized R & D structure that facilitated the creation of new technology in the home country followed by subsequent technology dissemination to overseas operations” (Robin, Carl F & Julian, 2000). Behrman and Fischer (1980) showed four management styles in relation to foreign R & D: absolute centralization, participative centralization, supervised freedom, and total freedom. Many MNC usually take participative centralization and supervised freedom as the major management styles. However, now, MNC want to let the innovation and knowledge transfer disperse throughout the global operations which can help them to achieve competitive advantage. So the MNC use global R & D networks instead of traditional centralized R & D structure. What drives MNC to change the structure? Robin, Carl F and Julian (2000) give four reasons.

1. **Outbreak of knowledge.** MNC locate the R & D centers in different countries to absorb the new knowledge and make innovation by the help of the universities and competitors across the globe.

2. **Achieving of local competitive advantage.** In order to win the market share in the global market, MNC should have the ability to adapt to local needs. In this kind of situation, the centralized R & D cannot give the locally need solutions suitably and fulfill the local customers’ need.

3. **Reducing product life cycles.** As the market changing rapidly, MNC should make them more flexible to meet market new tendency and take actions. They need new global R & D network to make their new invents quickly commercialized through the global market.

4. **Diversity of skills and technologies required.** The goods and service’s context is increasing all the time. MNC have to use diversity of skills and technologies to meet the new requirement. Abundance of resources can be achieved through the global networks. These multiple requirements encourage MNC to reconstruct the global R & D’s contracture.

However, in the recently, it becomes more difficult to use R & D knowledge efficiently. “The complexity of the network and the differences in language and culture lead to significant challenge” (Robin, Carl F & Julian, 2000). MNC realize that the differences such as geographic, time and cultural make coordination among the global dispersed R & D labs arduously. Norhria and Ghoshal (1997) realized that MNC use a combination of formalization and socialization mechanism to cooperate and govern the activities of decentralized subunits. Persaud, Kumar Uma and Kuman Vinod (2002) illustrated that socialization leads to creation of informal social networks. These kinds of social network can create more frequently communication among different R & D centers which may let different R & D centers more likely to share information, expertise, and technology. Sometimes, this will make them
collaborate on joint projects. The positive social networks will generate strong ability to complete project faster, cheaper and more effective.

Moreover, Persaud, Kumar Uma and Kuman Vinod (2002) also found that technologically supported communication is not effective as MNCs expect. They explained that “since the collaboration among subunit labs involves mostly tacit knowledge as opposed to explicit knowledge, electronic media are not appropriate.”

In order to improve the innovative capabilities of MNC’s R & D organization, manager can play more important role. Persaud, Kumar Uma and Kuman Vinod (2002) suggested that MNC’s manager should build more informal network, allow dispersed R & D organization more freedom in decision-making and inspire more face-to-face communication.

Research and Development (R & D) is an ongoing process especially for MNC. The R & D structure should be constructed to let different R & D’s knowledge spread through the whole company. Li and Yue (2005) used two key dimensions to show the MNC’s international research and development: functional focus (either research oriented or development oriented) of R & D activities and geographic dispersion or concentration of R & D sites. Then they give four categories of R & D configuration in a host country: ① concentrated research and development, ② dispersed research and concentrated development, ③ concentrated research and dispersed development, ④ dispersed research and development.

Figure 1: Four categories of R & D configuration in a host country (Li and Yue, 2005)

In concentrated research and development configuration, both research and development are conducted in headquarter. However, subunits have no participations...
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during the whole process of R & D operations. The outcome of R & D will be dispersed from headquarter to subunits later. In dispersed research and concentrated development configuration, subunits conduct their research based on their local market and centralize their output to headquarter, which conducts the overall development. In concentrated research and dispersed development configuration, only research is conducted in headquarter; the development is dispersed to all of the subunits. In dispersed research and development configuration, the functions of research and development are decentralized in different subunits.

In order to connect the two knowledge transfer mechanisms with the four R & D configurations, we have a presumption as follows:

In terms of expatriate management policy, we consider this knowledge transfer mechanism is more suitable for the ① concentrated research and development and ③ concentrated research and dispersed development. Because in the concentrated research and development configuration, if the headquarter wants to disperse the outcome of R & D to the subunits, it will be significant to expatriate managers to different subunits to make sure that the R & D output will be absorbed by all of the subunits.

While in the concentrated research and dispersed development configuration, we consider expatriating managers to subunits is becoming much more crucial. Since the managers will not only take charge of spreading knowledge, but also need to develop the knowledge in the local environment or market. Under this circumstance, managers should be more qualified to know well both the headquarters research outcome and the local subunit’s business culture and legal systems in developing process.

In terms of communication frequency, we consider that all of these categories of R & D configuration are influenced positively by communication frequency. In the configuration of ① concentrated research and development, ② dispersed research and concentrated development and ③ concentrated research and dispersed development, the communication frequency is conducted mostly between headquarter and subunits. In the ④ dispersed research and development configuration, communication is not only conducted between headquarter and subunits, but also among peer subunits. If the communication is conducted frequently between different subunits, the research development will be better dispersed among subunits then centralized to headquarter. But if communication is not conducted well with MNC, then the whole R & D system will turn out to be worthless.
3. Methodology

3.1 Research approach

There are two main types of research approaches, inductive and deductive (Bryman & Bell, 2007). The inductive research approach is applied when the researchers start with data collection and aim to develop new theories based on the data they collected (Sauniders et al., 2007). While, the deductive research approach is applied when the researchers start with building a theoretical framework based on the previous theories, and then try to apply this theory to a specific instance (Hyde, 2000).

In this thesis, the research approach is more deductive, since deductive research is often connected with fields where theory is fairly developed, while inductive research is used in fields where theory is less mature. And both the fields of knowledge transfer and global operations offer a lot of earlier research. That’s why we choose a deductive approach and started our research by searching and reading previous literature concerning knowledge transfer in MNC, knowledge transfer mechanisms and global R & D operations. Since building a broad and solid literature review and having a full understanding of the theoretical considerations concerning the specific research field are very import at the beginning of conducting the deductive approach (Bryman & Bell, 2007). After the literature review, we build our theoretical framework and try to connect the knowledge transfer mechanisms with different categories of R & D configurations, to see how knowledge transfer is encouraged through different mechanisms in different R & D configurations.

