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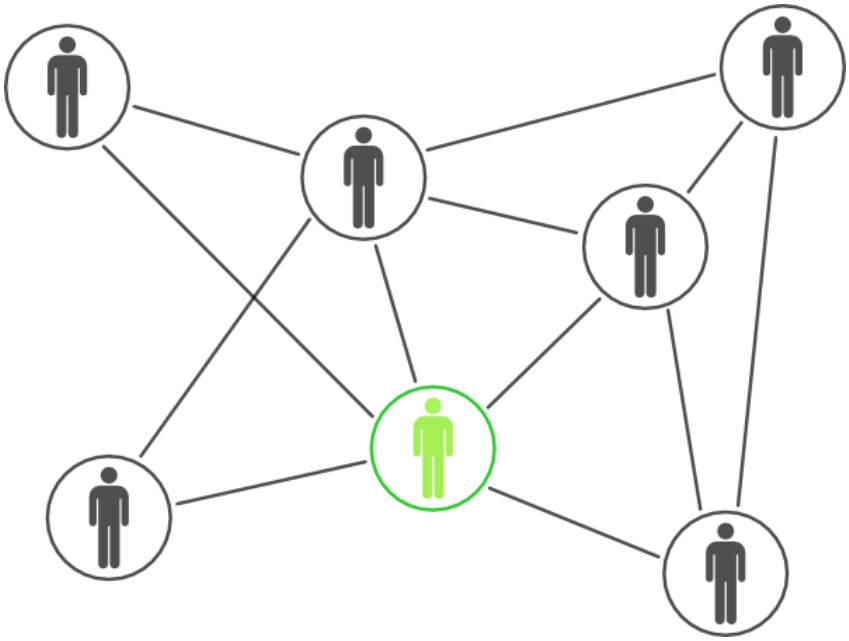

The role of Transactive Memory Systems where culture and language barriers exist

Managing a foreign workforce in the construction industry

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

KIM DONDER

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

In recent years, companies in the Swedish construction industry have struggled with finding potential employees with the appropriate competences and experiences. Countermeasures such as relying less on internal competences and more on subcontracting, or looking for competences abroad are among those preferred by contractors. Labour migration of this kind has an impact on several fronts and many new issues and problem areas arise that have to be managed within the industry. Issues that can be related to cultural and language barriers between the foreign workforce and the Swedish workforce have been largely neglected by research to date. Consequently, the purpose of this thesis is thus to use a Transactive Memory Systems (TMS) framework as a "filter" and tool in order to analyse how these types of cultural and language barriers, which originate in labour migration, actually affect everyday working life in the Swedish construction industry. In research, TMS is described as knowledge about "who knows what" and "who knows who knows what", and it is a type of dispersed knowledge that is important in group settings. Interviews were held in order to obtain data concerning two case study projects. The results show that the TMS concept is highly applicable to the construction industry and demonstrates which areas of current practice that are minimizing or exacerbating the impact of these kinds of barriers. The source of employees plays an important role and the emphasis should be on creating long-term relationships and collaborations with the providers of labour and minimizing the use of "posted workers". This solution gives the time and opportunities to really capitalize on shared experiences, integrate properly, and have greater control over competences as it minimizes the turnover of employees. Production supervisors play important roles in this interplay and should be allocated responsibilities in accordance with interdependencies that exist on site. Furthermore, their use of extra supervision and control, which is the preferred solution to these types of issues, could even be regarded as advantageous from a cultural standpoint as the foreign workforce seem to respond well and flourish under such management style. However, there are potentially even greater benefits of this style of management if it is complemented by also emphasising an "inclusive" management style.

Keywords: cultural barriers, foreign labour, language barriers, posted workers, TMS

Det transaktiva minnets roll där kulturella och språkliga barriärer existerar
Hantera utländsk arbetskraft i byggsektorn

Examensarbete inom masterprogrammet Design and Construction Project Management

KIM DONDER

Institutionen för bygg- och miljöteknik
Avdelningen för Construction Management
Chalmers tekniska högskola

