



Knowledge Acquisition for Newly Graduated Project Managers in Construction Industry

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

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Examensarbete BOMX02-17-106/ Institutionen för bygg- och miljöteknik, Chalmers tekniska högskola 2017

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Cover:

The complexity of project management (Source: threesixtygh.com. Image by: Unknown).

Department of Civil and Environmental Engineering. Göteborg, Sweden, 2017

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ABSTRACT

The profession of project management in the construction industry implies complexity and sensitivity, as managing a project is rather a challenging process from its start until its delivery. There are three basic goals which project managers struggle to accomplish while running projects which are completion within time and cost with the expected project quality. A project must meet all the three criteria simultaneously to be declared a success, which is rather a difficult task especially for new project managers. Taking the nature of project management into consideration, new graduators lacking work experience will be encountering various problems at workplace initially at the beginning of their career. Both on a physical and psychological basis. Thereby, they enter a period of intensive knowledge acquisition at site. The study demonstrates that the construction industry utilizes a traditional approach of knowledge management for teaching the new employees. Despite modern technology which is utilized for knowledge management in organizations such as databases, software, electronic instructions etc., the management of knowledge in the construction industry takes a practical shape. The newly employed graduators mainly get assigned to a supervisor by the company to teach them the profession gradually for a timeline until they get selfreliant. The study further illuminates that new project managers at site preliminarily utilize socialization of Nonaka's SECI model of learning to acquire new knowledge. Subsequently, they apply the knowledge into practice, which the model refers to as internalization in a spiral model. Both the SECI model and knowledge management in construction demonstrate that learning emerges from doing which is practice. However, the study also demonstrates that the model is environment-compliant. It does not work as efficiently in every environment as individuals and their national and personal cultures are diverse.

Key words: Knowledge management, knowledge, Nonaka's SECI model, knowledge acquisition, future project manager, construction, civil engineering, civil engineer

Kunskapsanskaffning för nyutexaminerade projektledare i byggindustrin

Examensarbete inom mastersprogrammet:: Design and Construction Project Management.

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SAMMANFATTNING

Projektledning betraktas vara ett komplicerat yrke. Då är en projektledare ansvarig för hela projektets livscykel från dess start tills dess överlämning till beställaren. Som projektledare bemöter man mångfaldiga problem, både psykiska och fysiska. Arbetserfarenhet samt ackumulerad kunskap är ett stort behov. Dock är situationen väldig känslig och extra problematisk för nybörjande projektledare som nyligen har utexaminerat från universitet och saknar arbetserfarenhet. Därmed, i en sådan situation ju mer kunskap man har desto bättre kan man undvika utmaningar.

Kunskap anses förekomma i två olika versioner: Tyst kunskap eller praktisk kunskap som betraktas vara ett privat ägande i en individs hjärna, följd av explicit kunskap, även kallad teoretisk kunskap som är artikulerad och dokumenterad på papper eller inspelningar. Tyst kunskap är en individs egen förståelse av ett något, som uppstår av mottagen information. Därmed är den svår att artikulera och beskriva muntligt och skriftligt. Den är bunden med praktik och anses förekomma från tillämpning av explicit kunskap som är skriftlig och dokumenterad. Så att man får en egen förståelse av det som man tillämpar till praktik och upplever praktiskt. Som en ny utexaminerad projektledare har man redan explicit (teoretisk) kunskap som man har anskaffat från universitet. Dock vet man inte hur realiteten ser ut, eftersom man inte har tillämpat den antagna kunskapen till praktik för att uppleva den och få en klar förståelse utav det. Studentens förståelse vid det fallet kommer från egen inbillningsförmåga. Därför har kunskapshantering en stor roll i lärandet av de nyrekryterade i organisationer, för att lära dem kunskap på arbetsplatsen. Även om databaser, instruktioner och direktiv är allt mer förekommande idag, så tar kunskapshantering fortfarande en konservativ, praktisk metodik i byggföretag. De nyanställda lär sig utifrån praktiska beteenden såsom interaktion och observation på arbetsplats och har lite nytta av instruktioner och elektroniska kunskapssystem. Studien visar att de nyutexaminerade anställda tilldelas senior projektledare med arbetserfarenhet (praktisk kunskap) att agera som deras guide och lära dem yrket under en viss tidsintervall. Detta betraktas som den mest framträdande metoden i byggföretag tills idag, för att överföra kunskap från erfarna personalen till de nya. Lärandet utvecklas gradvist och mera kunskaper ackumuleras med tiden. Då anses man att börja bli självständig som projektledare och lita på sig själv. Dock är sorts problem och projekt olika. Framgång i ett projekt innebär inte framgång i andra. Därför uppstår en riktig självständighet aldrig, utan som projektledare är man alltid beroende av andra oavsett antalårserfarenhet. Följaktligen är en välfungerande arbetsmiljö en nödvändighet, som produkten av bra samarbete, kommunikation och koherens på arbetsplatsen.

Den japanska kunskapsteoretikern Nonaka illustrerar lärandet och kunskapshantering i organisationer. Han introducerar en modell med namnet SECI-modellen, baserad på japanska organisationer. Modellen består av fyra processer, där teoretiska och praktiska kunskaper kontinuerligt konverteras till varandra i en spiral fortsättning. Akronymen SECI står för fyra processerna: Socialisering, externalisering (utlägg), kombination och internalisering. Socialisering är att man lär sig via observation och interaktion av de andra på arbetsplatsen. På så sätt får man en bild av det de gör och hur de gör det. I den processen får man tyst (praktisk) kunskap anser Nononaka, genom avbildning av andra d.v.s. att man förstår deras agerande på sitt eget sätt. Externalisering är en annan process, då man försöker att artikulera det man kan, d.v.s. att förvandla tyst (praktisk) kunskap till artikulerad, explicit kunskap via diskussioner, metaforer, symboler och exempel. Dock påstår många av Nonakas kritiker att det är omöjligt eller svårt att omvandla praktisk kunskap som är privat, grundad på individens egen förståelse till explicit och artikulerad kunskap. Exempelvis att lära någon att simma eller cykla, argumenterar kritikerna. Det går att förklara för individen, men det går inte att lära honom eller henne. Därmed påstår kritikerna att praktisk (tyst) kunskap inte kan artikuleras och göras till teoretisk (artikulerad) så kallad explicit kunskap. Den tredje processen av Nonakas kunskapsmodell är kombination. Här kombineras artikulerad (teoretisk) kunskap med andra artikulerade kunskaper, exempelvis att skriva en rapport, analys eller sammanfattning som är baserade på andra studier. Den sista processen av SECI-modellen är internalisering innebärande lärdom via praktik. I den processen tillämpas artikulerad, teoretisk eller explicit kunskap till praktiken och därmed omvandlas till praktisk kunskap. Det vill säga att individen får en upplevelse av att ändra teorin till praktik och lär sig utifrån det (egen förståelse). Även om Nonakas lärdomsmodell är internationellt erkänd men så anses den vara begränsad och miljöbaserad. Detta är för att modellen är baserad på japanska företag och samhället som betraktas vara eniga och mer sociala i jämförelse med andra delar av världen. För att modellen lyckas så behövs det en välfungerande arbetsmiljö, där bland annat socialisering och koherens är ett krav.

Studien, baserad på intervjuar med olika projektledare, demonstrerar att socialisering av Nonakas kunskapsmodell har preliminär roll när man är ny på arbetsplats. Via socialisering får man kunskap och tillämpar den själv efteråt på arbetsplatsen, vilket medför internalisering d.v.s. att applicera den mottagna kunskapen på praktiken och lära sig utav det. Detta antyder att kunskapsanskaffning är via praktik, även att läsa och observera är att göra (något) som är praktik. Därför är det också praktik som man gör vid akademier i form av utbildning och undervisning. I det fallet praktiserar man både på arbetsplatsen och på akademier för att anskaffa sig kunskap, bara sammanhanget är olika. Därmed är kunskapsanskaffning praktik i principen.

Nyckelord: Kunskap för nybörjande projektledare, kunskapsledning, projektledning, SECI modell, management, lärande på arbetsplats, kunskapsanskaffning

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Preface

As a future project manager, one always inquires how the work reality will be. Students frequently face intimidations while reading the management literature about the vast challenges the project managers encounter ranging from stress and distress all the way to penalties. It is vastly appreciated to have a nearly depicted canvas from the reality to know approximately what to be expected during the initial working period of a newly graduated project manager and its development in relation to knowledge acquisition in the working life. This assists the project management students psychologically in the reduction of their concerns about working life. The master's thesis tends to put the mentioned issue under enquiry. This examination is more valuable for those who have had no practical work experience in the construction management domain they study at university.

As the author of this study, I greatly recommend obligatory temporal internships arranged by universities in compliance with construction companies to be included in engineering programs. This is to prepare the students for the subsequent working life not only literary but also empirically, resulting in not feeling mentally unprepared prior to their working life. Furthermore, I like to thank all the participants who participated in making this study.

Gothenburg February 2017

Îvan Suleymanshar – Building Engineer BSc. & Design and Construction Project Management Student MSc.

1 Introduction

In this chapter, an initial canvas is given to the thesis explicitly. The thesis content is briefly outlined through the description of its aim, background, problem identification, limitation and the research questions. The limitation section outlines the scope of the study, as the topic is vastly extensive.

1.1 Background

In order for a project to be labelled successful, it must meet the criteria of completion within its deadline, budget and have the expected quality which together are considered the Triangle of Objectives (Wysocki, 2011). Project managers are constantly facing various challenges throughout the life cycle of a project. These challenges can have various negative impacts on the project and be barriers in front of achieving succession for the final project completion, such as causing delays, budget overrun, work inefficiency, quality deficiency etc. They can be of various types and emerge anytime and anywhere in the project life cycle (Kerzner, 2013). The challenges can even cause project failure and thereby endanger the project managers' interests in a way that they may face serious consequences as retributions such as lose of their position, defamation, imprisonment and other severe penalties in some countries of the world (Xinmin Daily, 2010).

The situation is more sensitive for those newly graduated project managers in the construction industry, who have not conducted internships previously to gain practical work experience in their profession. Such newly graduated employees have mainly acquired the knowledge of their profession through the theory taught at universities which is considered as explicit (theoretical) knowledge with minor practical experiences such as site visits implicated into their studies. They are incomparable with project managers having a longer work experience who possess tacit (empirical) knowledge in their domain. Theoretical knowledge is incomplete without empirical or practical knowledge. The two knowledge forms go hand-in-hand and complement each other. A new project manager needs a time interval of work experience to be selfsufficient and manage a project independently without senior managers' guidance (Newell et al. 2009). The sources of knowledge acquisition within organizations can vary which according to Nonaka's knowledge framework (also known as SECI model) are socialization, externalization, combination and internalization. The model demonstrates that knowledge can be acquired and created through four processes of conversions of the two knowledge forms: explicit and tacit. Hence, the role of knowledge management is prominently vital in achieving succession within organizations by coaching new inexperienced employees to be self-sufficient and increasing their proficiency (Evenson, Dubberly, 2011).