3.2 Research strategy

There are two main research strategies quantitative and qualitative (Bryman & Bell, 2007). Quantitative research strategy emphasizes quantification in the data collection and analysis. By using quantitative research strategy, researchers should promote certain hypothesis at the beginning of research, and try to collect a large amount of statistic data in order to find support for hypothesis (ibid). While, qualitative research strategy is usually used to study social phenomena more deeply and to gain more understanding of a particular subject. In qualitative research, more detailed and specific data can be collected through observing, interviewing and the document.

In this thesis, we preferred qualitative strategy, since we are going to analyze how different knowledge transfer mechanisms influence knowledge transfer in different R & D configurations, and communication is one main knowledge transfer mechanism which cannot be captured through quantitative strategies since this mechanism contains human behaviors and social phenomena, and they can be better captured through qualitative strategy. Face-to-face interview is one of the qualitative research methods that will help researcher get fruitful qualitative data.
3.3 Research design

According to the research question and purpose of this study, case study is chosen as a main research design. Bryman and Bell (2007) argue that case-study design can be selected when the researcher is interested in understanding a specific case, and the case study is concerned with the complexity and particular nature of the case in question. Since we are going to find out how knowledge transfer mechanisms influence different R&D configurations, so we chose four case companies to explore the relationship between knowledge transfer mechanism and R&D configurations. When it comes to define the population and sample of this study, we followed Richardson's (1999) definition of population and sampling. One population is the amount of elements that possess some determined characteristics and the sample is any part of the population.

3.4 Data collection

Lewis, Saunders and Thornhill (2007) describe two sources of data collection: primary and secondary. Primary data is when researchers go out and collect data by themselves, which is time consuming but a reliable way of getting up to date data. Secondary data is that collected from already published literature and existent research. In this paper, we will use both of two methods.

Referring to the primary data, the interview is the main method to collect data method. The approach that we adopted in this paper is semi-structured interview. It is one of qualitative interview. The researchers have an interview guide, but they can apply it in a flexible way. Basically, all the questions on the list will be asked and similar words will be used (Bryman & Bell, 2007). According to Bryman and Bell (2007), in addition to preparing questions, the interviewer also should be open for the new questions during the interview. In this study, we conduct our interview in three steps, namely, preparation of an interview guide, formulation of questions, and conducting interviews. In this process, we revise our questions continually and identify novel issues. As Bryman and Bell (2007) saying, we focus on two problems: balance and ethically sensitive. Through the face-to-face interview, we collect the primary resources.

Referring to the secondary data, Lewis et al. (2007) point out that when collecting data it is imperative to find information relevant to the paper’s purpose. Therefore, we collect secondary data mainly through the company’s website, annual report and academic database. In order to have more information, we also used e-mail and telephone to have more information.

3.5 Data analysis

Referring to abundant resources, we adopt a triangulation methodology which is really effective for us to sorted resources and find the relationship among different
items. Based on our model, we had to figure out what kinds of R & D structure was used by the company. After we got the whole picture of four companies, we could classify which kinds of R & D structure was preferred by them. Different R & D configurations had been figured out in the end.

Diagram 1

We tried to sort them based on two major items: expatriate management policy and communication frequency. We focused on finding the two important relationships: headquarter and subunits, and peer subunits. Referring to the expatriate management policy and communication frequency, we illustrated each company’s strategy to deal with these two important relationships. Moreover, comparing with these four companies, the advantages and disadvantages of the different strategies came out which really helped us to get fully understanding of the different types of R & D.

Diagram 2
4. Empirical data

In this chapter, empirical findings towards four case companies: Tylöhelio, Albany, Getinge and Huawei will be presented. And their R & D configurations will be figured out as well.

4.1 Tylöhelio world group

Tylöhelio is one of the world leaders in the sanitary ware industry. Tylöhelio provides saunas, showers and steam bathing, both at home and in public facilities. Helo, once a direct Finish competitor of Tylö, was acquired by an investment group, AAC Capital. Tylö is the other Scandinavian key player in the sanitary ware industry. In 2010, AAC capital formed a powerful group made of two former competitors, which named Tylöhelio group. By 2010, Tylö has employed 130 people, among of which 87 persons are in production section, thus 67 percent of Tylö’s work force is allocated to production.

4.1.1 Organizational structure

Tylöhelio has two research centers. One (PCH) is located in Halmstad in Sweden and another one (PCR/H) is located in Riihimäkl and Hanko in Finland. PCH is responsible for the Tylö brand and PCR/H focuses on the Helo brand. Before Tylöhelio group is established, the two research centers will not influence each other and they have their own operation system. The two R & D centers will not cooperate with each other and share the information. After Tylöhelio group founded, the new company try to make the two R & D centers becomes one in order to reduce the cost and form the unified strategy to compete with the competitors.
4.1.2 R & D

Tylöhelo’s management team communicates better than the sublevel department. Indeed, meetings are organized between Tylö top managers in order to discuss changes evolution at least once a month. Tylö and Helo have top meetings to share information and cooperate with each other to deal with the problems. However, the two brands are independent and they have their own operation teams. Both of them have their own distributors and subunits. They invent the products to meet their own business partners’ requirement. They just share the same top management team.

The innovation of Tylöhelo is the distributor driving. The company depends on the distributors which play really important role of the company’s innovation. Every year, the company invites the major distributors to come to the company. The company organizes all the distributors to participate a meeting which is casually and freely. During the meeting, the distributors will give their special needs and show what have happened in their own countries and predict the tendency. Tylöhelo collect all the information and form a team to analysis all the statistics. After meeting, the R & D department will give an official report which includes industry conditions and different countries’ special requirement. Later, the R & D department begins to start the product innovation to meet different distributors’ requirement. After they deliver new products, most of the manufacture activities will be continued in the manufactories which are located in different subunits. During the process of
manufacturing or assembling, if there is some problem occurs, headquarter will send engineer to subunits to deal with the problem and make sure that the product is in good quality

Beyond the meeting, the R & D contact with the distributors quite often in order to grasp the marketing’s new tendency. When the distributors want some special products, R & D begins to innovate and provide that products. All the innovation process is organized by the two R & D departments. They do not want to build the R & D department in the others countries and they try to produce all the major products in Sweden and Finland. The centralized R & D structure helps the company to reduce the cost and improve the operational efficiency. Now the company tries to build one R & D centers. The one R & D department can have more resources and also can separate the two brands to avoid products’ convergence. One R & D center can share the information better and communicate easily. The obstacles of the knowledge transfer will become less and less.