SAMMANFATTNING

Under senare år har företag i den svenska byggbranschen kämpat med att hitta potentiella medarbetare med rätt kompetens och erfarenhet. Motverkande åtgärder såsom at förlita sig allt mindre på intern kompetens utan mer på underleverantörer eller att leta efter kompetens utomlands, hör till de som föredras av entreprenadföretagen. Arbetskraftsinvandring av detta slag har en inverkan på flera fronter och många nya frågor samt problemområden uppstår som måste hanteras inom branschen. Forskning kring hur kulturella och språkliga barriärer som existerar mellan den svenska och utländska arbetskraften påverkar interaktionen mellan dessa grupper, är nästintill obefintlig. Följaktligen är syftet med detta examensarbete att använda en av modellerna för Transaktiva Minnessystem (TMS) som et ”filter” och verktyg för att analysera hur dessa typer av kulturella och språkliga barriärer, som har sitt ursprung i arbetskraftsinvandring, faktiskt påverkar det dagliga arbetslivet i den svenska byggbranschen. Inom forskningen är TMS beskrivet som kunskapen om “vem vet vad” och ”vem vet vem som vet vad”, och är en typ av dispergerad kunskap som är viktigt i gruppsituationer. Intervjuer genomfördes för att få information till fallstudien som bestod av två olika byggprojekt. Resultaten visar att TMS konceptet är lämpligt att applicera på byggbranschen och att det visar vilka delar av nuvarande praxis som minimerar eller förvärrar den inverkan som dessa typer av barriärer har. Källan från vilken de utländska arbetarna hämtas in spelar en viktig roll. Tyngdpunkten bör ligga på att skapa långsiktiga relationer och samarbeten med leverantörerna av denna typ av arbetskraft och minimera användningen av ”utstationerad arbetskraft”. Denna lösning ger den typ av tid och möjligheter företagen behöver för att kunna dra nytta av gemensamma erfarenheter, integrera ordentligt och ha större kontroll över kompetens genom att minimera omsättningen av anställda. Arbetsledare ute i produktion spelar en viktig roll i detta samspel och därför bör de tilldelas ansvar i enighet med alla de typer av ömsesidiga beroenden som finns ute på arbetsplatserna. Dessutom kan användningen av extra övervakning och kontroll, som är arbetsledarnas prefererade tillvägagångssätt för att hantera dessa typer av barriärer, till och med ses som fördelaktigt ur ett kulturellt perspektiv. Den utländska arbetskraften verkar svara bra och frodas under denna typ av ledarstil. Dock finns det ännu större nytta av denna typ av ledarskap om den kompletteras med ett fokus på en ”inkluderande” ledarstil.

Nyckelord: kulturella barriärer, språkliga barriärer, TMS, utländsk arbetskraft, utstationerad arbetskraft

Contents

Preface

I would like to thank my supervisor Petra Bosch, Associate Professor at the Division of Construction Management at Chalmers University of Technology. I am very grateful four all your ideas, expertise, and help that you have provided throughout the whole time that this thesis was conceptualised and executed.

I would also like to thank all the interviewees for taking time to contribute with your experiences and opinions.

Göteborg June 2015

Kim Donder

Abbreviations

CMC – Computer-mediated communication

EU – European Union

FTF – Face-to-face

TEP unit – Task-expertise-person unit

TMS – Transactive Memory Systems

1 Introduction

This chapter of the report introduces relevant background information and underlying concepts that are fundamental to the idea behind this thesis. This information transpires into a thesis purpose and two research questions specific to this report. The last part of this section presents limitations that have restricted the research process.

1.1 Background

This section introduces all the information that serves as background knowledge to the purpose and the rest of this report.

1.1.1 Swedish construction industry

The Swedish construction industry has recovered well after a slight decline caused by the economic crisis around the year 2009 (Sveriges Byggindustrier, 2015). The development will continue although in a slightly slower rate over the next couple of years due to increased taxes and proposed amortization requirements. The construction labour market has been through some ups and downs in recent years but statistics show that open unemployment was on average 4,7 % throughout 2014. This is actually an improvement of 1,1 percentage points on an annual basis.

However, companies in the industry still report difficulties in finding potential employees with the right competences and experiences, which has resulted in a situation where many companies have decided to slow down planned expansion (Sveriges Byggindustrier, 2015). Adjacent to this fact, there is also an additional labour difficulty that the industry has to deal with in the upcoming years. In 2012 the construction industry occupied around 318 000 people and around 38 000 of them are 60 years of age or older. It is expected that most of them will retire within a 5-year period, which is a big difference compared to the corresponding numbers at the turn of the last century when around 14 000 employees were in the same situation. This type of "tail heavy" age distribution will create an even bigger vacuum of experienced personnel. Many companies have counteracted by relying less on internal competences and more on subcontracting, and thus disseminated the problem over a larger set of actors. Additionally, it has also created incentives for companies to look for competences abroad.

1.1.2 Employment of foreign labour

Ever since the formation of the European Union (EU) there has been an internal emphasis on peoples rights to live and work wherever, within the borders of EU, that they desire (Dobson, 2009). Even though there have been some temporary restrictions and transitional measures, each new batch of members are slowly incorporated into this vision. Sweden was, together with Ireland and the UK, the only members that imposed virtually none transitional measures when EU expanded in 2004, from 15 member state to 25 member states (Gerdes and Wadensjö, 2014). Sweden also approached all subsequent enlargements equivalently.

The last two big enlargements of EU that occurred in 2004 and 2007 were followed by large labour migration from new member states (Friberg et al., 2014). Most of them have come from Poland and they have primarily been a source of labour in industries such as construction, manufacturing and services (Thörnqvist and Bernhardsson, 2014). Swedish construction companies have used this opportunity to manage the problem of not finding enough knowledgeable employees within Swedish

borders (Sveriges Byggindustrier, 2015). Additionally there has been an increase of "posted workers", i.e. people employed by foreign companies and only in Sweden for a shorter period of time that by law is no longer than 6 months.

This type of labour migration brings forward many new issues and problem areas that have to be managed within the industry, but also from a national level (Woolfson et al., 2014). Individual voices and institutions have raised awareness of instances where the terms of employment and working conditions of foreign employees have been inadequate (Gerdes and Wadensjö, 2014), loopholes in regulations that can be interpreted in a way which allows companies to avoid a considerable amount of taxes (Thörnqvist and Bernhardsson, 2014), undeclared work, "social dumping" (Friberg et al., 2014), and other problems of that nature.