1.2 Aim

The study is aimed at project managers-to-be who are still studying civil engineering in construction at universities and possess no work experience. It aims at examining how new project managers learn to fulfil their work in the construction corporations by acquiring adequate knowledge and being self-sufficient gradually to deal with their challenges themselves. In relation, investigating Nonaka's SECI model of knowledge creation and acquisition is a main aspect of the study - whether the model is actually responsive to the problem under enquiry and how much it is useful and applied in reality. The final absolute goal of the study is confronting the theoretical concept of the

study with the empirical one of reality life to verify their correspondence: To what extent, how and why (Buser, 2013).

1.3 Problem Identification

A future project manager requires knowledge and information against challenges encountered in working life. The individual has little experience about how the work reality in a company looks, except for what s(he) has read and studied previously. The ways the young manager will learn his or her actual profession practically is an issue, significant for examination. However, the diversity between work environments influences the learning of the new employee. This study reviews graduated project managers, who lack practical experience (internships) and tend to work as project managers subsequent to their graduation, as a significant proportion of managers will eventually work in other areas of the construction industry. Even though universities frequently provide or encourage their students to take a part in internships, still a significant number of them omit or not get that potentiality. This results into substantial concerns subsequent to their graduation while exposed to working life, especially in construction which is considerably complex and entails a great liability.

1.4 Limitation

The study focuses on knowledge management which is a vastly prevalent and broad area. Thereby, only knowledge acquisition forms are investigated in guidance with Nonaka's knowledge creation and acquisition model, also known as SECI model. This is consistent with unpractised new project managers' situation and revolves around their case.

1.5 Research Inquiries

- 1. How to acquire adequate knowledge which a new construction project manager requires at workplace?
- 2. How supportive is the SECI knowledge management model for knowledge acquisition?
- 3. Is knowledge acquired through practice or education?

2 Method

This study is a part of the master's program Design and Construction Project Management (DCPM) and touches the intended program domain, implying sustainability to the management literature via its outcomes. The choice of matter not only relates to the program but also to the author as a student lacking work experience, who intends to research the initial period of managers' working life in relation to learning at workplace and the necessary steps one has to take. It relies on information based on literature and real life experiences of managers as a confirmation.

The study is conducted in association with project managers of various ages and experiences, either working as project managers currently or been working as such in construction corporations. They are interviewed to share their experiences of the beginning of their career in relation to knowledge acquisition on site. The research strategy of deductive approach has been taken into consideration for conducting the study, which is qualitative and interpretative. It comprises a theoretical part based on the management literature and an empirical part based on the interviewees' experiences. Finally, the two parts are evaluated jointly to examine whether the theory is in compliance with the interview results depicting working life and to find reasonable explanations for the evaluation of the achieved results.

Initially, it was planned to follow up a project manager at workplace for a limited time interval comprising of one to two weeks for observation in the making of the empirical part of the study. That was not possible and the idea was modified into interviews instead which resulted the study to be based on attendees' point of view rather than the author's observation. Such might have led to some differentiation of the study outcomes by getting a different canvas. This changed the focus from practically conducting the empirical study and getting primary information through own observations into getting secondary information, via the attendees' own opinions. Thereby, a question of trustworthiness arose. However, instead of obtaining one experience merely, now several experiences from different workplaces and perspectives were accomplished. This resulted in a diversity of samples for the empirical study.

Eventually, an interview guideline of four questions was formed in making the empirical study which was decided to be based on interviews solely. In total 14 different project managers were contacted for interviews during May 2017. Whereas, solely six of them agreed on participation. Thereby, it limited the trustworthiness and the validity of the study to be revolving around these individuals alone. In addition to many project managers' unwillingness of participation, time constraints played also a major role in shaping the study. A specific deadline was dedicated for the study completion between January – June 2017. It must be noticed that based on the circumstances, several times the study extension and structure were changed and reshaped.

Apart of the 14 project managers also a few construction corporations were contacted to convey contact information to a few project managers of their own. No responses were given however. As project managers are busy on a daily basis with time constraints, even half of those who were interviewed only agreed on interviews via mail, to respond to the study questions through emails. Thus, short and less desirable answers were achieved from them in comparison to those who were interviewed directly in a face-to-face conversation. This once again restricted the abundance of information in the empirical study. The time of conducting each direct interview changed based on the will of the interviewees to sharing information. A few were willing to offer more information and others less. On the other hand, the questions of the interview guideline are partially personal which may have led to the limitation of the study. In contrast of the empirical study, Chalmers Electronic Library was utilized for acquiring a wide range of information for the theoretical study.

As the study is partially based on interviews, ethics have also influenced the outcomes of the study. Due to ethical factors, the surnames of the interviewees and their workplaces were anonymized. Also, the information of the interviewees is from one perspective and personal. Whereas, some claims might have not exactly been the way one side of the work biography claims to be as many aspects of life are paradoxical. Furthermore, due to working for a corporation and feeling obliged to be positive towards it, the interviewed might have not been entirely truthful in highlighting negative experiences of their companies or have greatly skipped this aspect. Thus, ethical factors constantly put the trustworthiness of studies like this under enquiry.

2.1 The Study Structure

The study begins with a theoretical study relying on other authors' information and data about the study area. This is followed by an empirical study comprising interviews. The empirical study comprises interview questions, an interview analysis and the results of the interviews which are coherent and based on one another. Subsequently, a comparative discussion is conducted, where the theory and the empirical data are evaluated and juxtaposed critically. Finally, a conclusion is derived from the study outcomes.



Figure 1 Suleymanshar, I., (2017). *The Study Structure exhibiting a deductive methodology*. Gothenburg: Chalmers University of Technology.

2.2 Interviewees

In this chapter, a brief description is given about every interviewed project manager. Generally, they are divided into two groups: Project managers working in the present time and others who have worked in the past but are back to academies contemporarily in the same profession.

Philip X

Philip is a British construction project manager who is currently also a lecturer of Construction Engineering. He has over 20 years of experience in the construction and engineering industry, 13 of which have been dedicated to working outside the United Kingdom in various foreign countries such as USA, Kuwait, Saudi Arabia, Egypt, Germany, Nigeria, Libya and China. On the other hand, he has also 20 years of academic experience when he has been teaching in various universities such as Northumbria University of Newcastle and Chalmers University simultaneously and elsewhere in China, Spain, France and Germany. He has also participated in the development of MSc. programs at the two universities such as Project Management MSc. of Northumbria University and International Project Management MSc. of Northumbria universities in the year 2000.

Interviewed 8th May 2017, Chalmers University of Technology

Karin X

Karin holds a degree in civil engineering from Chalmers University, specialized in infrastructure and water engineering since 1982. She has begun working as a civil engineer ever since, with 35 years of work experience until now. She has started her career as an assistant within a medium-sized concrete corporation. Later, she has proceeded with housing production of heavy construction projects. Karin has also worked with project management, contract relationships, quality and environment management systems, procurements, calculations, management of sub-contractors and even employee-related studies temporally. Approximately ten years ago, she has begun working as a design manager for her current company, based in Gothenburg.

Interviewed 11th May 2017, Skanska Office in Gothenburg, Sweden.

Daniel X

Daniel is a civil engineer in construction who has graduated in 2007 at Yazd University in Iran. He has been working as an engineer in various engineering sections including management even prior to finishing his studies. After a while, he has moved to Sweden and continued his career where he gets an internship for approximately four months at a portal company based in Gothenburg encompassing construction as well. Thereafter, he comes back to the academics and studies the master's program IPM (International Project Management) at Chalmers University of Technology contemporarily.

Interviewed 15th May 2017, Chalmers University of Technology

Malin X

Malin is a project manager working at a construction company contemporarily in Sweden, Trollhättan. She is originally a land surveying engineer, graduated in 2009 at Väst University of Trollhättan, Sweden.

Interviewed via e-mail 12th May 2017

Johan X

Johan is a building engineer who is graduated at Chalmers University of Technology in Sweden. He holds a bachelor degree in civil engineering of the construction industry and works as a project manager at a prominent construction company in Gothenburg, Sweden. He possesses years of work experience in the building branch since his childhood.

Interviewed via email 16th May 2017

Joakim X

Joakim is a recent project manager working at a construction corporation. He holds a bachelor degree in civil engineering and design from KTH (Royal Institute of Technology) in Stockholm. He further has studied at Queens University of Belfast in Northern Ireland, UK for a term as an exchange student. Joakim has graduated a year ago in 2016 and has begun his working career ever since at his current company in Sweden, where he undergoes the initial period of learning at workplace contemporarily.

Interviewed via email 12th June 2017



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3 Theoretical Study

In a paradoxical situation such as managing projects when challenges are diverse and numerous, some expected and some not, the most optimistic way of dealing with such is knowledge acquisition (De Wit & Meyer, 2014). The more knowledge acquired, the more assurance is accomplished and the less uncertainty remains. Entering working life by inexperienced new graduators within corporations is most challenging temporarily, as gradually the situation is brought under control through practical knowledge acquisition at workplace which is known as tacit knowledge. By now, unpractised new employees have mainly acquired theoretical knowledge, known as explicit knowledge in solving and handling issues within their careers without having a chance to experience how to apply the knowledge learned at academies (Dalkir, 2005). This situation demonstrates whatever theoretical solution is studied at academies is not a response into solving various problems faced at workplace in reality, as the challenges are unique and diverse. Therefore, there is a need for corporations to foster their new employees and equip them with their knowledge in both of its forms, practical and theoretical. This practice is literary known as knowledge management (King, 2009). It must be reminded, that here the intention encompasses merely those new graduators who have not conducted practical internships during their study periods at academies.

In this chapter the following topics are reviewed based on the management literature:

A generic outset of knowledge management; Knowledge management in construction; An introduction to knowledge, knowledge forms and knowledge acquisition; One of the knowledge acquisition models known as Nonaka's SECI model and critical views of the model.

3.1 Knowledge Management

Knowledge management as a term has emerged during 1980s, which is rather new. However, the practice of knowledge management and knowledge sharing has been around for a very long time, dating back to history (Dalkir, 2005). There are many definitions for managing knowledge in organizations. The process implicates knowledge formation, acquisition, transfer and implementation by employees optimistically to promote development and navigate organizational function in the right direction. Theorists define knowledge management (KM) as the process of creating knowledge complied with knowledge interpretation, distribution, usage and innovation. Moreover, KM is yet defined as the process of managing knowledge to obtain organizational requirements and transform organizational knowledge into finding new approaches for better accomplishing organizational objectives (Serban, Luan, 2002).