4.1.3 R & D configuration

According to the data, Tylöhelo world group is a MNC that operates through 9 subunits, which sell through a network of distributors in 89 countries. Each company is independent with headquarter and has their own operational management, which in turn has responsibility for their own budget. Tylöhelo has two R & D centers. One is located in Halmstad in Sweden and the other is located in Riihimäkl and Hanko in Finland. Both the research and development activities are conducted in these two centers. However, these two R & D centers focus on different brands. The Halmstad center is focusing on Tylö brand and Finland center is focusing on Helo brand. After the merging of these two brands, communication is encouraged between these two R & D centers. However, they still keep the focus on their own brand development when conduct the innovation. Based on this data, we consider Tylöhelo’s R & D configuration is more in line with the concentrated research and development configuration (Figure3), in which these two R & D centers are regarded as one centralized R & D for the whole brand Tylöhelo.

Figure3: Concentrated research and development
4.2 Albany

Albany International is a global company of advanced textiles and materials processing company. Albany is the world’s leading producer of custom-designed fabrics and belts essential to the production of paper and paperboard. Now the company extends its advanced textiles and materials capabilities into a variety of other industries: most notably aerospace, composites, nonwovens, building products, high-performance insulation and yarn (Albany, 2012).

4.2.1 R & D

Albany has three R & D centers: Sweden, France and USA. The Halmstad research center is the biggest one. Albany still has several manufacture factories: Korea, China, Germany, UK, France, USA, Sweden, Canada, Brazil and Mexico. January 2012, it sold the Albany door system company. Now, the company focuses on the paper industry.

Every quarter, all the R & D centers should send reports to headquarter which include the new technology and the new area to innovate. Headquarter begins to evaluate all the reports in order to avoid the inner competition. Now Albany tries to give the three different R & D centers into different functions which are better to use different resources. The paper industry is a complex industry so Albany tries to differentiate the different manufacture companies to let them produce the different parts of the paper machine. The company just sends the different parts of the machine to the customer and installs in the customer’s factory.

In Albany, they build project team to connect three R & D center together. Engineers from different R & D centers can build a project team, and different project team will focus on the innovation of different part of paper machine. Every second week, three R & D centers will hold a meeting through the telecommunication system. Every week, Mikael Danielsson (the director of the R & D, Headquarter) also has a meeting which includes the marketing department and selling department. The different department begins to discuss the problems and new tendency of the industry. After that, Mikael begins to hold a meeting for his project team which involves different R & D centers in order to let them to know all the information and try to deal with problems. When Albany has new technology or new products, it sends the product engineer to let all the subunits to learn this new technology or new products. Albany affords the customized service which plays the major role of the company. If one customer has special requirement, the local company will send the requirement to headquarter. Mikael will organize a meeting for the three R & D centers and try to make a solution. When the requirement is approved, local product engineers from different subunits will be gathered in one R & D center and have a training education. After the training, engineers will be sent back to the local company to implement the
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new technology and sometimes make a development. The three R & D centers can discuss and deal with problem among themselves without headquarter. Each R & D centers can make their own innovation and develop the products. Among the different R & D centers, they have frequently informal contact which is really good for them to share the information and cooperate each other. Albany also takes cooperation R & D. Now, they have the partnership with the Stora Enso which is also a leader in the paper industry. They will share the center information and use each other’s advantage to make innovation or develop products. The company really appreciates the frequently communication which can make the different subunits understand each other better and reduce the innovation time.

4.2.2 R & D configuration

According to the empirical data, Albany has manufacturing facilities in 11 countries globally, and it has three R & D centers, which are located in Sweden, France and USA. All three R & D centers are independent with headquarter. While they maintain a communication with headquarter mainly through the quarter report. Both research and development are conducted in the R & D centers. Although the three R & D centers are independent with each other, they still maintain a good cooperation through the building of different project teams. Within the project team, engineers from different R & D centers always work together and develop new technology. Based on this data, we consider Albany’s R & D configuration is more in line with the dispersed research and development configuration (Figure4). However, there is still one difference between Albany and this R & D configuration. Albany doesn’t have a research or development center in headquarter, the responsibility of headquarter is to keep the overall control of all subunits and make final decision.

![Figure4: Dispersed research and development](image-url)
4.3 Getinge

Getinge Infection Control (GETINGE) is belonged to GETINGE AB. The Getinge Infection Control business area has two divisions: healthcare and life Sciences, which work together with the other two business areas, Extended Care (ARJOHUNTLEIGH) and Medical Systems (MAQUET). The entire GETINGE group of companies research on state-of-the-art medical technology (Getinge, 2012).

![Getinge group structure](http://www.getingegroup.com/en/About-Getinge-Group-name/Organization/)

Worldwide, Getinge Infection Control ranks among the leading providers of disinfectors and sterilizers within the healthcare and life sciences segments. Getinge Infection Control is founded more than 100 years and still keeps going on innovation and technological progress in the field of disinfection and sterilization. Getinge Infection Control has three customer segments: Healthcare, Pharmaceutical/Medical device, Research. From 2004 to 2009, the Getinge Infection Control develops fast through the merger and acquisition and forms the Getinge AB.

4.3.1 R & D

Getinge has 7 research centers: 3 in Sweden, 2 in France, 1 in USA and 1 in China. The France Company has several subunits which are just the sales office. Getinge is growing very fast through the acquisitions. The decentralized culture is rooted the whole company. Headquarter try to avoid interfere and reduce the influence. The main strategy is to lower the centralization and increase the indecency. Each subunit has its own operation system which can provide the products for the local market.

December 2011, Getinge just hold the first the global meeting for the whole company and shared the information. Every year, Getinge will hold global meetings 4 times. This kind of meeting tries to let all the subunits to know the whole company’s status.
and what the peer subunits are doing now. In order to avoid the internal competition, when the different subunits have the similar products or make the similar innovation, this meeting will let them know and stop the internal competition. The research center makes the knowledge and technology innovation and also can develop the technology become the real products. Relying on the telecommunication system, the headquarter can communicate with the subunits through the presentation and sending e-mail. They try to understand each other better. However, they still make everything local.