1.1.3 Why Transactive Memory Systems (TMS)?

However serious the problems described above may be there has been limited focus on how cultural and communication barriers, which originate in labour migration, actually affect everyday working life in the Swedish construction industry. That is why this thesis only focuses on the issues that can be related to when the foreign workforce and the Swedish workforce are in contact with each other. Specifically, everyday working life will be analysed through the "filter" of Transactive Memory Systems (TMS), and the issues and concepts that fit within that framework.

Throughout the research, TMS is described commonly as the knowledge of "who knows what" and "who knows who knows what" (Jarvenpaa and Keating, 2011). This type of dispersed knowledge is important in group settings and little is known about its vulnerability to cultural and language barriers.

1.1.4 What type of cultural and language barriers?

Hofstede (2001) studied the cultural differences from a national perspective and developed a scoring system to compare national culture differences in a relative manner. The examination yielded a model that consists of a couple of dimensions in which the national cultures are graded. The dimensions give an indication of the differences that may exist between two cultures, and the barriers and problems that might follow. The dimension "*Power distance*" describes how inequalities in power are perceived and approached. Higher scores result in stricter and more comprehensive hierarchical structures whilst lower scores imply an attempt to distribute power more equally. The dimension "*Individualism*" regards individual's self-image and if it is expressed in terms of "I"; higher scores of individualism, or in terms of "we"; lower scores of individualism and thus a more collectivistic society. The dimension "*Masculinity*" reflects to what extent a culture values achievement, heroism, assertiveness, and material rewards, while lower scores imply a more "feministic" society that values cooperation, modesty, and quality of life. The dimension "*Uncertainty avoidance*" depicts to what extent people are prone to feel uncomfortable in situations where there is built in uncertainty or a high level of ambiguity. Cultures that score high have strict codes of behaviour and try to avoid uncertainty, whilst cultures that score lower are more comfortable in uncertain situations. These dimensions will be further described and analysed in Chapter 4 in this report. Specifically, a review of the dimensions will be made in accordance with the context studied in this report in order to provide the information that will be necessary for further analysis.

Communication, which is the transfer of information between two parties, is important in order to achieve coordinated results (Dainty et al., 2006), and allow for successful team integration (Baiden and Price, 2011). The introduction of a foreign workforce to the inherent complexity of construction projects adds challenges that originate in limited proficiency in the local language (Loosemore and Lee, 2002). These types of linguistic differences act as managerial challenges, which are strengthen further by cultural differences.

In fact, language is the most prominent cultural variable and is thus translated into a significant communication barrier (Loosemore and Lee, 2002). The preference among managers that are faced with this kind of issue is to rely on "cultural gatekeepers". They are part of the foreign groups and have sufficient language skills to be regarded as able to fulfil the role of translators. This is however also problematic, as up to 40 % of the intended meaning in communication can be lost even if professional translators are used. Furthermore, a phenomenon called "Chinese whisperers" which implies distortion of the original message, influences communication chains to a higher degree if chains have to be extended (Dainty et al., 2006).

1.2 Purpose

The purpose of this thesis is thus to use a TMS framework as a "filter" and tool in order to analyse how these types of cultural and language barriers, which originate in labour migration, actually affect everyday working life in the construction industry. More specifically, the study will be based on an analysis of Polish construction workers in the Swedish construction industry, as this was the setting in both of the studied cases in this report. The particulars associated with this setting will be further described and elaborated upon in Section 3.3 and Chapter 4 in this report. The TMS framework used in this thesis is developed by Ren and Argote (2011) and is described in detail in Section 2.3. The analysis will be restricted to the part of the framework that describes the antecedents of TMS, i.e. the preceding conditions and factors that determine the degree to which the phenomenon will be possible. Specifically, the analysis will cover the two categories of antecedents termed "*Team composition inputs*" and "*Team-level inputs*", depicted in Figure 1 below.

Team composition inputs	*Team-level inputs*
- Member demographics	- Task interdependence
- Member technical competence	- Goal or reward interdependence
- Team member assertiveness	- Group training
	- Team familiarity
	- Shared experiences
	- Communication
	- Technology/Virtuality
	- Imposed knowledge structure

Figure 1 Antecedents of TMS used in the analysis of this thesis.

1.3 Research questions

How do "*Team composition inputs*" and "*Team-level inputs*" influence TMS in construction projects where culture and language barriers exist between management and part of the workforce?

How can construction projects support effective TMS in terms of "*Team composition inputs*" and "*Team-level inputs*"?

1.4 Limitations

Due to time constrains the scope of this study could not include an analysis of the whole concept of TMS and its role in the studied setting. The study of TMS is almost non-existent when it comes to the construction industry. Thus, the decision was made to focus the analysis to only one part of the framework of TMS formulated by Ren and Argote (2011), which is presented in its entirety in Section 2.3. By virtue of the lack of research the logical point of departure for this study seemed to be to consider the part of the framework that constitutes the basis of the whole concept, i.e. the antecedents of TMS.