Thereby, KM to mainstream authors is a set of coherent theoretical and practical processes encompassing strategizing, planning, organization, promotion and supervision of people and methodologies in an organization to make sure that knowledge-orientated possessions of the organization are proficiently acquired, utilized and improved by the employees. Knowledge-oriented possessions of the organization comprise explicit knowledge which is concrete such as documents, instructions, databases and norms as well as tacit knowledge which is unattested such as experienced workers' knowledge of optimistic approaches of work performance or knowledge possessed by teams acquired through experience about specific issues (Serban, Luan 2002). KM functions as operating the knowledge-related processes firstly, followed by

creating methods to pursue them and supporting the employees into attending the processes and acquiring the intended organizational knowledge. Whereas, the essential goal remains as developing the current organizational knowledge, improved work performance and promoting strategic decision making (Dalkir, 2005). This profound task is often delegated to project managers to supervise the subordinates, especially the newly employed personnel of the organization. Here, socialization plays a major role, which the managers need to promote by creating social accesses in order to accomplish succession in their KM agenda (King, 2009).

Social accesses can be formation of an experts' network within the organization, containing experienced employees where less experienced ones such as the newly recruited can turn to for assistance and guidance. Another method of socialization in the way of successfully achieving KM goals is forming what King (2009) calls practice communities, which are teams of employees focusing on a common issue. Creating such social processes illustrates the practical side of KM and facilitates it towards succession. That is because knowledge can be private and possessed within an individual's mind. Thus, for transferring this private knowledge, socialization such as forming social groups and networks like the mentioned is vastly important. Thereby, it can be pointed out that KM processes are pretty social-oriented rather than technology-related. Hence, organizations must focus on communication and socialization as an essential tool in pursuing their KM processes (King, 2009).



Figure 2 Linear Knowledge Management within Organizations (King, 2009).

The figure demonstrates coherence of four stages of processes, where each stage implies the other. This canvas illustrates how a basic knowledge management (KM) shall function and accomplish its goals. The KM processes imply improvements in organization processes such as innovation, collective and individual learning and decision making. In addition, the improved organizational processes lead to improved intermediate outcomes such as better actions, services, products, relations etc. Finally, all these together imply better organizational performance and function as the final goals' approach. This is a traditional approach to the KM theory (King, 2009).¹

Also, organizations have Knowledge Management Systems (KMS) which assist them in pursuing their KM and facilitating it. KMS are computer applications which are a part of the organization's electronical Communication and Information Systems (CIS)

¹ This is a linear version of KM, used as an exhibition for comprehension of the context. There are other versions as a diversity of KM, such as the SECI which is spiral and the study is based on.

and support the KM processes. They comprise databases such as lectures, calendars, social networks such as those previously mentioned which connect experts of the organization with those of less expertise for guidance about a range of matters (King, 2009). However, even so still KMS are not that efficient and not really relied on within organizations. The management of knowledge takes a more practical way than electronic as the emergence of KMS is new (Styhre, Josephson and Knauseder, 2004).

Even though the theory of KM is rather new, but organizations are gradually adopting it. KM is taken quite more seriously contemporarily than ever and it is expected to be escalating in the future (Dalkir, 2005). The following factors illustrate why KM is of high importance today:

• Globalization

The world is undergoing globalization contemporarily. So do businesses. Organizations today strive to be more global based on their profitability and economic interests (Serban, Luan 2002). Therefore, the need for KM is extra important today in a multicultural, multi-locational and multilingual environment (Dalkir, 2005).

• More Active Corporations

Today corporations work quite faster than previously, with heightened productivity and more work, due to the rise of modern technology (Wolf, 2001). Therefore, wiser workers and creativity leading to new methodologies and better organizational performance are required. All these necessities require a need for KM more than before (Dalkir, 2005).

• Organizational Amnesia

Employees today do not tend to stay within an organization for the rest of their lives. They are more flexible and change organizations based on their interests and circumstance (Wolf, 2001). In this way, their knowledge based on experience accumulation within years of work will be lost from the organization, when they move out. This creates a need for KM for continuity of knowledge of the organization. This phenomenon is referred to as organizational amnesia (Dalkir, 2005).

Despite the organizational need for KM, also individuals within the organization are highly in need of KM for advantageous reasons escalating their status, such as KM assists the workers to perform their work efficiently, without blockades, save times and keep deadlines via efficient decision making and problem resolution (Serban, Luan 2002). KM also implies socialization among the knowledge workers by binding them together. Additionally, KM enhances creativity by providing problems for the workers to solve and learn from (Dalkir, 2005).

KM requires order for categorizing different types of activities that are needed for managing knowledge within an organization. Thereby, there are frameworks such as models which assist in structuring knowledge-oriented work. There are different KM models, representing different methodologies of managing, creating and converting knowledge (Cristea, Capatina, 2009). This study will focus on the SECI model due to its simplicity in highlighting managing and creating knowledge.

3.1.1 Knowledge Management in Construction Industry

The construction industry is reliable mainly on knowledge from every aspect due to its complexity. Traditionally, tacit knowledge is held by elder employees within the construction industry and passed over to new ones in various ways such as interaction, observation and so on. Also, with the emergence of technology and modernization explicit knowledge has been documented and accumulated within the industry in the forms of documents, databases, directives, standards etc. Even so, the industry seems to go on the traditional and conservative way of teaching new employees rather than utilizing the documented knowledge for learning (Ly, Anumba, and Carrillo, 2005). KM is significantly more important than ever for today's construction industry worldwide. That is due to factors such as construction becoming more complex than before and customers being more demanding. Therefore, construction corporations have to adapt to the situation and turn the concept of KM into practice systematically and implement it (Ericsson, Reismer, 2011).

Many different theorists have illustrated the management and learning knowledge in the construction industry. Styhre, Josephson and Knauseder (2004) point at the management of knowledge is preliminary through personal contacts and interaction informally, as the construction industry is regarded as conservative. According to Jonsson (2015) and Senge (1997) the construction industry comprises practice communities, each community carrying out certain professions. Whereas, Dubois and Gadde (2002) suggest that knowledge is created via collective adaptations within construction corporations leading to a shared understanding among the employees. In order to share and create common knowledge in such an environment, synergy and union are highly needed as Huysman and Wulf (2005) consider both technological (KMS-Knowledge Management Systems) and social elements to promoting joint learning in such an environment. On the other hand, Robinson et al. (2001) believe that merely a relatively small number of construction corporations in fact implement KMS (Knowledge Management Systems) and the management of knowledge is primarily practical. A study conducted by Carrillo et al. (2003) demonstrate that: 40 percent of construction corporations have a KM strategy. Another 41 percent plan to have a KM strategy in a near future. Also, 81 percent view KM as a possibility of development of their companies and some of them have already appointees such as senior managers or a KM group within the company for the implementation of their KM strategy.

The British Standards Institution (BSI) states that the cost of defects in the British construction industry is estimated to be £20 billion annually. These construction defects are directly a consequence of insufficient information communication and usage. Nevertheless, fewer corporations of the construction industry have adopted knowledge management practically (Ly, Anumba, and Carrillo, 2005). Thereby, theorists believe that KM is a rather new concept in a conservative industry such as the construction one. Even though the idea of KM is rather old but it has not been taken into consideration by explicitly and independently dealing with it, such as dedicating a department within the organization to handle it. Thereby, it is still in the stage of development as traditionally new employees within the organization have learned through others. Nowadays, the awareness of KM is prevalent and corporations as a part of their innovation convert the concept into practice by developing strategies and electronic systems dedicated to managing knowledge even though the process is rather slow (Lidelöw, Lundberg, 2016).

3.2 Knowledge

As previously hinted, theorists have various definitions for knowledge. The most notable of which is "*a justified personal belief*", hinted by the Greek philosopher Plato (King, 2009, p.3). The study of knowledge is called epistemology, which is divided into two versions, each defining knowledge distinctively: The epistemology of possession and the epistemology of practice. The epistemology of possession defines knowledge as something private which people possess in their minds. It highlights the psychological aspects of knowledge, where knowledge is considered as a mental ability of the human which can be developed, implemented and utilized for the efficiency of work. Whereas, the epistemology of practice demonstrates knowledge as something which people do and emerges from experience. The epistemology of possession denotes knowledge as a pyramid, where knowledge itself is a part of and comprises data, information, knowledge and wisdom. Every component of the hierarchy is coherent and leads to the other. This theory indicates that knowledge alone is not the whole entity but other knowledge-compliant factors complete it into wholeness (Newell et al. 2009).



Figure 3 Knowledge Hierarchy according to Newell et al. (2009).

Data: data is defined as concrete entities, such as documents which is the basis for information (Newell et al. 2009).

Information: information is defined as compiling and organized data, which also functions as the basis for knowledge (Newell et al. 2009).

Knowledge: Knowledge is further defined as a personal belonging in the individual's mind which is created out of information and data. It gives meaning to information and data, based on one's own insight and analysis of the compiled information and data as a way of sense making (Newell et al. 2009).

Wisdom: Accumulated knowledge creates wisdom by the individual which entails a better comprehension of data in the bottom of the knowledge hierarchy (Newell et al. 2009).

There are two types of knowledge which are known as tacit knowledge and explicit knowledge. Tacit knowledge is a type of knowledge which is hard to be expressed orally or explained in words and figures. It is the type of knowledge which people possess and is based on their personal experiences that is hard to articulate. Thereby, it

emerges from practice and is viewed as practical or empirical knowledge (Newell et al. 2009). Explicit knowledge on the other hand is the opposite of tacit knowledge and can be expressed literary and orally. It is documented in various forms, such as texts, tapes and figures. Due to that reason, it is viewed as theoretical knowledge. In other words, tacit knowledge is personal inside an individual's mind, whereas explicit knowledge is accessible (Dalkir, 2005). Moreover, individuals are unique. What is difficult for someone to articulate might not be that difficult by someone else. Thereby, in this sense the knowledge being defined as tacit or explicit is personal and individual-compliant. Dalkir (2005) highlights the context by stating that frequently it is harder for professionals to express the knowledge they possess, compared to other individuals. Thus, knowledge by experts tends to be of its tacit form.