Headquarter knows that they lack of network and communication between headquarter and different subunits. Although headquarter believes that the good communication can make the subunits learn from each other and cooperate with each other, however, the Getinge AB does not have any communication mechanism to facilitate communication between subunits. Getinge AB just sends the top managers who are from the headquarters to the different subunits to know the subunits’ status and their requirement. This kind of manager can be seen as a controller who supports headquarter to govern all the subunits. Headquarter said that it was difficult to create polices and mechanisms to let the subunits cooperate or even communicate with each other, because of the language, culture and distance.

4.3.2 R & D configuration

According to the data, there are seven R & D centers in Getinge. Three centers are located in Sweden, two in France, one in USA and one in China. Since Getinge grows up quickly mainly through its acquisition strategy all over the world, the company has a typical decentralized culture and R & D is decentralized in the subunits. In this case, the headquarter tries to avoid interfere and reduce the influence on the oversea subunits and let them make innovation and develop new technology by themselves. So that all of the research centers are independent with headquarter. And each of the research centers is independent with each other and focusing on one special field to make innovation. Based on this data, we classify Getinge as the dispersed research and development configuration. But Getinge is not the perfect model that showed in figure4. Since in Getinge, both research and development are conducted in R & D centers, and there is no cooperation between different R & D centers. So, we made certain modification of the picture to fit Getinge’s R & D configuration (Figure6).

![Figure6: R & D configuration in Getinge](image)
4.4 Huawei

Huawei is a Chinese multinational which focuses on the networking and telecommunications equipment and IT services. Huawei is the second largest ICT solutions company in the world (after Ericsson). Huawei’s core activities are building telecommunications networks; providing operational solutions and consulting services and products to the companies; producing communications devices (according to http://en.wikipedia.org/wiki/Huawei).

![Huawei group structure](image)

Figure 7: Huawei group structure (according to Huawei annual report 2011)

In 2011, Huawei recorded revenues of CNY 203.9 billion and net profits have over CNY 11.6 billion (Huawei annual report 2011). Just in 2011, Huawei employ nearly 30,000 additional employees. In order to cope with the international competition, Huawei changes the family straight-line management system. Huawei use the flexible matrix organizational structure which focuses on the dynamic management. This kind of structure is dynamic with the development of the new business growth, new products innovation or new market opportunities (Zhao, 2007). However, the change is temporary. When the short task is solved the structure retains to normal. The structure is stable but it also adjusts with the different situation. The flexible matrix organizational structure consists three items: static structure, a dynamic structure and an inverse help system. Now Huawei changed this model to adjust with the business divisions and regional divisions. They continue the process from the stable to adjustment and then back to stable. With the internationalization, Huawei make the organizational structure more international and localized.
4.4.1 R & D

Huawei has built 23 research centers in Germany, Sweden, the UK, France, Italy, Russia, India, China, and other countries. In order to have competitive advantage and own the advanced technologies, Huawei also has established 34 joint innovation centers in the world. Huawei has over 62,000 employees who just focus on the product and solution R&D, which occupy more than 44% of Huawei’s total employees in the worldwide (140,000 total employees). In 2011, Huawei invest more than CNY 23,696 million in R&D. Huawei’s basic strategy is to keep on investing no less than 10% of sales revenue in R&D and to use 10% of the total R&D investment on pre-research to go on studying and following new technologies and new field.

According to the World Intellectual Property Organization (WIPO), Huawei is ranked second in term soft patent applications under the WIPO International Patent Co-Operation Treaty (WIPO, 2010) (Foster and Reinsch, 2010).

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2010</th>
<th>YOY(%)</th>
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<tbody>
<tr>
<td>Research and development expenses</td>
<td>23,696</td>
<td>17,653</td>
<td>34.2%</td>
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<tr>
<td>as % of revenue</td>
<td>11.6%</td>
<td>9.7%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Selling, general and administrative expenses</td>
<td>33,770</td>
<td>31,439</td>
<td>7.4%</td>
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<tr>
<td>as % of revenue</td>
<td>16.6%</td>
<td>17.2%</td>
<td>-0.6%</td>
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<tr>
<td>Other operating expenses / (income)</td>
<td>400</td>
<td>585</td>
<td>-31.6%</td>
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<tr>
<td>as % of revenue</td>
<td>0.2%</td>
<td>0.3%</td>
<td>-0.1%</td>
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<tr>
<td>Total operating expenses and other income</td>
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<td>as % of revenue</td>
<td>28.4%</td>
<td>27.2%</td>
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</table>

According to the World Intellectual Property Organization (WIPO), Huawei is ranked second in term soft patent applications under the WIPO International Patent Co-Operation Treaty (WIPO, 2010) (Foster and Reinsch, 2010).
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<table>
<thead>
<tr>
<th>Overseas Patent Applications</th>
<th>10,978</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorized Patents</td>
<td>23,522</td>
</tr>
</tbody>
</table>

Table1: Number of patents (according to Huawei annual report 2011)

Huawei is the major partner in standards development in cloud computing. Huawei’s research centers do not engage in the business area which can be treated as the academic school. The headquarter send engineers to different research centers to learn the advanced technology and bring the new technology back to headquarter. However, these expatriate engineers just stay in 6 month or one year. Later, headquarter will send new engineers to research centers. In the subunit of Sweden, there are 150 employees which have more than 100 Chinese expatriate engineers. The other Swedish employees are really professional engineers who have more than 10 years’ experiences.

In order to promote the development of advanced technology, Huawei do not interfere research centers’ innovation. Each research center decides its innovation areas independently without considering the profits and the business. Each research center should send all the technology document to Chinese headquarter and headquarter put them into technology data base. The research center just does the research and do not do development. The headquarter make decisions that which technology should be developed. The Sweden research center really appreciates this kind of organization system. However, employees just focus on their research do not care about the company’s culture. This is really a problem for the Huawei’s international process.