Furthermore, additional limitations were upheld and some inputs that are considered as antecedents of TMS were excluded from the analysis in this report. This exclusion concerns the third category of antecedents, besides the included "*Team composition inputs*" and "*Team-level inputs*", called "Organizational/contextual inputs". The reasons for exclusion of the antecedents under this category is described below:

Organizational/contextual inputs

- Acute stress: This input was excluded from the analysis as the research method restricts the possibility of accurately analysing different types of stressors and how they influence the project environment. A longitudinal study would be more appropriate to identify stressors more accurately.
- Geographic distribution: This input was excluded solely because of the fact that there exist no geographic distributions in the context that has been studied in this report.

The results of this thesis were supposed to be based solely on interviews, but due to some unforeseen and unfortunate events only four appropriate interviewees were found. The reasons behind the scarcity of interviewees lies firstly in the fact that there were less people that felt that they had enough interactions with a foreign workforce, than were anticipated in advance. Some companies also turned down the opportunity to provide interviewees. The reasons behind this are hard to pinpoint but a possible explanation could be that there are still some controversies surrounding the use of a foreign workforce in Swedish industry, which could impact the willingness to participate in this kind of research. Due to the relative scarcity of subjects, the discussion and conclusion of this report had to be adapted to not only include practical contributions and implications but also a more comprehensive examination of theoretical contributions and implications.

1.5 Outline of the thesis

In order to give an overview of the thesis as a whole, the separate sections of this report are presented below:

1. Introduction: In this chapter the thesis background is presented in order to define the knowledge gap from which the research is based. Furthermore, the thesis purpose, research scope, and research questions are presented here as well.

2. Theoretical framework: This chapter presents a comprehensive review of the theoretical concepts and frameworks related to the main subjects of this thesis.

3. Methodology: This chapter describes the method with which this thesis has been approached. It describes the design and the reasons behind the main strategy, the literature review, the cases that were chosen, and the interviews that were conducted.

4. Contextual background: This chapter presents a review of the contextual background specific for this particular thesis and complements the theoretical framework with further data and information.

5. Findings: In this chapter the results from the interviews are presented in a summarized form.

6. Discussion: This chapter encompasses an examination, comparison, and discussion of the findings and the underlying theoretical frame of reference.

7. Concluding remarks: This chapter represents the main conclusions and the most prevailing themes brought forward in the discussion. Practical and theoretical contributions are summarized in accordance with the research questions devised in the Section 1.3.

2 Theoretical framework

This chapter aims to presents a comprehensive review of the theoretical concepts and frameworks related to Transactive Memory Systems (TMS). It starts with defining the concept of TMS by describing where it originates from and how it has been influenced by successive research. Subsequently a comprehensive review of the framework of TMS, which is the foundation of this thesis, is presented.

2.1 Origins of Transactive Memory Systems (TMS)

Back in the 1980s Daniel M. Wegner and his colleagues began developing the construct of TMS (Jackson and Klobas, 2008). It was conceptualized on the basis of observations regarding shared awareness of "who knows what" in a dyad (Wegner, 1987). Like group mind theory, it builds upon an understanding of the parallels between individuals' mental paradigms and group behaviour. According to Ren and Argote (2011), it was not long before the idea gained traction within the research communities of a multitude of disciplines. The influence TMS has on groups and organizations has since then been studied in disciplines like communication, management, information systems, and social psychology (Peltokorpi, 2008).

2.2 Building upon Wegner

The first step of generalizing and expanding the initial definition of TMS, at that time involving only the context of shared memory in intimate couples and other dyads, was to examine its applicability on larger groups and in organizational settings (Jackson and Klobas, 2008; Lewis, 2003; Liang et al., 1995; Nevo and Wand, 2005). The primary description of TMS accomplished by Wegner et al. (1985) contrasted the concept into two separate constituents:

I. The knowledge that is contained within individuals' memory systems
II. The set of transactive processes arising when individuals in a group interact

Liang et al. (1995) continued the work of Wegner and his colleagues in an effort to further extrapolate their findings and the concept to the group level. In a laboratory experiment they investigated task performance of work groups that had been trained together, compared to work groups where individuals had been trained separately. In their analysis Liang et al. (1995) found that the groups that had been trained together outperformed the other groups with respect to an increased tendency to:

- Divide and thus specialize in recalling different segments of the task
- Trust in one another's abilities regarding everyone's respective specializations
- Coordinate the different segments of the task in a more efficient way

These indicators of TMS have been widely adopted and investigated ever since and are known now as (a) knowledge specialization, (b) task credibility, and (c) task coordination (Ren and Argote, 2011).

With these indicators as a basis, Lewis (2003) developed and validated a 15-item scale (See *Appendix 1*) that was designed to indirectly measure and thus enable an analysis of TMS in organizational settings. They considered this indirect approach to be valuable and useful from a research perspective, because of the infeasibility of direct measurements of TMS in various practical situations.

2.3 An integrative framework of TMS

In an attempt to summarise most of the research on TMS from the year 1985 up until 2010, Ren and Argote (2011), constructed a framework of the antecedents, moderators, and consequences of TMS. The framework is presented in Figure 2, and it presents and groups the antecedents of Transactive Memory Systems on the left-hand side of the figure. Presented in the middle of the figure are the main components of TMS, i.e. the indicators that can be used to measure the construct. Listed on the right-hand side, are the consequences and effects of TMS. Additionally, the last group depicted in the framework are aspects that are recognized as moderators in the interplay between TMS and the outcomes that researchers have proposed. The framework has been constructed by following the guidelines for an Inputs – Mediators – Outcomes framework devised in Mathieu et al. (2008), and subsequently adjusted to work for TMS.