As explicit knowledge is attested, it is easier to acquire through concrete tools such as documents, records, canvas etc. Tacit knowledge, on the other hand which is unattested requires some challenges to be acquired. Newell et al. (2009) argue that tacit (personal) knowledge in fact can be turned into explicit knowledge and then acquired by others. When the knowledge is converted, it can be shared among communities so they also obtain an approximate comprehension of a certain matter, without having to have had experienced it themselves. This theory highlights a context in which knowledge is a personal possession, like any other private belongings and can be transferred from one person to another (Dalkir, 2005). This theory of knowledge as possession that can be shared has been highly opposed by other theorists who are adherents of the epistemology of practice. These critical theorists believe that individuals cannot fully acquire the knowledge which is shared by a knower who has converted his or her tacit knowledge based on experience into explicit (articulated) knowledge, if a certain practical guidance was not provided by the knower (knowledge possessor). Thus, complete knowledge is acquired through practice, interaction and socialization not via instructions solely. This is when the knowledge possessor practically guides others on how to apply the articulated knowledge optimistically, even using signs and tools to make them experience what he or she has experienced. E.g. a chef inventing a formula for a certain food. Without him or her practically guiding others into how to make the food properly, those who remake the food might go astray despite having the exact formula depicting the chef's possessed knowledge. Thereby in accordance with this theory, knowledge is practice and emerges from experience (Newell et al. 2009). This example demonstrates: Learning by experiencing and supervision as two methods of tacit knowledge acquisition, which are also proposed by Dalkir (2005).

Other notable methodologies for acquiring tacit knowledge are the following according to Dalkir (2005):

***** Interview with Experts

Interviewing experts with many years of work experience in a certain domain is highly important for tacit knowledge acquisition. Dalkir (2005) attests structured interview and stories as key tools used for a successful interview. The meaning of structured interviewing is a detailed interview, based on extensive conversations, where the questions directed to the expert are previously structured, in a way that they clearly touch the matter under enquiry. To better comprehend the meaning of the responses provided by the interviewee, the interviewer should ask after exemplar stories, which are actual incidents that the interviewee has witnessed or experienced. The sagas support the responses of the interviewee and make them better trustworthy. By documenting the interview, the tacit knowledge possessed by the interviewee thus is converted into explicit knowledge and acquired. The process equals the externalization processes of the SECI model of learning (Evenson, Dubberly, 2011).

Learning through Interaction with Experts

Tacit knowledge can be acquired through physically interacting with people who possess expertise in a certain matter. The point of this method is to observe how the experts perform their work, confront challenges and efficiently make decisions. Subsequently, the knowledge seeker gets a clue of how things are done and catches the tacit knowledge. Additionally, the way the expert handles the challenges can also be documented in various ways such as writing notes, analysis, filming etc. Thereby, the tacit knowledge is turned into explicit knowledge and caught (Dalkir, 2005). The process equals the socialization and externalization processes of the SECI model of learning (Evenson, Dubberly, 2011).

Learning through Mistakes

This methodology of tacit knowledge capture is also based on experience. By making mistakes, one is able to experience failure and learn from it (Styhre, Josephson, 2006). The process equals the internalization process of the SECI model, which is learning through experiencing (Evenson, Dubberly, 2011), (Dalkir2005).

✤ Community of Practice

Dalkir (2005) further mentions collective learning and acquiring knowledge through communities of practice (CoP) as mentioned previously by King (2009). This means employees forming specific groups (communities) focusing on a common field of interest. The members investigate, share information and knowledge within the group through joint performances. Thereby, they learn from each other and acquire, create and elaborate knowledge in such a way (Wenger, 1998). The process equals the socialization processes of the SECI model of learning (Evenson, Dubberly, 2011).

✤ Electronical Learning

This methodology implies simulation programs, where one is able to experience the reality electronically via certain computer software. In this way, an approximate canvas of the reality is depicted and the tacit knowledge is acquired through electronical experience (Dalkir, 2005). The process equals the internalization process of the SECI model, which is learning through experiencing (Evenson, Dubberly, 2011).

3.3 Nonaka's SECI Knowledge Management Model

The SECI model, which is also known as Nonaka's model is a knowledge management model which is invented by Ikujiro Nonaka in 1991 and later revived by Hirotaka Takeuchi (Nonaka, Takeuchi, 1995). Nonaka views knowledge management as a knowledge creation and acquisition procedure (Serban, Luan 2002). Hence, the model solely concerns knowledge creation and acquisition through four conversions of the two knowledge forms: Tacit knowledge which is practical and personal knowledge and explicit knowledge which is documented and transferrable knowledge (Cristea, Capatina, 2009). The invention of the model is a result of the two researchers'

examination of the progress of Japanese corporations in innovation and creativity. The two researchers discover that the success of the Japanese corporations is not objective attached to mechanical factors but it is rather subjective, attached to the employees as knowledge owners and the way they share it among each other. In such a case, the success emerges from tacit knowledge. Nonaka and Takeuchi assert that Japanese corporations are group-oriented and based on unity. Therefore, knowledge is not individual-based but group-based instead in such a united environment, which facilitates its sharing, transfer and conversion (Cristea, Capatina, 2009). They view continuous knowledge creation as a basis for continuous innovation and continuous innovation as a base for the corporation's competition capability in the market against others (Evenson, Dubberly, 2011).

Nonaka believes through conversions of the two knowledge forms, knowledge is acquired or new knowledge is created. He divides the knowledge conversion procedure into four approaches, from which the acronym SECI is derived. SECI stands for the four approaches: Socialization, Externalization, Combination and Internalization. Each approach is a conversion process of knowledge from which knowledge is acquired and created by others (Evenson, Dubberly, 2011).



Figure 4 Nonaka's four knowledge conversions (Source: Allkm. Image by: Unknown, 2017).

1) Socialization (tacit to tacit)

Socialization equals transferring knowledge through social interactions, such as face-to-face contacts between individuals, communication and time spending in the place, until the knowledge seeker gets a clue and comprehends. It is the most natural way of knowledge acquisition and creation. Thereby, it is a tacit to tacit knowledge conversion. Theorists see that as a disadvantage, since the knowledge will not be documented and remains in its tacit form (Dinakar, 2009).

2) Externalization (tacit to explicit)

Externalization is the process of converting tacit knowledge to explicit knowledge. In this process, tacit knowledge will be explicated, documented and attested through various ways such as metaphors, workshops, notions, and figures. This articulation makes it available for transfer. Thereby, it will be

shared, exchanged and acquired by others as it is transferred from one's mind into the outside (Dalkir, 2005).

3) Combination (explicit to explicit)

Combination is the process of combining explicit knowledge with other explicit knowledge for creating new, extended or more complex explicit knowledge as a prototype. Examples of this process can be a report based on literature review, a summary of texts, a new model based on older models etc. Combination is an essential method for organizational innovation (Dinakar, 2009).

4) Internalization (explicit to tacit)

Internalization is the process of learning through practicing. The process basically involves implementing explicit knowledge into practice and thus experiencing and understanding it in an individual's own version. Thereby, tacit knowledge is created, acquired and internalized within the individual's mind, which can be further developed into new inventions. This process also promotes organizational innovation (Evenson, Dubberly, 2011).

The model functions in a spiral and continues way. New knowledge is generated in the individual's mind through applying explicit knowledge into practice and experiencing it personally. Such knowledge is considered tacit which is based on the individual's own experience or perception. Subsequently, this tacit knowledge is transferred to others via socialization, still not documented or articulated properly. Thereafter, the tacit knowledge is allegedly² externalized through dialogues followed by figures, metaphors and other aids which make it seized into documents and other tools. At that phase, the tacit knowledge is explicated, thus converted into explicit knowledge. The explicit knowledge is thereafter combined with other explicit knowledge making it further proper and organized to be shared. Finally, the manufactured explicit knowledge is acquired by the individual and applied to understanding it in one's own way. Thereby, the explicit knowledge is made into tacit again. The process continues in a spiral form according to Nonaka's SECI model (Easa, 2012).

² Many knowledge theorists do not believe in tacit knowledge can be made explicit (Easa, 2012).



Figure 5 The SECI knowledge creation & acquisition model with examples (Evenson, Dubberly, 2011).

3.3.1 Critiques of the SECI model

As Nonaka's SECI model is internationally recognized due to its simplicity which makes it easy to understand and apply, there are also several notable critiques to it resulting in major concerns. A main disadvantage of the model is that it solely encompasses knowledge transfer, acquisition and creation aspects of knowledge management which is vastly broader than these. It does not consider all the processes of knowledge management. In other words, it is considered to be a basic model as it does not imply to larger issues such as decision making utilizing the knowledge forms (Dalkir, 2005). Another main critique of the model is that it is based on Japan and the Japanese culture which is more united and social-oriented for knowledge transfer. Therefore, the model might function well in Japan but be less sufficient in other societies. That is due to the reason that individuals elsewhere might not be culturally as

social as the Japanese within corporations which results in a dull knowledge transfer. Additionally, criticizers argue that the model is not for an intercultural context such as being utilized for an international work environment. Therefore, its succession is based on a cultural homogeneity, which is partially not the case for today as many major corporations have employees of diverse backgrounds nowadays due to globalization. Also, most criticizers put the socialization mode of the model under enquiry. That is because communication is considered to be a major problem in front of the model with regard to team members' diverse educational levels, ages and experiences. Frequently, professionals use a more sophisticated language than others, which might lead to a difficulty of comprehension among them and the others. That is even if language diversity was not a case and all the team members used the same language. Thereby, the model highly neglects diversity as an issue and is not international (Gourlay, Nurse, 2005).

Criticizers believe that the function of the different processes or modes of the model is culture-oriented, a few of them either not really function or function better in some cultures than the others (Cayaba, Zelinna, 2013). E.g. networking is a prevalent practice in the Arab World, thus socialization is quite functional before the other modes. On the other hand, externalization, combination and internalization are less functional in the Arab World. Arabs tend to not like to externalize their own knowledge and want to keep it private until it is an absolute necessity of sharing their knowledge. Whereas, they are not that used to combination, as documentations require different management levels' approvals taking a longer time and procedure. When it comes to internalization, the Arabs trust the knowledge held by others, from whom they acquire via socialization. They do not tend to apply the knowledge acquired from the trustees to experience it themselves, due to their trust in the knowledge keepers. Therefore, socialization is mainly preferred in the Arab world as the main source of knowledge acquisition, before all the other processes of the SECI model (Easa, 2012). As for China, socialization and externalization processes are highly preferred before the others. That is because the Chinese are highly a networked people according to Easa (2012). They hold tacit knowledge within their networks and are merely willing to externalize their tacit knowledge and making it explicit to people whom they have relations with, inside their networks. Therefore, knowledge is shared within departments of Chinese organizations not between them. Thereby, the combination process of the SECI model is not wellfunctional. There is also a problem in the internalization process of learning by doing in China, due to the Chinese' fear of confessing mistakes, according to Easa (2012). As for Russia, once again the modes of the model function differently as not all of them are preferred. In contrast of China and the Arab World, in Russia the socialization and externalization modes are not well-functional. That is because of the Russians' unwillingness of sharing their knowledge with others. The Russians seem to be more individualistic rather than group-oriented. Furthermore, the combination process is also limited in Russia, due to the reason that Russian corporations tend to keep any information secretive which is related to business. Additionally, the internalization process is not really helpful either for learning due to the same reason as China that the employees fear to admit mistakes. Thereby, once again the SECI model encounters limitations asserts Easa (2012). Such examples put the trustworthiness of the SECI model under enquiry and indicate that it functions separately or partially in various regions of the world (Bratianu, 2010).