Huawei expatriates engineers into the different research centers frequently which is really helpful for the company to master the advanced technology. However, it is not a good way to help the employees build strong and permanent relationship with each other. When the expatriate engineers come back to China the relationship is stopped. These expatriate engineers comes from the 15 different department of headquarter and they should send reports to their Chinese direct manager. The research center just teaches them and do not take responsibility for them.
4.4.2 R & D configuration

According to the data, Huawei has built 23 research centers in Germany, Sweden, the UK, France, Italy, Russia, India, China, and other countries. And headquarter is located in Shenzhen in China. All of the research centers are independent with headquarter. Moreover, different research centers also independent with each other. Each of the research centers is focusing on its own special field towards new technology. And there is neither intra-competition nor cooperation among different research centers. The research centers only take the responsibility of exploring new technology and early design of the product. All of the new technology achievements from research centers will be gathered in headquarter where final development is conducted. Based on this data, we consider Huawei is more in line with the dispersed research and concentrated development configuration (Figure 11)
5. Analysis

5.1 Expatriate management policy

Expatriating managers to the foreign subunits is a very important factor that facilitates knowledge transfer within MNC (Gupta & Govindarajan, 2000; Björkman et al, 2004). In this part, we will analyze this knowledge transfer mechanism from two directions. One is expatriate manager or engineer between headquarter and subunits, the other one is expatriate manager or engineer between peer subunits.

5.1.1 Expatriate manager/engineer between headquarter and subunits

When we explore the relationship and knowledge transfer mechanism between headquarter and subunits in these four case companies, we find that Tylöhelo and Huawei employ this knowledge transfer mechanism mainly through sending engineer between headquarter and subunits. However, Geinge and Albany employ this knowledge transfer mechanism mainly through expatriating top manager from headquarter to subunits.

According to the data, Tylöhelo is in the concentrated research and development configuration. All of the research and development activities are conducted in two research centers for two brands separately. In this case, the knowledge transfer between research department and development department is effective and efficient, since these two departments work very close with each other when they make product innovation. After they deliver new products, most of the manufacture activities will be continued in the manufactories which are located in different subunits. During the process of manufacturing or assembling, if there is some problem occurs, headquarter will send engineer to subunits to deal with the problem and make sure that the product is in good quality. Tylöhelo applies this expatriate management policy to help knowledge transfer between headquarter and subunits (R & D and manufactories). By doing this, knowledge is transferred to the recipient and finally utilized in the right way by recipients (Szulanski, 1996).

Another company that established the policy of sending engineers from headquarter to subunits is Huawei. However, this policy is employed differently with Tylöhelo. The expatriate engineers will come back to headquarter after they learnt the new technology and transfer it to headquarter, in this case, the knowledge transfer direction is from the subunits to headquarter not from headquarter to subunits. According to the data, Huawei is an R & D orientation company. And its basic strategy is to keep on investing no less than 10% of sales revenue in R & D and to use 10% of the total R & D investment on pre-research to go on studying and following new technologies and new field. Moreover, the company is in the dispersed research and concentrated development configuration, which shows Huawei has a
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decentralized research in its subunits and conduct a centralized development in the headquarter. In this case, keep a smooth and effective knowledge transfer from subunits to headquarter is crucial. Huawei cope with this mainly through the expatriate policy. The headquarter will send engineers to different research centers for 6 months or one year to learn the advanced technology and bring the new technology back to headquarter. During this period, expatriate engineers will send reports to their Chinese direct manager regularly in order to keep knowledge transfer from subunits to headquarter. According to the data collected in the subunit of Sweden, there are 150 employees in which more than 100 are the expatriate engineers from China. From this we can see the importance of expatriate engineer policy in Huawei. And this policy really contributes a lot to facilitate knowledge transfer between subunits and headquarter.

The other two companies Getinge and Albany also applied this knowledge transfer mechanism. However, they choose to send top managers from headquarter to subunits instead of engineer. In Getinge, they usually send the top managers who are from the headquarters to the different subunits to know the subunits’ status and their requirement. In Albany, they also have this kind of policy that certain top managers will travel around different subunits to get to know their working conditions. Although this kind of expatriate manager is more considered as a controller or supervisor who supports headquarter to govern all the subunits, they still take the responsibility of transferring knowledge or information between headquarter and subunits. Here the knowledge is seen as a mix of framed experience, important values, and contextual information (Nonaka, 1994). During their trip to overseas subunits, they can share their work experience and culture with subunit managers and other workers, which could help form informal communication networks within the MNC organization (Bartlett & Ghoshal, 1990; Scullion, 1994).

When we analyze the reason behind this result, we found that both Tylöholo and Huawei applied a concentrated development in headquarter. In this case, knowledge transfer towards new technology between headquarters and subunit is very important. That’s why these two companies choose engineer rather than top managers to take the responsibility of knowledge transfer. Since they consider engineers are more qualified to transfer technology knowledge and fix the technique problems during their expatriate period. However, in the other two companies Getinge and Albany, both of them have a decentralized R & D configuration. All of the research and development are conducted in the subunits. Headquarters just keep the overall control of all subunits, and does not take the responsibility of R & D. In this case, they do not need to transfer technology knowledge between headquarter and subunits. That’s why they choose top manager instead of engineer to transfer process knowledge between headquarter and subunits.
5.1.2 Expatriate manager/engineer between peer subunits

According to the data, only one company, Albany, adopted the expatriate management policy between peer subunits. In Albany, this policy is applied mainly through expatriating engineers between different subunits. Albany is the world’s largest producer of customer-designed engineered fabrics and process belts, so if one customer has special requirement, the local company will send the requirement to headquarter. When the requirement is approved by headquarter, local product engineers from different subunits will be gathered in one R & D center and have a training education. After the training, engineers will be sent back to the local company to implement the new technology and sometimes make a development. Szulanski (1996) stress that the underlying (original) knowledge is not the key element in knowledge transfer, to what extent the receiver acquires potentially useful knowledge and utilizes this knowledge in own operations are the most important elements of knowledge transfer. In Albany, expatriate engineer plays an important role during the process of knowledge transfer. They will not only take charge of spreading knowledge, but also need to develop the knowledge in the local environment or market. Considering that Albany is in the dispersed research and development configuration, and its innovation process is mainly through the cooperation of the engineers from three R & D centers. In this case, it is very important to expatriate engineers between different subunits to facilitate knowledge transfer and share resources during the innovation process. Albany also realized the importance of this policy and took good advantage of this policy to conduct the project work and facilitate knowledge transfer effectively between different subunits.

When it comes to the other three case companies, no empirical data shows that they have expatriate management policy between subunits. When we analyze the reason behind this, we found that Tylöhelo is in the concentrated research and development configuration, and the company does not have research centers in subunits, so that they do not need to expatriate manager or engineer between different subunits. For Huawei, they have a decentralized research in the subunits. However, each of the subunits only focuses on its own specific field towards new technology and does not cooperate with each other. In this case, the desire of knowledge transfer between peer subunits is relatively low, since they do not consider knowledge from other subunits is significant for themselves.