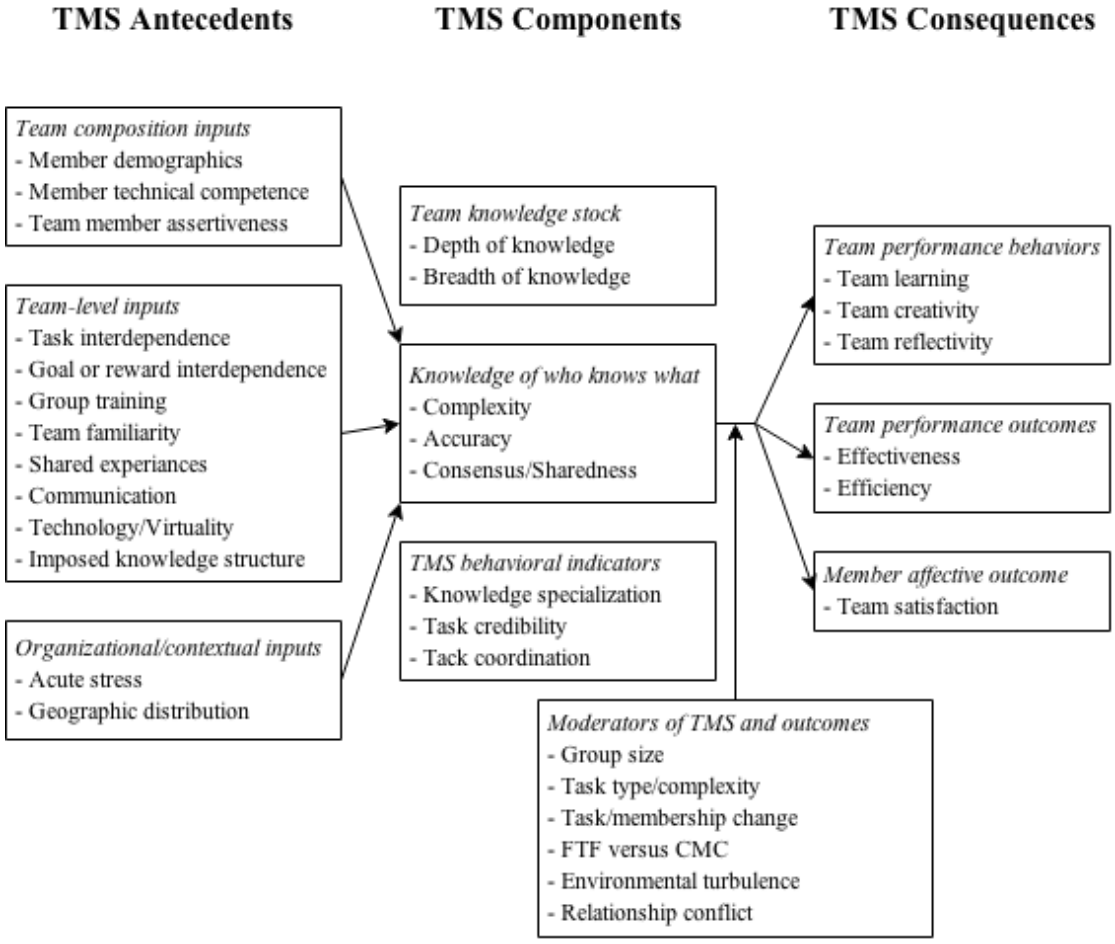


Figure 2 An integrative framework of TMS, taken from Ren and Argote (2011).

Each part of the framework presented in (Ren and Argote, 2011) will now be described in more detail starting with "TMS Antecedents", followed by "TMS Components" and "TMS Consequences", and lastly the "Moderators of TMS and outcomes". As mentioned in Section 1.2, not all parts of the framework are included in the scope of the result and analysis part of this report; nonetheless the whole framework is presented to better illuminate the entirety of the concept of TMS.

2.4 TMS Antecedents

As stated by (Ren and Argote, 2011), the antecedents of TMS can be categorized into the following three categories that are further going to be explained separately:

- Team composition inputs
- Team-level inputs
- Organizational/contextual inputs

In this report some of the antecedents in the framework developed by Ren and Argote (2011) that have similar scopes will be paired together. This is implemented in order to better fit the studied context, the findings, and the subsequent analysis and discussion. Thus the pairing will continue throughout this report.

2.4.1 Team composition inputs

Team composition inputs, or "member attributes" as it is also known as include factors such as member demographics, member competences, and member assertiveness and personality (Ren and Argote, 2011).