On the other hand, critics revolve around the externalization process of the SECI model and believe it is not entirely correct as they argue tacit knowledge occasionally cannot become explicit (Cayaba, Zelinna, 2013). E.g. how to hold a balance when cycling cannot become explicit regardless how extensively it is explicated, unless somebody tries the action himself or herself to experience how it is like and learn from that experience argues Easa (2012). Therefore, these criticizers consider the externalization process as limited as some tacit knowledge cannot be explicated. Other criticizers question the validity of the SECI model. They argue that Nonaka has founded his model based on senior managers only, without taking other managers into consideration such as middle managers (Easa, 2012). In addition, criticizers believe combination and internalization modes are more if not the important modes for creating knowledge compared to the others. They argue that tacit knowledge is generated by the individual through explicit knowledge in the process of internalization by applying the explicit knowledge and creating the tacit one out of it. And this explicit knowledge which gives birth to the tacit knowledge is arranged and manufactured through the combination process of the model. Then the newly created tacit knowledge can be shared via socialization and re-made into explicit via externalization. Thus, these two processes of internalization and combination are the main sources for creating new knowledge within the organization (Easa, 2012). Other criticizers argue that Japanese corporations pay more attention to tacit knowledge which is in compliance with the socialization mode of the model. Whereas western corporations set focus more on explicit knowledge which is associated with the combination mode of the SECI model. Thereby, they view the combination mode as the essential knowledge creation source in comparison to the others (Bratianu, 2010).

Furthermore, some criticizers argue that Nonaka demonstrates tacit knowledge and explicit knowledge as separable, whereas in fact they are inseparable as knowledge is neither fully tacit nor explicit (Easa, 2012). They believe tacit knowledge is needed to understand explicit knowledge and vice versa. Thus, they complete each other to be understood and acquired by individuals (Gourlay, Nurse, 2005). Furthermore, criticizers believe that Nonaka's model fails to explicate how an individual's mind produces ideas itself leading to new knowledge creation but it relies on external factors to transfer knowledge into the mind. They believe it is incompatible with the concept that knowledge originates in the individual's mind as Nonaka demonstrates that knowledge is compatible with actions. On the other hand, other criticizers believe that Nonaka omits the fact that knowledge is personal and not everybody is willing to share it (Bratianu, 2010).

4 Empirical Study

This chapter is based on interviews with various project managers with different experiences and ages. It is an endeavor to depicting the reality through the project managers' experiences, where personal and generic questions about knowledge acquisition at workplace are enquired. Here, the theoretical study is confirmed with the reality the managers have experienced within their work life.

4.1 Questions of Interview Guideline

QI: What is the history behind the beginning of your working life? How does the company train the new employee to get adequate knowledge?

QII: How long did it take until you began to rely on yourself without turning to others for guidance?

QIII: Which of the following knowledge sources have been of most assistance throughout your career, based on **SECI Knowledge Acquisition Model**:

- Socialization (interaction, communication with experts, observation at site etc.)
- **Externalization** (workshops, lectures, symbols and figures)
- **Combination** (literature review, reports, analyses etc.)
- Internalization (learning through experience)

QIV: What is your personal advice to future managers entering their working life?

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4.2 Interview Analysis

1. Work Biography Related to Companies' Training Methods for Beginners

Philip: Philip announces that he has been only 17 years old when he has first began working in the construction sector as he simultaneously has studied his engineering program at Liverpool University. Thereby, his career as a future project manager begins with a juxtaposing process as a new engineer and a student at the same time. Initially, he is assigned to a senior manager to supervise him as his guide. Once a week he is working and is given minor tasks to carry out by his supervisor, such as revisions of architects' drawings, calculations, information collection and similar tasks. Whereas, the rest of the week is comprising his academic studies at university. By time the difficulty of his delegated tasks escalates. Despite delegating him tasks to perform, the senior manager also takes Philip with himself to seminars for listening and observing, as well as to site visits and other managerial events to acquire knowledge in the profession. This indicates learning by doing (internalization) and socialization. In summary, the process of learning has been dualism: Learning the theory at college and the practice on site jointly. Consequently, by the time of graduation the new project manager has been already established and just left the academics and remained on the working field. Also, this dual process of learning has been one methodology in the UK, not an obligation. Other students have also been able to solely focus on their academic studies instead.

Karin: Karin has graduated during a recession, when new jobs have been rare. She has initially begun working as an assistant at a concrete company for a few short months. Later, she begins working as an intern for four months at Göteborgs Enegi corporation where she manages building boiler rooms for district heating. Thereafter, she is employed at Skanska and works as a project manager for the construction of a district heating project at Kungsbacka in Sweden. The project has been sophisticated due to the technology being rather new in Sweden. After that, she has worked as an installation coordinator for a further medium-sized corporation named SPS based in Kungälv, Sweden and continued working with management of installations in various projects at Bohus and Sorte regions. Thereafter, she begins her real career with managing construction projects, contract relationships, procurements, calculations within the construction sector and gets stabilized. Among the many construction projects of hers, Karin has managed many hospital projects. After a period of learning her profession and acquiring enough knowledge, she has been allowed to choose any task she has desired within a range of tasks of the company. Frequently, she likes to choose what is more challenging as a hobby. She discovers that she is more into production, structure, order and signing contracts thus decides to continue with management as her specialization.

According to Karin, she has been assigned to a senior, experienced manager as a guide for her and other beginners like her during the initial period of her career. However, he has not been present all the time for her. Thus, she has to contact him frequently through telephone or visit him whenever it is needed. Karin further describes that she was sent out on projects to cope with the situation on her own very early on in her career, with having the senior manager as an indirect supervisor. This meant encountering her fears and worries on her own but having the backup support from the senior manager to not fail. She thinks this method of knowledge acquisition has formed her as a manager to overcome obstacles alone fearlessly, which promotes creativity and to dare confronting challenges. On the other hand, working at various domains and phases of engineering has also formed her as she claims. From every domain or phase of construction engineering, she has acquired some knowledge. Together they have become pieces of the greater canvas leading to the formation of the entire engineering picture consequently. This means finally mastering her profession, by the time she decides to solely adhere to the management domain.

Daniel: Daniel has begun working in parallel as he has been studying to becoming an engineer. In this way, he has acquired both tacit and explicit knowledge forms simultaneously. His first job has been about managing in finding a new method of building a new lighter type of concrete brick with companions at a corporation in Yazd, Iran. Thereafter, he has been working for another company based in Tehran with the responsibility of controlling construction materials. Afterwards, he has been working as a sales manager for the same company. After a while, he takes a larger step and finds a small company himself as a building contractor in partnership with four other companions. All of them originally being civil engineers. The company undertakes the construction of medium-sized buildings. This is when he encounters his paramount challenges in engineering and management. He continues working at his company and other ones, as a civil engineer for seven years in Iran.

Daniel states that he has been very uncomfortable and stressful at the beginning of his work. However, he learns profoundly from an experienced engineer at work in Iran, who becomes his guide into learning the profession. Even at the beginning of their own company in Iran, they make numerous mistakes, which results in knowledge escalating but lower profitability.

Also during his initial period of work at his portal company in Sweden, he begins wondering a lot of questions himself, such as "Why we have all these things? How to use them? What is the relation between the work and the items etc." These questions assisted him into better understanding and acquiring knowledge. There, he is assigned to a manager who also happen to be a Chalmers University graduator, from the program Design and Construction Project Management, MSc. Whenever he has questions or gets stuck in his tasks, he turns to his manager for guidance. However, that does not limit him from asking other experienced employees there, whom he interacts with and turns to after need. He continues to interact with anyone at the workplace, even normal workers and asks them about the beginning of their work at the company and the challenges they have encountered. That is to learn from them and establish himself there as every company is unique. Furthermore, the company itself sends him out with workers to observe and learn. In addition, project managers have almost weekly visited the company and held workshops for the employees, to share their knowledge which has been a knowledge acquisition endeavor arranged by the company for its employees.

Malin: Malin states that they acquire knowledge in various ways at her company. Partially introductory (explicit) knowledge via the company's knowledge management system (KMS) but also practically through socialization with colleagues and executives. She personally has been working as a junior project manager, assigned to a senior one as her guide for one and a half years, prior to getting her own responsibility as an independent project manager.

Johan: Johan announces that the main reason for him to work within the construction industry is that his dad is a part of it and works as a construction manager on site. During his childhood, he has followed him to his work at various construction sites. Eventually, this leads to Johan assisting his dad during vacations and holidays after his ability when he grows older. This upbringing results in efficient knowledge acquisition in the construction branch directly from the start. When he is employed at his current company, he further takes an education at the company called "Three First Years" back then. This education is the company's knowledge management for new beginners and goes simultaneously with their work. It assists him profoundly in learning his profession, aside from his academic background and childhood learning. It comprises lectures and activities, in accordance with schedule. There is also lots of information to obtain from his company's knowledge management internal network, which leads to explicit knowledge acquisition. There are many "help templates" and a direction known as "Vårt Sätt Att Arbeta" (Our Way to Work) to download embedded within the company's knowledge management network. Apart from these, one can also seek assistance from colleagues and "if one has luck, he will get a mentor to seek help from" Johan states.

Joakim: Joakim states that he has begun working at his company in roughly ten months now. He has been an intern for the last nine months. His main knowledge source has been working with experts and senior colleagues in different projects, when he has constantly asked questions about matters which he has not comprehended or matters which he has been willing to learn more about. The company has blended him with senior managers to follow and learn from practically, as he has also been given smaller tasks to carry out himself in the meanwhile. This is the company's methodology for teaching new beginners, which strongly points at practice and interaction.