Finally the result from Getinge surprised us a little bit. Although this company is in the dispersed research and development configuration which is the same with Albany, however, it doesn’t have the expatriate engineer policy like Albany, and there is no cooperation between different subunits when they make innovation. Empirical data shows that the growth of Getinge mainly through the acquisition all over the world. R & D centers that located in different countries only focus on their own technology development and the local market. Each of the R & D center services for one product
unit specially. And they cooperate with each other to deliver products for the local market. Since there is no project work between different R & D centers, the desire of knowledge transfer between peer subunits is relatively low, that’s why they do not send engineer between different subunits to transfer knowledge.

5.2 Communication frequency

According to Bartlett and Ghoshal (1990), communication is considered to be a basic and crucial tool that used to facilitate direct contact between managers in different subunits so as to encourage knowledge transfer. In this part, we will also analyze communication frequency as one knowledge transfer mechanism from two directions. One is communication frequency between headquarter and subunits, the other one is communication frequency between peer subunits.

5.2.1 Communication frequency between headquarter and subunits

Maintaining a frequent communication between subunit managers and headquarter managers is very important for the transfer of innovations from headquarter to its overseas subunits (Ghoshal & Bartlett, 1988). When we look through the empirical data, we found that only Tylöhelo and Huawei maintain a frequent communication between headquarter and subunits. However, in Albany and Getinge, the communication frequency between headquarter and subunits is low.

According to the data, Tylöhelo is in the concentrated research and development configuration. And the expatriate management policy between headquarter and subunits helps promote the communication frequency between headquarter and subunits. Besides that, Tylöhelo also conducts a frequent communication with its distributors. As we know that, one of Tylöhelo’s strategies is building a strong network with its distributors. Therefore, distributors play an important role in the innovation process. Every year, Tylöhelo invites the major distributors to the company to share information concerning the demand in their own countries and discuss together, try to predict the tendency. All of the information collected in that meeting will be utilized by R & D center to change product design and make product innovation. After the meeting, R & D center also keeps a frequent contact with the main distributors in order to grasp the marketing’s new tendency. By doing this, the company can quickly capture what the market needs and figure out what can they offer. Frequent communication help facilitate the knowledge transfer between subunits and headquarter, and promote the innovation process in R & D centers.

Another company that maintains a frequent communication between headquarters and subunits is Huawei. According to our previous analysis, Huawei applied the expatriate management policy by sending engineers from headquarter to subunits. During the expatriate period, engineers will keep sending reports to their Chinese direct manager regularly in order to keep knowledge transfer from subunits to headquarter. In this
case, headquarter can easily keep control and supervise all the subunits. Through these expatriate engineers, frequent communication is conducted between headquarter and subunits, which really facilitate the knowledge transfer from subunits to headquarter.

However, when it comes to Albany and Getinge, we found that both of them keep a low communication frequency between headquarter and subunits. Considering that both of the companies have a decentralized R & D configuration. And headquarter does not take the responsibility of research and development, it just keeps the overall control of all the subunits. In Albany, the subunits only use the quarter reports to keep in touch with headquarter every three months. In Getinge, the headquarter usually hold global meeting four times per year, and this meeting is try to let all the subunits to know the whole company’s status and what the peer subunits are doing now. During this meeting, managers from different research centers will exchange their knowledge and information about their innovation projects. By doing so, internal competition will be avoided effectively. In addition, headquarter also use the telecommunication system to keep in touch with the subunits, but this communication frequency is still very low. Since from the head quarter’s perspective, they don’t want to interfere or influence the subunits too much. They consider the subunits are capable to make the decisions and develop new technology by themselves, and they also think that the subunits know much better than headquarter towards the local market. So that they don’t want to have a frequent communication with the subunits, they just try to make everything local.

5.2.2 Communication frequency between peer subunits

Frequent contacts between managers from different subunits within the MNC network can facilitate communication and inter-unit knowledge transfer (Ghoshal et al., 1994). According to the data, we only find one company, Albany, maintains a frequent communication between peer subunits. However, in Tylöhelo, Getinge and Huwei, the communication frequency between peer subunits is low.

As we know that Albany is in the dispersed research and development configuration. In this case, the desire of communication and cooperate between peer subunits is relatively high. In Albany, communication is frequently conducted between subunits, and the three R & D centers are connected mainly through the building of project team. Every second week, the three R & D centers will hold a meeting through the telecommunication system. During the meeting they will discuss the project work and deal with the problems together. Video conference is considered as the main way of communication between R & D centers. Moreover, among the different R & D centers, they also have frequently informal contact which is really good for them to share the information and cooperate with each other. Although many scholars (Gupta & Govindarajan, 2000; Monteiro et al., 2008) argue that compared to the close
communication between headquarter and subunits (e.g. a formal reporting system), communication channels between peer subunits tend to be relatively weak or even absent, Albany find a good way to maintain frequent communication successfully through the project work. And this method really helps a lot in facilitating knowledge transfer between R & D centers and promoting innovation.

When it comes to the other three case companies, we found that the communication frequency between peer subunits is low. For Tylöhelo, this company is in the concentrated research and development configuration, so most of the communication is conducted between the research center and distributors in order to capture the information for product innovation. The peer subunits just focus on their local market and provide service for the local customer. Hence the desire of communication between peer subunits is low. Besides that, different distributors seldom communicate with other (except the meeting hold once a year) due to language and country distance, all of the information and data are collected from each distributor directly by the two research centers. So that headquarter consider the direct communication with distributor is more effective and efficient. They do not need to facilitate communication between distributors.

In Huawei, the communication frequency between peer subunits is also very low. Since Huawei is in the dispersed research and development configuration, and the research centers do not cooperate with each other, they only focus on their own special field of technology development. In this case, the desire of communicating between peer subunits is low. Moreover, all of the research and technology will be gathered and further developed in headquarter. Therefore, keeping a frequent communication between headquarters and subunits is more important than that of between peer subunits.