2.4.1.1 Member demographics

As stated by Wegner (1995) there are four sources for designation of expertise:

- Superficial attribution based on lineaments such as age, gender, and ethnicity
- Attribution based on particular assignments
- Attribution according to an individuals access to information
- Attribution based on an explicit indication of expertise, e.g. job description

In an experimental study Hollingshead and Fraidin (2003) examined how gender stereotypes can affect the pre-designation and assessment of knowledge in otherwise unacquainted individuals. Firstly, the results implied that individuals of both genders had a comparable view of what the stereotypes encompassed. Secondly, the results also indicated that in comparison with same-sex partners, opposite-sex partners were more likely to attribute expertise areas that were rooted in gender stereotypes. Consequently, this prompted a situation where opposite-sex partners' knowledge accretion corresponded to the gender stereotypes. The implications in practise, in accordance with these findings, suggest that gender stereotypes are upheld in TMS and that they must be considered as influential. By contrast, in their review of the literature with regards to this specific subject, Ren and Argote (2011) concluded that a trait such as gender has been shown to be less relevant in organizational settings, where distributed expertise (Lewis, 2004) or role designation is more important, but instead has considerably more effect on the TMS of couples in intimate relationships.

2.4.1.2 Member technical competence

Generally, teams with more differentiated knowledge develop stronger TMS (Lewis, 2004; Littlepage and Silbiger, 1992). A concept that is intrinsically connected to the development of TMS with regards to various team composition inputs and based on members' competences is what Brandon and Hollingshead (2004) termed, the task-expertise-person (TEP) unit. Some managers are prone to assume that the individuals within a group will allocate responsibility for different tasks in accordance with members' ability to achieve results in certain areas. However, this depends and varies in congruence with the groups' ability to determine this capacity. An example of a full TEP unit is when an individual in an organization or a group knows that the assistant project manager Patrick is in charge of the time schedule. Here the TEP unit turns out

to be, *time schedule - assistant project manager - Patrick*. TEP units can thus be perceived as a governing body of information that entails suggestions about where to find information regarding a particular subject. As the consonance between task-expertise-person cannot be regarded as static (Wegner, 1995), the formation of TEP units turns out to be a repetitive and cyclic process (Brandon and Hollingshead, 2004). Brandon and Hollingshead (2004) identified three stages of the development of a TEP unit:

- Construction: In this part of the cycle a TEP unit is constructed based on the information that is available. Initially this could mean previous experience, assigned roles, office handbooks, or other types of paperwork.
- Evaluation: Over time the TEP relationships may change through the accretion of more relevant information as the units are constantly assessed with regards to the reliability of the initial information.
- Utilization: The last step of the cycle is when the units are tapped for actual information. This in turn results in a feedback loop that re-evaluates the TEP unit, based on the result of the utilization step, and new information leads to the construction of new units and the cycle repeats.

As individual members in groups rely on their particular experiences and interactions when constructing TEP units, it is possible that they differ internally or that they are used differently based on an individuals notion of where specific information could be retrieved (Brandon and Hollingshead, 2004). Discussions that involve the whole group can be used as a countermeasure in order to readjust and calibrate the units into balance.

Furthermore, another important issue that has to be contemplated is the negative effect of only partially constructed TEP units (Brandon and Hollingshead, 2004). When a *T*, *E*, or a *P* is absent, the usefulness of the construct is understandably diminished and has to be questioned. Brandon and Hollingshead (2004, p. 635) described partially constructed TEP units in the following manner:

> *"Knowing, for example, that group members Denara and Rishon are engineers is not useful if one does not see how engineering applies to the group task (i.e., a E-P relation), nor is it as useful to know that the group task requires engineers (i.e., a T-E relation) if one does not know who the engineers are. It is less of a problem to know that a particular group member is responsible for a task, without knowing why they are responsible (i.e., a T-P relation), because a basic notion of expertise can be built from a task-person relation."*

2.4.1.3 Team member assertiveness

Research also insinuates that TMS is influenced by the assertiveness of certain members that have been assigned roles that are critical for task completion and the effectiveness of the workflow (Pearsall and Ellis, 2006). Individuals that have been assigned these roles, and that can be characterized as assertive, are to a high degree able to improve the overall effectiveness of the team. In particular, these individuals are able to ensure more efficient and effective interactions, resource allocations, and flow of information between knowledgeable team members. Subsequently, organizations have an incentive to map and understand the workflows and interactions that take place. Moreover they should assign these types of individuals to particular roles so as to have a potentially greater effect on effective TMS and thus also positively affect organizational outcomes.

2.4.2 Team-level inputs

As seen in Figure 2 in Section 2.3, the team-level input category includes the antecedents "Task interdependence", "Goal or reward interdependence", "Group training", "Team familiarity", "Shared experiences", "Communication", "Technology/Virtuality", and "Imposed knowledge structure".

2.4.2.1 Task interdependence and Goal or reward interdependence

The term interdependence describes the degree to which individuals in a group are mutually dependent on one another (Wegner et al., 1985). TMS is influenced by the degree of interdependence that exists between members' tasks and goals (Jarvenpaa and Majchrzak, 2008; Ren and Argote, 2011; Yuan et al., 2009). Cognitive interdependence is seen as vital from the point of view of TMS and means that the people within the group are dependent on the interconnections between their own knowledge and the knowledge of other group members (Brandon and Hollingshead, 2004). If the general perception within a group is that of strong cognitive interdependence, the effects are noticed as an increased potential of developing effective TMS. In fact, Brandon and Hollingshead (2004), deemed cognitive interdependence to be the one antecedent that is most important for effective TMS. In this particular framework of TMS, developed by Ren and Argote (2011), cognitive interdependence is what you get when you combine the antecedents "Task interdependence" and "Goal or reward interdependence", i.e. it depends both on the degree to which individuals' goals are aligned, but also to how individuals' task are interrelated (Brandon and Hollingshead, 2004). These theories were empirically tested and verified by Zhang et al. (2007). They concluded that the interdependence of both tasks and goals have a positive effect on TMS. Furthermore, they also measured some positive correlation between task and goal interdependence, which suggest that the two concepts are closely related or possibly dependent, even though they are separate antecedents of TMS.