2. Obtaining Enough Knowledge

Philip: After beginning to work at the age of 17, according to Philip it has taken five years for him to be really qualified to mainly rely on himself. By the age of 22 he has been basically able to cope with smaller jobs but has had still a senior guide for assurance. However, even then he has not been allowed to directly talk to clients or architects like senior project managers. If he has had to do so, he has needed guidance and allowance from a senior manager of the company. This phase also has proceeded until the age of 24-25, when he has been managing his own smaller projects without supervision. By the age of 25 Philip has managed four projects simultaneously for his corporation in 1974 worth £20 million in today's estimation. Philip states that learning has been faster through working with smaller projects rather than larger and more complicated ones. So that his knowledge acquisition process has escalated gradually by time. In the meanwhile, if he has been delegated to participate in larger multi-million projects then his task has been handling one aspect of such a project not more. Whereas, in the case of smaller projects he has been responsible of the entire project lifecycle and all aspects of it. At the age of 30, Philip has been vastly self-reliable and gone abroad to work internationally. All the challenges of the construction management have remained the same then but the payment has risen in comparison to the UK projects at home. Once again in such a situation of working in a foreign country, Philip has been in need of guidance from local project managers to be able to run his projects. From now on, he also learns from the international project managers as every individual is unique in terms of their techniques and methodologies of management. However, the basic principles remain the same, Philip hints. In summary, Philip states that the core

knowledge acquisition for him has ranged between the ages 22-30 in understanding his profession successfully. Afterwards, the learning process has slowed down into observing new techniques, innovations and learning from others. So, the knowledge acquisition never ends but changes forms. It is a long-term and slow process, Philip announces.

Karin: Karin strongly opposes the term of reaching self-reliance. She repeatedly states that she stood on her own feet from day one of her work, as her senior manager guide was not present at workplace for her. However, he has been really generous and always stood by her when she has needed him. This characteristic of generosity and kindness from her guide has encouraged her to dare asking questions constantly and made her stabilized right from the start, even though she has been "*thrown out on large projects very early on*". She states "*if you could not manage in uncertainty, then you are not a project manager*". On the other hand, a real stabilization or perfection is never achieved Karin claims, as every project is unique. Success in one or numerous projects does not mean success in the next one.

Daniel: Daniel states that normally after managing and observing two projects entirely, one gets the canvas of the profession and becomes stabilized. However, that depends on the project size and it is individual-compliant as well. It depends how much one observes and struggles to learn. Being taught to do certain things is not enough for learning. One must have the ability and the interest to seek further knowledge on his or her own.

Malin: Malin states that after the limited time interval (one and a half years) as a junior project manager who was guided by a senior one, she allegedly was recognized as a qualified project manager in the company and assigned to tasks independently. Though, she believes that a proper stabilization is never reached, as projects are unique and problems related to them are diverse. However, she is stabilized mentally due to "*I know that I have always a boss or colleagues to turn to if there was something I felt uncertain about*" she claims. In this case, coherence which leads to cooperation and a mentally comfortable work environment is essential for everybody's success in the company.

Johan: Johan states that he has constantly changed services at his company. Therefore, he has never felt completely at home with any of his previous careers, until a couple of years after that he has begun working as a project manager. He further points out that he grew and gained progress with good feedbacks from his bosses about daring to take greater responsibility and be self-reliant.

Joakim: Joakim announces that he still inquires considerably and requires support in many tasks. He states that even though that he has a good self-esteem and trusts himself but there is still much to learn. The work is varying and one is repeatedly a part of new situations, with new problems and challenges to resolve and learn from. Joakim believes he needs to be questioning and asking for assistance for many years to come, based on what he has witnessed so far regarding the diversity and complexity of engineering work. He believes that a proper self-sufficiency is hard to accomplish within a proposed time interval as projects are unique. Therefore, the main reliance for everybody's success is cooperation in a socially good work environment.

3. Most Assistive Learning Process of SECI model

Philip: Philip states all the knowledge acquisition processes of the Nonaka's SECI knowledge model occur and are important. However, based on the individual's experience a few of them might have been more helpful and ubiquitous than the others. When it comes to workplace Philip's main knowledge source has been **socialization** of the SECI model, especially in the forms of interaction with others and observation. This is followed by **combination** of the SECI model in Thomas's learning biography. They are also followed by many years of work experience, leading to **internalization**.

Philip believes observation has been one of his main methods of learning, such as capturing people's ideas, the way they carry out tasks and learning from their mistakes while interacting with them. Also, looking at people's negative and positive sides, take the good and neglect the bad one, as he further states. So, the learning process is practical and psychological. According to Philip, it takes 15-20 years of work experience before getting to this point. One needs at least 15 years until (s)he gets secure, before being confident and then the learning process never stops. It is continuity, just as Nonaka's knowledge model. Each new project brings new challenges, meaning new observations and thus new knowledge to acquire.

Philip has done his master's studies in construction management at the age of 42, which means coming back to academics after a long period of work. According to him, his knowledge in his profession has increased dramatically along with his master's studies focusing only on management aside from his previous bachelor studies which have focused on overall aspects of construction engineering. This equals the combination process of Nonaka's knowledge management model, where pieces of theoretical explicit knowledge are combined to form further knowledge by the individual. His master's studies have aided him in understanding his profession in depth, explicitly and extensively as bachelor studies are on a basic level. So, the theory once again has completed his knowledge acquisition along with his empirical experiences over the years, especially in management. Philip states that his academic studies on master's level gave him visions, the ability of seeing the larger canvas and questioning things on a broader basis, thus evaluating them critically. So, by returning to academics in his 40s, now he is able to put all the pieces together to form the larger picture, as he is already equipped with empirical (tacit) knowledge. Philip further states theory and practice go hand-in-hand and without any of them one cannot become professional in his career. He also wishes that he has done his masters studied long before that age. Therefore, the theoretical (explicit) knowledge has an equal importance to the practical (tacit) knowledge, according to Philip. This is precisely an opposite view of the many who claim that most of the theory studied at universities is not in fact needed for working life, one learns his profession merely through practice.

Karin: According to Karin, **socialization** of Nonaka's SECI knowledge management model has been profoundly important in her work biography. However, the other knowledge acquisition processes complying with it are vastly important as well as they all are complementing the entire knowledge acquisition circle. E.g. she has taken courses and attended workshops run by experts simultaneously with her work to acquire more explicit (theoretical) knowledge and apply it in her work. This process equals the externalization, combination and also internalization processes of the SECI knowledge acquisition model. Thereby, depending on the individual's experience one or more process(es) of the SECI model might be more helpful than the others, but they all are

needed for the entire learning process. One specific course which Karin has taken has been a leadership course assisting the specialization of her management profession. Karin further adds that through the years one accumulates his or her knowledge. Therefore, the knowledge acquisition process is a never-ending and escalating process.

Daniel: Daniel believes **socialization**, in the forms of interaction and observation at workplace, is very important for new beginners to obtain knowledge. The beginning of his knowledge acquisition at site has been based on: Observation, guidance by the experienced, questioning issues at site himself and communication with older employees at various ages with various responsibilities at workplace. However, the other knowledge acquisition processes of the SECI model follows and might be differently important at various stages of working life. As highlighted previously, while learning through socialization at workplace day-to-day, workshops were weekly arranged by his company, where experienced managers were invited to share their knowledge. The process equals externalization of the SECI knowledge management model. Thereby, all the knowledge processes of the model are present at various periods of working life and their importance differs depending on where someone is in his or her career, when socialization comes first for beginners and the rest follows.

Daniel further states that the way one shares his or her experimental tacit knowledge is highly important. Many people, especially experts who know considerably in their profession lack that ability to be efficient knowledge sharers. He demonstrates an example to support this claim which is that besides having his senior manager to ask questions, he also occasionally turns to an older employee in the company with 30 years of work experience. Frequently, he comprehends nothing or very little from the expert's explanations or vice versa, the expert does not understand his question to give him a proper answer. This puts the process of tacit-to-explicit knowledge conversion (externalization) under enquiry.

Taking his biography into account (studying and working back and forth), Daniel states work experience is very important for learning. It helps to understand the theory one studies at university and it becomes more familiar on how to apply it. Otherwise it is just based on imagination, as one has no experience about how it is like when the explicit (theoretical) knowledge acquired at academies is applied in reality. That means work experience implies the internalization learning process of the SECI model: Learning through turning explicit knowledge (theory) into tacit knowledge (empirical), which means learning through practicing. Therefore, work experience eases the comprehension and acquisition of explicit knowledge and converts it into tacit knowledge. This methodology of working and studying has helped him profoundly in his career to get a broader picture of his profession, as he is a master's student of management contemporarily after many years of work.

Malin: Malin states that despite being assisted by a senior manager and her companions at workplace to learn, her main learning source has been the **internalization** of the SECI knowledge management model. She believes that "Even if one was said to do certain things, it is meaningless if you do not turn the instruction into practice and experience how it is like! Only by then the knowledge settles inside the mind and is properly acquired."

Johan: Johan insists on the **internationalization** process of the SECI model to be most efficient for knowledge acquisition among the other processes. That is because "*It is a combination of all the other processes together*" as he states.

Joakim: Joakim states that **socialization** of the SECI model has been his main learning source so far in the beginning of his working life.

4. Personal Advice to Future Project Managers

Philip: Philip suggests working in a corporation equals isolation, a circled and closed environment. Thereby, one does not learn that much from that in comparison to changing environments. That is why companies should send out their personnel to courses, meeting other personnel, discussing things from other angles etc. This process further results in new knowledge creation, innovation and development. So that environment change is complaint with the knowledge acquisition and creation process.

Karin: Karin's main advice to new project managers is to be social with the others and see themselves as a part of a team to accomplish a common goal. Karin states "*participate with what you are good at and learn what you are less good at from the others*" which means unity is vastly important. Furthermore, to not be afraid or shy to ask questions. It is better to ask rather than fail. Also, to dare confronting challenges and "*not being afraid of jumping into the deep water*". One gets a lot of knowledge through that method which has been her own initial method of learning. Moreover, to not isolate oneself in one domain of engineering but to dare to undertake new tasks, which one is not very familiar with. Only through having experiences more or less in everything, one can be a real project manager to get the overall picture of the engineering profession and to cope with the entire project lifecycle. As a final piece of advice, Karin announces that enjoying your profession one can never be successful. Therefore, students must be very careful about choosing a career they are interested in prior to studying at university.