However, the result we got from Getinge is beyond our exception again. Although the company is in the dispersed research and development configuration, however, the communication frequency between peer subunits is low. Although headquarter believes that the good communication can make the subunits learn from each other and cooperate with each other. However, Getinge does not have any communication mechanism to facilitate communication between subunits. Headquarter considers that it is difficult to create polices and mechanisms to let the subunits cooperate or even communicate with each other, because of language, culture and distance. When we analyze the reason behind this, we consider that Getinge is a typical Local-for-Local innovation corporation, so each subunit will focus on its own innovation field and service for the local market. The need of communicating with the peer subunits is relatively low, because they are focusing on different markets and this kind of communication will not help them learn from each other significantly. Moreover, certain frequent communications across countries may lead to a lot of money and time, so headquarter has to weigh the pros and cons before they make new policies towards
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this issue. However, if Getinge wants to develop Local-for-Global innovation, then the communication frequency between peer subunits will be a crucial element that influences the success.

Based on all the analysis above, we made the table below to show the results more clearly.

<table>
<thead>
<tr>
<th>Expatriate management policy</th>
<th>Between headquarter and subunits</th>
<th>Between peer subunits</th>
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<tbody>
<tr>
<td>Expatriate engineer</td>
<td>Expatriate Top manager</td>
<td>Expatriate engineer</td>
</tr>
<tr>
<td>Tylökelo</td>
<td>Getinge</td>
<td>Albany</td>
</tr>
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<td>Huawei</td>
<td>Albany</td>
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<table>
<thead>
<tr>
<th>Communication frequency</th>
<th>Between headquarter and subunits</th>
<th>Between peer subunits</th>
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<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Tylökelo</td>
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<td>Albany</td>
</tr>
<tr>
<td>Huawei</td>
<td>Albany</td>
<td></td>
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</tbody>
</table>

5.3 Type of innovation process related to R&D configurations

When we are analyzing different R & D configurations of these case companies, we find that these different R & D configurations could be related to the companies’ innovation process. Ghoshal and Bartlett (1987) once indicate four different innovation processes, which include Center-for-Global, Local-for-Local, Local-for-Global and Global-for-Global innovation process. Based on this model, we analyzed this four case company and summarized as follows:

Tylökelo is a Center-for-Global innovation company. According to our analysis, Tylökelo is in the concentrated research and development configuration. All the innovations are developed in the two R & D centers centrally, and the products are sold globally, which reflects what Ghoshal and Bartlett (1987) define center-for-global innovation are those where headquarter or a central research center such as the corporate R&D laboratory, creates a new product, process, or system for worldwide use.

Albany is a Global-for-Global innovation company. Since Global-for-global innovations are those that are created by pooling the resources and capabilities of
many different organizational units of the MNC, including the headquarters and a number of different subunits, so as to arrive at a jointly developed general solution to an emerging global opportunity (Ghoshal & Bartlett, 1987). According to our analysis, Albany is in the dispersed research and development configuration, and its innovation process is mainly through the cooperation of the engineers from three R & D centers, and the resources are shared during the innovation process. Since their product is not focusing on the local level, when they deliver new product, it can be sold globally.

Getinge is a Local-for-Local innovation company. Local-for-local innovations are those that are created and implemented by a national subunit entirely at the local level (Ghoshal & Bartlett, 1987). According to our analysis, Getinge is in the dispersed research and development configuration. However, there is no cooperation between different research centers, and they will not share their resources, which restricts the research centers only can do research and make product innovation at the local level not for global. The research centers just utilize the local resource; make innovations and service for the local market. In this case, each research center can better concentrate on their native market and will not lose the focus.

Huawei is also a Global-for-Global innovation company. According to our analysis, Huawei is in the dispersed research and concentrated development configuration, which shows Huawei has a decentralized research in its subunits and conduct a centralized development in the headquarter. Although there is no cooperation among research centers, their achievements towards new technology will be gathered in headquarter and make final development. From this we can see the innovation process is based on the resources from all these research centers, and the final new product is for the global market (Ghoshal & Bartlett, 1987).
6. Conclusion

In this chapter, we will draw some theoretical conclusion from our research firstly, and come to some suggestions for future research. Finally, managerial implications for these four case companies will be presented.

6.1 Theoretical conclusions

The purpose of this research is to find out the relationship between knowledge transfer and R & D operations through two knowledge transfer mechanisms and three categories of R & D configurations. Based on the analysis, we conclude our main findings as follows:

1. In terms of expatriate management policy, if the company employs a concentrated development in headquarter (or R & D center), it is very important to expatriate engineers between headquarter and subunits. According to this kind of cases, knowledge transfer towards new technology between headquarter and subunit is crucial, and engineers are more qualified to transfer technology knowledge and fix the technique problems during their expatriate period. If the company applies a dispersed research and development configuration, and headquarter does not take the responsibility of R & D, it is better to expatriate top manager from headquarter to subunits so as to transfer process knowledge and keep overall control of subunits. At the same time, sending engineers between peer subunits is also very important to facilitate knowledge transfer between peer subunits especially when different subunits cooperate and conduct innovation project together.

2. In terms of communication frequency, we found that if the company employs a concentrated development in headquarter (or R & D center), it is very important to conduct frequent communication between headquarter and subunits. Since in this case, the desire of knowledge transfer from headquarter to subunits is strong and communication is considered to be a good mechanism to facilitate knowledge transfer so as to promote innovation process. If the company applies a dispersed research and development configuration, and headquarter does not take the responsibility of R & D, it is very important to maintain a frequent communication between peer subunits. Since in this case, innovation is achieved mainly through the cooperation of peer subunits. And keep a frequent communication will help subunits better coordinate with each other and fix the problems together.

3. In addition, we also found there is a connection between innovation process and R & D configurations. If the company is in the concentrated research and development configuration, it will be easier to conduct center-for-global innovation. In this case, new products are created in R & D center for worldwide use. The companies that have a dispersed research and development configuration or dispersed research and concentrated development configuration can conduct
global-for-global innovation, since both of the two R & D configurations have a decentralized research, and the resources are shared at the beginning of research, then the pre-achievement will be gathered and utilized to develop final product sold worldwide.