2.4.2.2 Group training and Shared experiences

Another important factor to consider is the effect that group training, and other shared experiences, have on the development of TMS (Liang et al., 1995; Ren and Argote, 2011). Liang et al. (1995) investigated task performance of work groups that had been trained together, compared to work groups where individuals had been trained separately. In their analysis they found that the groups that had been trained together outperformed the other groups. Their results also indicated that there might be other effects than effective TMS that would lead to increased performance. This meant that perhaps it could be possible to train everyone individually, and then only provide them with some information about other members' knowledge, and achieve the same results. The proposition was proved wrong first by Moreland et al. (1996), where they showed that individual training with an addition of some team-building exercises were not as effective as well developed TMS where people trained and performed together. Secondly, Moreland and Myaskovsky (2000) showed that the positive performance effects that were observed could not even be described by the increased possibility of communication that arises with group training. Instead the results all pointed towards effective TMS as the notion that mediates the relationship between group training and increased performance.

2.4.2.3 Team familiarity

Prior team familiarity, which indicates if the individuals within a group have knowledge about each other due to past interactions, have been shown to have positive effects on the performance of TMS (Gruenfeld et al., 1996; Ren and Argote, 2011). This is supposed to be due to the increased probability of members fully comprehending the other person's expertise. However some contradictory results have also been observed. Lewis (2004) showed that prior familiarity had a constructive effect on the development of TMS, but only in team compositions that had been constructed with a high degree of distribution with regards to expertise. Subsequently, the combination of a high degree of overlapping knowledge and prior familiarity had a moderating effect on TMS development.

2.4.2.4 Communication and Technology/Virtuality

The issue of how communication affects the development and support of TMS has been highlighted from the very beginning when Wegner et al. (1985) first used the construct of TMS. Since then, the importance of communication has been emphasized several times in literature (Choi et al., 2010; Lewis, 2004; Liao et al., 2012; Yuan et al., 2009). The degree to which communication is significant has nevertheless varied in different contexts but according to Ren and Argote (2011) it can be summarized as follows. TMS is affected to a greater extent by effective communication in early stages of group development, and is less important in later stages. Furthermore, electronic communication seems to have measurable effects on TMS only when face-to-face communication is not possible to the same extent, for example in distributed teams.

2.4.2.5 Imposed knowledge structure

The last antecedent under this category is the way in which particular expertise is imposed artificially, i.e. by role assignment. As previously stated, role assignment affects task-expertise-person (TEP) units, that help members of a team locate expertise (Brandon and Hollingshead, 2004), but the effects were already noticeable in a study conducted by Wegner et al. (1991). The study indicated that imposed knowledge structures are beneficial if the members in a dyad have no previous experience of one another, consequently dyads with prior familiarity perform better without any imposed structures of expertise.

2.4.3 Organizational/contextual inputs

Organizational and contextual inputs include factors such as geographic distribution and acute stress (Ren and Argote, 2011).

2.4.3.1 Geographic distribution

Due to globalization the number of organizations that have geographically distributed teams is increasing every year. Effective TMS takes longer to achieve in geographically dispersed teams and is affected by a multitude of aspects such as culture, communication, trust, and organizational practices (Alavi and Tiwana, 2002; Evaristo, 2003; Jarvenpaa and Keating, 2011, Jarvenpaa and Keating, 2012).

2.4.3.2 Acute stress

Additionally, organizations put demands and pressures on its members, both in the present but also many future stressors can be anticipated. This acute stress, as it is called, has been found to have mostly negative effects on TMS (Pearsall et al., 2009).

2.5 TMS Components

As described earlier, the concept of TMS has evolved over the years and has been portrayed by Ren and Argote (2011) to include the following three areas: team knowledge stock, knowledge about who knows what, and TMS behavioural indicators.

2.5.1 Team knowledge stock

Wegner et al. (1985) identified two types of memory; internal memory, and external memory. Internal memory is associated with the knowledge that the individual possesses, and external memory is the knowledge that de individual can access through external sources. Other team members may hold a big part of this knowledge, which means that the necessity for adequate information about the *depth* and *breadth* of each member's knowledge and expertise is important (Lewis, 2004). The nature of this knowledge stock plays an important role in facilitating the structure and differentiation of expertise that enables teams to gain access to more information than could be resided within any single member (Lewis and Herndon, 2011). Differentiation of knowledge does in turn provide the possibility of a greater division of cognitive labour, which is regarded as a key aspect of TMS (Kotlarsky et al., 2012; Lewis, 2004). Thus the knowledge stock of a group is important to consider when the group tries to accomplish a task as the members within the group consist of the primary source of knowledge and information (Austin, 2003).