Daniel: Daniel has several pieces of advice to young new project managers such as:

- Start a good beginning with others at work, be as social as you can and make your network until you stand on your feet. If they had a party, be there! Have a personal relationship with the personnel, so they interact with you accept you as their manager. This acceptance is very important by the workers who already have lots of knowledge in the profession in comparison to someone new as you who just enters their workplace. In order to be accepted by the workers as one above them, whom you are not in relation to knowledge initially, you must be interactive with them. Otherwise, you get isolated and not taken seriously as a manager. So, creating a coherence psychologically is very important for succession. Daniel also states, that workers who are mainly young adults frequently discuss bed-related, private matters of life among each other at work. One might not be comfortable with such discussions which might result into being less socialized among them.
- Do not stand by and wait for tasks to be given to you to acquire knowledge. Work on your learning by yourself, such as asking experienced employees "*I like to follow* you to meetings, I just want to be present there for observation". If they allowed, follow them on their work, for one to two weeks. Even if they were unsure and

rejected, do not give up and insist! Or ask your boss (e.g. the senior manager assigned to you) in the company to find you someone for the same mentioned method of learning. Being open and diplomatic by gently using the appropriate language are of high importance for such matters to drive your agenda. E.g. informing your boss "You pay me, you need my performance in the best way. Therefore, delegate someone so I follow to learn". Shyness can be the greatest hindrance in front of the learning process of a new employee. Even during lunch time go to the employees of the same profession as you and ask them "What was your failure? How can I impede it? What is your experience in the company? How did you learn here?".

- Many companies have knowledge management systems (KMS), read their projects as archives. Thereafter, ask the managers "What happened? Why was the outcome like that?" Subsequently, go and pay a visit to the project. Even ask the project users, what problems they have today. This is one paramount way of learning by observation, which is a very important initial step for new project managers who do not have experiences of their own to learn from. Therefore, one must turn to others' experiences to learn.
- Socialize with people working at other companies, e.g. through social media to build connections with the outside of the same profession. This will heighten your status in your own company. They will entrust you to send you out in partnerships with other corporations for conducting projects cooperatively.
- Be kind to authoritative personnel of the company for getting your job delivered. E.g. you will need permission from a certain executive to studying special courses helping your career in the organization. E.g. Daniel here shares a personal experience where he constantly socializes with a female executive responsible for courses of his company in Sweden. He even brings her chocolates as incentives. She in return, allows him not only to take the course he desires but also to take several others to acquire extensive explicit knowledge.
- "What is my responsibility?" shall be the initial question in your mind prior to working with any task or in any project.
- Specialize yourself in an area initially and later get knowledge in other areas as much as you can.
- As a project manager when you encounter a problem: research on it firstly, find others' resolutions, then inquire it yourself and manage into resolving it. This characteristic of management, Daniel has learned from his senior manager at his Swedish company, where has been an intern for approximately four months. This methodology of resolving problems indicates finding an appropriate solution not only based on your own experience but also on others' experiences as well, as your own experience might not be right all the time or valid for all sorts of problems. Therefore, obtaining a resolution in such a way means it is the most optimistic one.
- Try to not demonstrate that you are single if you were, concerning private life relationship status. You might get social problems, as people easily blend social life with work life. This will affect your performance and work environment. Thus, it becomes a barrier socially in front of your knowledge acquisition.

Malin: The most important advice given to future project managers by Malin is to "dare to entrust one's colleagues". By that statement she thinks the information and

knowledge coming from the colleagues shall be trusted by you who are new and received without doubts. Also, during co-operations one shall entrust the colleagues' approaches for solving problems. You and the colleagues might have different thoughts for solutions, based on your diverse knowledge and both might be right. Just because of having no knowledge in the colleagues' approaches does not mean they are wrong. This issue of entrusting colleagues' knowledge is a main obstacle within organizations nowadays leading to tensions and incoherence among the employees. Asking for clarifications is the best method for overcoming such an issue and also learning something new.

Johan: Johan's main advice to new project managers entering working life is to be humble and not afraid to take steps by your own. He states that he senses there is a greater lack of prestige nowadays in the contemporary building industry in comparison to ten years ago when he entered it. One goes long in his profession via demonstrating his or her humbleness and being courageous to ask.

Joakim: Joakim's main advice for new project manager at workplace is to dare questioning and not being afraid of making mistakes and own decisions to develop further. In other words, courage which for many is a difficulty in a new place is an ingredient for development and success, vastly needed for beginners.

4.3 Results

In this chapter, the accomplished results of the empirical study regarding knowledge acquisition for beginners are assembled and demonstrated based on the interviews.

1. Studying and Working Jointly

Philip and Daniel had not graduated as they had begun working with engineering. Whereas, also companies offer further temporal education such as courses for their workers when they begin working by them. This was the case for Johan who had studied a course called "Three First Years" at his company when he had begun working. In this methodology tacit and explicit knowledge are together acquired simultaneously which means getting the knowledge, experiencing it and then understanding it as a fast way of learning. In this way, it will settle down inside the mind. Explicit knowledge is acquired through the studies of academies. However, even though the knowledge is obtained, one does not know how to implement it and visualizes to understand it. This resembles hearing something without seeing it. Thus, the process is not complete, as one uses visualization to understand the situation. Since practicing or experiencing is not included, the acquired explicit knowledge can easily be forgotten. Therefore, studying a profession and working at it simultaneously is the essence of learning it, as one experiences it. Those who had later studied masters in their profession all pointed at the same conclusion: The practice helps to understand the theory. This implies the internalization process of Nonaka's SECI knowledge acquisition model, as a process for not only acquiring knowledge but understanding it and keeping it permanently inside the mind.

2. Supervision by Experienced Supervisor

The empirical study demonstrates that the main method of teaching new graduators is by assigning them to senior managers to guide them through their knowledge acquisition journey and challenges within corporations. The degree to which these senior managers dedicate themselves to their disciples varies between one another. A few do that extensively by even accompanying the new graduators to their own meetings and conferences for observation as a way of learning. However, others do not tend to be that close to their disciples but are available through telephones and other indirect contacts when needed. Thus, there are direct and indirect supervisions by the senior managers. This method of guidance for acquiring knowledge equals a gradual stair-like method of learning, where knowledge is escalating by time. In other words, it resembles nurturing at workplace, between a senior colleague and a junior one likewise a parent and his or her offspring. By time less nurturing (guidance in this context) is needed, when the new project manager reaches a level of mainly relying on oneself and standing on his or her own feet. This was the case for all the interviewees: Philip, Karin, Daniel, Malin, Johan and Joakim. Even if the company did not directly assign a senior manager to the newly graduated employee, naturally one follows senior colleagues for guidance. So, it is also a natural process for acquiring knowledge. This was case for Daniel from Iran, who had not been assigned to any specific senior manager but had himself followed an experienced colleague for guidance and learning. Although, all other interviewees asserted that despite having a specific senior manager to look up to, they were highly reliant on their experienced colleagues for constantly learning new things and guidance. Therefore, following senior people at corporations as an initial source of knowledge seems to be a logical and prevalent way of learning for newcomers according to the empirical study.



Figure 6 Most common learning for beginners (Source: 123rf.com. Image by: Rosu).

3. Massive Pressure from Start

In contrast of the traditional teaching method consisting of gradual learning, another methodology was: Directly throwing the new graduator into the deep water to learn swimming but with an indirect support of a supervisor. In this way, a balance was reached: Not to drown (being successful) and also learn from the pressure. This was the work biography of **Karin**, from an older period (1980s). It related to one case, thus was rare. According to Karin, the profession of project management equals profound physical and also psychological challenges which complement each other. She states "*Not being afraid of jumping into the deep water*" (2017), that a project manager learns to learn right in the start by being exposed to challenges to overcoming psychological

fears which leads to creativity formation and learning from one's own positive and negative experiences. When if a negative experience emerged, there is always assistance from the surrounding. This methodology of learning implies independence in seeking knowledge, that knowledge acquisition is a more personal process. A new employee is a knowledge seeker and must not only acquire knowledge from others but also primarily discover it himself or herself. It is noteworthy that Karin is mainly the only interviewee to interconnect knowledge acquisition with psychology, which plays a main role in the learning process.



Figure 7 The project manager Karin compared her learning biography with a new swimmer being thrown into the water to learn swimming but indirectly being supervised by a body hook to overcome her fears and control them (Source: exceliteplas.com. Image by: Cooksey).

4. Knowledge Management System (KMS)

As time moves forward and corporations modernize, nowadays the companies possess specialized knowledge management systems and electronic networks for newcomers to acquire explicit knowledge simultaneously with tacit knowledge as they work. E.g. in the case of Johan's company, as one of the most prominent construction companies in Sweden and internationally, they had the "*Our Way to Work*" direction (Johan, 2017) as a guideline for employees to read, along with other electronical help templates. Thus, the learning process is dual and encompasses both tacit and explicit knowledge forms.

5. Knowledge Sharing and Transfer

Workshops run by experienced personnel are arranged by the company as a part of training new employees to acquire knowledge in both of its forms. This was the case for **Daniel**, who claimed that approximately every week they had workshops related to their work at his company where he had an internship for approximately four months. This is a method for sharing and transferring knowledge spirally and continuously within organizations, from seniors to juniors who will consequently become seniors by time and yet transfer their knowledge to newcomers in the organization. Thus, in such a way knowledge especially in its tacit form which is based on individuals' work experience will be preserved and shared within organizations. Even if the knowledge

possessors one day no longer remained in the organization their knowledge will remain and be acquired by new generations of employees.

6. Most Assistive Learning Process of the SECI model

It is noteworthy to remind that the SECI model is a spiral model of knowledge management for creating, sharing and transferring knowledge within organizations. Therefore, all of its four modes are coherent and rely on each other. Thereby, the interviewees have experienced all of them. However, a few of the model modes might have been more prominent for the knowledge seekers to get more knowledge and learn more from. Thereby, the interviewees reflected to a few of them as more assistive for new beginners in corporations based on their experiences.

The new graduators seem to use observation at site and interaction with senior employees as the most prominent ways of acquiring new knowledge. The empirical study exhibits that the majority of the interviewed project managers are for socialization and internalization, or a combination of both which both rely on the individual and involves practice. However, that depends on the period of working life, which the study exhibits that initially socialization is very important to obtain or receive knowledge when one is a beginner. However, one does not really learn it unless he or she experiences it by implementing it into practice. Only through the practice of the obtained knowledge a true learning emerges. This is therefore, those who chose internalization as the best learning method state "if one was said to do certain things, it is meaningless if you do not turn the instruction into practice and experience how it is like! Only by then the knowledge settles inside the mind and is properly acquired" (Malin, 2017). By that they hint only through practice of the acquired knowledge, a true learning emerges in the individual's mind. This comes despite of them having received knowledge through socialization at the beginning of their work life. Also by observing Nonaka's SECI model, it is realized that the internalization comes last in the circular learning model, which turns the received and explicated knowledge into practice to be learned. This is in compliance with Johan's statement (2017) "it is a combination of all other processes". In the empirical study Philip, Karin, Daniel and Joakim reflect to a process similar to socialization as the best learning process. Whereas, Malin and Johan point at internalization. However, as mentioned previously they all have experienced and acquired knowledge from the other SECI model processes (modes) as well but prefer the two mentioned over the others.