6.2 Suggested future research

In this thesis, we chose a case study design and conducted a qualitative approach to find out the relationship between knowledge transfer and R & D operations within MNC. However, we worked with a rather small sample of firms, and the case companies we choose are mainly from Sweden and China. Therefore, we couldn’t assert that the results of our research could be generalized to other countries or other types of companies. But it does present a reasonable starting point. So that we suggest future research could be conducted from a test proposition and choose quantitative approach. Large quantitative study concerning the relationship between knowledge transfer mechanism and R & D configuration needs to be conducted in order to test our results. In this case, large number of MNC will be involved and the results could be more reliable and better generalized. Another suggestion for future research is that researchers could choose analyze other knowledge transfer mechanisms which we didn’t have a focus in this paper, for example, formal integrative mechanism, corporate socialization mechanism (Gupta & Govindarajan, 2000), performance evaluation and compensation (Björkman et al, 2004), and find out how these knowledge transfer mechanisms are configured in order to support knowledge transfer in global R & D operations within MNC.

6.3 Managerial implications

According to our research, both expatriate management policy and communication frequency are very important for MNC to keep a good knowledge transfer in global R & D operations. Therefore, we suggest that MNC could establish expatriate engineer policy and send engineer from headquarters to subunits or between peer subunits in order to transfer technology knowledge and facilitate R & D operations. Moreover, MNC could also establish expatriate manager policy and send top managers from headquarter to subunits so as to transfer process knowledge and keep overall control of subunits. In terms of communication frequency, if MNC employs a concentrated development in headquarter (or R & D center), we suggest they maintain a frequent communication between headquarter and subunits so as to keep a smooth knowledge transfer between them. If MNC applies a dispersed research and development configuration, it is very important to keep a frequent communication between peer subunits. However, due to the weak communication channels between peer subunits, communication frequency cannot be conducted very well in many MNC, and subunits feel difficult to share its best practices and skills effectively with other subunits. To overcome these barriers we suggest that MNC should provide more opportunities for subunit managers to build communication networks with other subunits. For example, organize international training programs, establish international forces and
committees and encourage visits across MNC units. So that research and development can be transferred effectively between peer subunits.

6.3.1 Managerial implications for the firms in the study

In this part we draw certain managerial implications for the firms in the study. Our recommendations are based purely on the knowledge transfer aspects, and that there might be many other considerations pointing to other implications.

Firstly, for Tylöhelo, as we argued before, this company is in the concentrated research and development configuration. However, now the company has two R & D centers in different countries conduct innovation for two brands separately. In order to reduce cost and improve the operational efficiency we suggest Tylöhelo gathers all the R & D activities in one R & D center. In this case, engineers from two R & D centers can communicate much easily and effectively. Knowledge sharing and knowledge transfer from research to development will be facilitated efficiently. Besides that, Tylöhelo should also keep the high communication frequency and expatriate engineer between headquarter and subunits, in order to facilitate a good knowledge transfer and help R & D center capture the valuable knowledge for product innovation.

Secondly, for Albany, as we know that this company is in the dispersed research and development configuration, and the communication frequency between subunits is high mainly through the project work and expatriate engineer between different subunits. Through the cooperation of the three research centers, Albany can conduct a good innovation and provide products worldwide. However, the communication frequency between headquarter and subunits is low. So that we suggest Albany build an R & D center at headquarter in order to become a perfect dispersed research and development configuration. In this case, the achievement from subunits can be gathered in headquarters R & D center and make final development. Through expatriate engineer policy, knowledge transfer between subunits and headquarter could be facilitate significantly so as to help headquarter utilize all the resources to make innovation.

Thirdly, for Getinge, analysis shows that the company is in the dispersed research and development configuration. However, the communication frequency between headquarter and subunits is low, expatriate manager is in the top manager level. Moreover, there is no cooperation and expatriate engineer between different subunits and the communication frequency is low as well. In this case, we suggest, first of all, Getinge should promote the communication frequency between subunits. And subunit managers need to make more effort to maintain direct contact via telephone calls, e-mail exchanges, and business trips, to transmit knowledge to their peer subsidiaries (Miao, Choe & Song, 2010). If Getinge wants to become a global-for-global innovation company, it is very important to establish the cooperation between
different subunits, in this case, resources from different subunits could be shared and integrated to better conduct innovation and produce product for global market.

Finally, for Huawei, as we know that, Huawei is a typical example of dispersed research and concentrated development company. All the research activities are decentralized in subunits and their achievements will be gathered in headquarter and utilized for final development. In order to maintain an efficient knowledge transfer between headquarter and subunits, headquarter keeps expatriating engineer to subunits and maintain a frequent communication with subunits. However, the expatriate engineer only worked for 6 months or one year to keep knowledge transfer from subunits to headquarter, which is not good for engineer keeping a long term relationship. That's why the engineers do not have much informal interacting with each other and they just focus on their own research field. So we suggest Huawei extend the expatriate period and let the engineers establish their own network, cooperate and learn from each other. In this case, knowledge transfer within the subunits will be facilitated significantly.
Interview guide

1. Do you have any subunits in other countries, and how many? Where are they located?
2. Do you have Research center in your corporation? And how many? And where are they located? What are their functions?
3. If the company just has one Research center, do the subunits have rights to develop the products for the local market?
4. If the company has several Research centers, are they independent? And are the product development conducted only in headquarter or both in headquarter and subunits? And how does it work?
5. Do you have policy that sending managers or engineers from headquarter to the subunits? Or do you have expatriate managers or engineers between subunits? If so how many managers or engineers you usually send to one subunit? And how often?
6. What kind of responsibilities do the expatriate managers or engineers take? Are they only transferring knowledge to subunits or they can also take the responsibilities of developing the new technology? And do these expatriate managers or engineers accomplish their responsibilities very well?
7. How do you think the expatriate managers or engineers influence the knowledge transfer between headquarter and subunits? And among different subunits?
8. How do you think the expatriate managers or engineers influence the research and development that conducted between headquarter and subunits? And among different units?
9. Do you have communication between subunit managers and headquarter managers? And among subunits? And how often?
10. What kind of communication tools do you usually use? How do you think about them?
11. How do you think communication frequency influence the knowledge transfer between headquarter and subunits? And among different subunits?
12. How do you think communication frequency influence the research and development that conducted between headquarter and subunits? And among different units?
Reference


Birkinshaw, J., Fey, C., (2000), Building an internal market system: insights from five R&D organizations. In: Birkinshaw,


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Zhao, Zhongyao. (2007). How to transition Chinese firms into world-class corporations---organizational and cultural innovations are key. MIT Sloan School of Management.[Accessed 20 April 2012]


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[Accessed 20 April 2012]