5 Discussion

In this chapter, the overall major results of the study (both empirical and theoretical) will be evaluated and juxtaposed with critical, contemporary and future concerns.

The studies of knowledge associate knowledge either with personal possession, something private inside the human's mind or with practice, something which people do. However, by paying a closer attention to Nonaka's SECI model and its modes it is noticeable that knowledge is aligned with practice, according to the model. That is because, all the four processes of the SECI model are associated with practice. Even reading and writing down reports, analyses and similar documents are practice as a regard to the combination process of the model. In such a case, it does not matter as studying at university or being at workplace, knowledge acquisition is associated with practice. However, knowledge as a personal possession is also valid concerning tacit knowledge. Tacit knowledge is private and emerges from one's own experience, which is created through the internalization process by applying explicit knowledge into practice. Thus, the produced tacit knowledge is a personal possession as every individual can understand things in his or her own way.

Nevertheless, what the SECI model of Nonaka does not hint at is individualism. The model illustrates knowledge creation, transfer and learning collectively at organizations. Also, the personality and the extent of the knowledge seeker's efforts are essential for escalating the learning process, as the interviewee Daniel hints at. Hence, individual-related factors which affect the learning process can be: Daring to ask questions; asking for services by experienced ones related to learning and insisting on the demands, even if they were rejected; dedicating some vacant time to researching on the company's previous projects etc. These require a revolutionary spirit and courage which unfortunately many new graduators might lack. Another main individual-related factor is the personality of the knowledge seeker. Being social and open to attracting others for socialization is a fundamental challenge, as some might have a difficulty in having that characteristic. Thereby, this demonstrates that the learning process is paradoxical: It is individual-based (what one can do) and group-based (assistance which one can be offered by co-workers).



Figure 9 The knowledge acquisition process is dualism: Extent of one's efforts of learning & others' assistance (Source: Customerserviceexperts.com. Image by: Donnelly).

However, the function of the SECI model within different work environments might put its validity under enquiry especially concerning socialization. It is not certain that all the members of a team are equally social or interactive, even if all of them were from the same culture (in this case Japan). This is the main weakness of Nonaka's model. The degree of socialization among individuals differ depending on their home and national cultures. In contrast of the interviewees' positive view of this domain, there are constantly people who feel depressed and isolated by others at workplace which leads to a barrier in front of their knowledge acquisition socially. Thereby, the model is environment-compliant and functions differently in accordance with the sort of work environment and the personalities of that environment.

Additionally, one interviewee (Daniel) also states that the workers are mainly young adults and have sensitive adult conversations while interacting with them. Thus, the following questions arise: Who says that the new employee likes such conversations? Or have such a personality as them to be interactive with such people? And shall one change himself just to fit in and learn from them? Such questions tell us that the socialization will be a definite challenge initially to new employees. The situation deteriorates when the new employee is actually a new graduator, highly in need of learning from others and needs the workers to accept him or her as their manager even though the new graduator lacks their knowledge.



Figure 10 Will the environment at workplace be as social as one is? The function of the SECI model is environment-oriented, therefore limited (Source: acostamed.com. Image by: Unknown)

Furthermore, having the ability to share or explicate tacit knowledge is a major problem especially for experts who know lots in their profession. The empirical study illustrates a case of an elder employee with 30 years of experience, when neither can he understand the knowledge seeker nor can he explain his knowledge properly. Thereby, the knowledge seeker in return does not understand him either. Whereas, the knowledge seeker turns to a younger employee who is his senior manager with the same questions and both of them are able to understand each other. This example corresponds with the theoretical study which states that experts have a weakness in expressing and transferring their knowledge. Thereby, such questions the trustworthiness of the externalization and socialization processes of the SECI model, as the more knowledge

one possesses the weaker one becomes in sharing it with others due to knowing a lot and expressing it in a rather professional language. In other words, Nonaka demonstrates the ways to transferring, creating and acquiring knowledge. However, the individuals' abilities are vastly important for succeeding the model. This example once again inquires the validity of the SECI model.

Finally, by examining the empirical study we are able to understand that the learning process of one's profession is a continuity, where a proper stabilization is not likely reached in the sense of fully relying on oneself after a period of knowledge acquisition without getting trapped. That is because projects and problems complying with them are diverse and different. Moreover, time and encountering new workers and environments imply new techniques and methodologies. Therefore, coherence and interaction at workplace are extremely important and everybody's succession, including the company's, depends on them. This once again puts Nonaka's SECI model under enquiry in relation to socialization and unity, as every environment is not Japan and everybody is not the same. Thereby, **socialization** for the interviewees is a key dynamic for the learning process and the succession of the SECI model. This consequential observation results in the following **visualization model** of learning at workplace:



Figure 11 Suleymanshar, I., (2017). *Study Result: A visualization model* of knowledge acquisition of an employee's profession lifespan. Gothenburg: Chalmers University of Technology.

The visualization model demonstrates the work timeline of an employee in his or her profession at a workplace, driven by socialization as its fuel for acquiring new knowledge constantly. Initially the learning process occurs with haste, when the proper basics of the profession are learned by implementing the acquired knowledge at work. After a period, the curve begins to bend. However, it is still growing which indicates one has approximately learned the basics of the profession and has the ability of approximate self-reliance, but still might be needing substantial assistance from others. Subsequent to this point, the learning process slows down but proceeds. This is when one adds new knowledge constantly to his or her accumulative professional knowledge, such as new techniques and methodologies. The acquisition of the professional knowledge supposedly ends when the employee's working life reaches its end. The work biography of Philip as the oldest interviewee is a proper reference to the validity of the consequential study model.

The visualization model also assists into understanding and rectifying a few contrasts of the interviewees' speeches. E.g. Daniel states that normally after conducting two or more projects, one reaches the self-reliance point. His statement indicates the bending point (star) of the curve, the period after learning the basics. Whereas, Malin seems to totally oppose this claim and believes self-reliance is never reached and the project manager is like a chain with the surrounding co-workers. In this case, Malin apparently thinks of the entire lifespan of the employee's profession, as a continuity depending on others as demonstrated in the visualized study model. Moreover, Karin states that she was self-reliable right from the start, as her senior manager for learning was not present at site with her. Yet, she simultaneously states that he was present and reachable when needed and she learned considerably from co-workers. This supports Malin's claim indicating socialization indeed is the fuel behind survivability and learning, as the team functions as a chain. Furthermore, Karin states that flexibility of changing fields of the same profession assists into development and gaining further knowledge. Whereas, Johan dismisses this claim and states due to constantly changing fields, he did not really become self-reliable in any of them but learned collectively. By that statement, Johan points at distraction of the illustrated knowledge acquisition model (figure 11), where he remains in the learning basics section of the model and changes to another area of his profession. This supports Karin's advice to develop in one area initially (also reaching the second section of the model), before changing it. In the end, all these contradictions imply diversity among different individuals about their diverse experiences of learning and what has been optimal for them.

As a resolution to the illustrated problem of the thesis, the study overwhelmingly tells us that practice and learning go hand in hand. Therefore, the best piece of advice to any student studying at university is to involve his or her studies with internships. That is to acquire theoretical knowledge at university and learn it or settle it down inside the mind by implementing it into practice via the internship. Thus, by the time the student graduates he or she has no concerns or intimidations about the working life and is not a blind man at workplace but an experienced one.

5.1 Future Study

It must be reminded that the discussed results of the study all are based on other theorists and individuals' experiences. Therefore, this study is preliminary an approximate depiction of the reality. Individuals and environments highly differ one from another. It can be strongly argued that psychological aspects play a major role in the succession or failure of one's learning journey at workplace, based on personal experience at academies as the study researcher. The knowledge management models, such as the SECI one of the study do not highlight the vast importance of psychology in one's learning. Their succession is reliant on a suitable and thriving psychological work environment. Future studies about learning and knowledge acquisition should also revolve around the psychological environment around the learner, which plays a major role in socialization which this study labels as a key for acquiring new knowledge. Sadly, the vast majority of all the theoretical studies which were utilized for making this study missed the importance of psychology at workplace, which is aligned with socialization. In future studies, more can be investigated about the relation between psychology and knowledge acquisition. Without a psychologically good condition of the knowledge seeker, no efficient learning process can be accomplished. Thereby, psychology and learning are in compliance. If more time had been given to this study, it could have been complemented with the importance of psychology and learning to result in a richer outcome.

6 Conclusion

In this chapter, a conclusive answer is provided to each of the research questions which preluded the study.

1. How to acquire adequate knowledge which a new construction project manager requires at work place?

According to the study, the acquisition of knowledge takes a more conservative way through socialization and guidance by seniors. Despite the emergence of technology and modifications within organizations such as the emergence of KMS, still new recruiters rely on a mere practical way of acquiring knowledge as before. No to little use comes from databases, instruction or electronic knowledge management systems, rather than the new comers learn via elder ones in traditional ways such as interaction, observation and supervision. Therefore, knowledge management at least in the construction industry is conservative as the study concludes.

2. How supportive is the SECI knowledge management model for knowledge acquisition?

The model illustrates the methods of acquiring knowledge. The succession of the model vastly depends on the environment and its individuals: whether the environment is psychologically thriving in relation to coherence, cooperation and socialization of its individuals. The environment can be a workplace environment or a national environment, as everywhere is not equivalent to Japan culturally. Thereby, based on environmental variables the supportiveness of the model varies.

3. Is knowledge acquired through practice or education?

According to the study, education in the form of reading, writing and observing is doing which is practice as this is also confirmed by the SECI model. However, applying the knowledge received through institutional education (e.g. universities) at workplace is an optimistic way to understanding the work reality according to the empirical part of the study. That is because without this application of the institutional, acquired knowledge, one visualizes how the work reality might be thus his or her perception will decrease as the study participants claim. Therefore, education and practice complement a full knowledge acquisition cycle. Here, only the context is different. At institutions one practices considerably but the pressure is not the same, as mistakes do not imply costs and retributions in the same context as they do at workplace. Thereby, there is a difference in the context (environment) of knowledge acquisition between workplace and institution, not in the way of knowledge acquisition between education and practice as both are doing and the same in this sense.

I believe, the learning process is dual, as applause is not done with one hand but with two. It depends on what one can do to learn and what others can offer. In both of the cases, the will to learn or to help teaching are paramount into succession. One learns constantly from others and from novelties as time passes. Thereby, the learning process in a profession is a continuity and a communication between a recipient and a conveyer. A professional can be both the recipient and the conveyer, learning from the outside and also teaching the outside.

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