2.5.2 Knowledge of who knows what

This category of TMS components includes all direct indicators of TMS that have been categorized into three differing components: (1) *Complexity*, (2) *Accuracy*, and (3) *Consensus/Sharedness* (Ren and Argote, 2011). These dimensions have been studied through asking members of a team to describe what type of knowledge the group possesses and how this knowledge is distributed, and then comparing this with observational data (Liang et al., 1995). *Complexity* describes how expertise is distributed within the network of group members, *Accuracy* describes how well the views correspond to actual expertise, and *Consensus/Sharedness* describes how well the views correlate within the group (Austin, 2003; Moreland, 1999).

2.5.3 TMS behavioural indicators

There are also more indirect components of TMS that emerge with the development of transactive systems if groups score high on direct measures (Moreland, 1999). Throughout research (Moreland and Myaskovsky, 2000; Lewis, 2003) these sets of behaviours have been identified and characterized as:

- *Knowledge specialization*: Encompasses the disposition of members to divide the responsibility of remembering certain types of knowledge in a distributed manner.
- *Task credibility*: Encompasses group members' trust in the expertise that are claimed or assigned to other members of the group.
- *Task coordination*: Encompasses a group's capability to capitalize on the distributed knowledge and expertise of its members in a cooperative demeanour.

2.6 TMS Consequences

Pertaining to the Inputs – Mediators – Outcomes framework (Mathieu et al., 2008), Ren and Argote (2011) separated the consequences of TMS into three subsections:

- Team performance behaviours
- Team performance outcomes
- Member affective outcome

The first category "Team performance behaviours" involves notion such as team learning, creativity, and reflectivity (Ren and Argote, 2011). These notions are considered to be important "team goals" that stimulate increased performance. "Team performance outcomes" are the results of team learning, creativity, and reflectivity and they include: effectiveness and efficiency. The last subsection, "Member affective outcome" relates to the positive effects that can be observed in individuals such as commitment and satisfaction.

2.6.1 Team performance behaviours

In a study of Turkish new project development teams, Akgün et al. (2006) concluded that a well established TMS had positive effects on team learning and consequently also on team performance outcomes. Similarly, TMS has furthermore been shown to increase the level of creativity on team outcomes (Gino et al., 2010). This effect is possible because TMS helps teams to bridge and reduce overlaps in knowledge through specialization. Specialization, in turn, enables members to focus on their own particular area, which can be seen as a more effective use of cognitive resources that frees up individuals to be creative. The last category under this subsection is related to the ability of teams to adjust objectives, strategies, and processes to conform to changes in environmental constrains, i.e. team reflectivity (Dayan and Basarir, 2009). In their study, Dayan and Basarir (2009) demonstrated that TMS indeed has favourable effects on team reflectivity.

2.6.2 Team performance outcomes

Effectiveness and efficiency gains derived from more elaborate TMS were already conceptualized and measured at the early stages in the expansion of the theory (Wegner et al., 1985; Wegner, 1987). From that time the effects have been measured in both laboratory settings and in field studies (Ren and Argote, 2011). Both Wegner et al. (1991) and Hollingshead (1998) concluded that groups remembered with greater accuracy in well-developed TMS. Analogously, both Lewis et al. (2005) and Liang et al. (1995) showed that TMS has a positive effect on more practical assembly tasks. Moreover, performance effects have also been studied in various types of contexts in field studies (Ren and Argote, 2011). In their study, Faraj and Sproull (2000) concluded that improved effectiveness and efficiency could be explained by the increase in knowledge about where expertise is located within a group. More field research has indicated similar results were direct links were made between well-developed TMS and improved performance (Akgün et al., 2006; Choi et al., 2010; Yoo and Kanawattanachai, 2001).

2.6.3 Member affective outcome

Satisfaction is an important outcome in team settings and was shown to be a result of well-developed TMS in early laboratory studies (Wegner et al., 1985). The results have been seen to take place in organizational settings as well (Michinov et al., 2008).

2.7 Moderators of TMS and outcomes

Throughout the literature there are some elements, which are derived from variable group arrangements and other varying organizational settings that change the effects TMS can have on group performance (Ren and Argote, 2011). Ren and Argote (2011) grouped these variables under the category of "*Moderators of TMS and outcomes*", in order to fit into an Inputs – Mediators – Outcomes framework developed by Mathieu et al. (2008). The following mediating variables are included in the framework:

Group size

Michinov and Michinov (2009) indicated that smaller groups had a higher chance of developing and using TMS effectively. Although the statistical correlation was relatively small, they nevertheless proposed that there could be an effect that had its roots in communication complications that proliferate with larger group sizes. Complementary observations have also been made in a study made by Jackson and Moreland (2009). However in their study they observed that there was an increase in the amount of communication between members in smaller groups. Thus they reasoned that smaller groups have higher chances of effective TMS, due to the fact that larger groups are often less cohesive, which results is reduced eagerness to share information. These field studies have further been supported by some simulation studies such as Palazzolo et al. (2006). Their study gave indications that suggested that group size does indeed matter in TMS. Larger groups might have trouble developing TMS as it becomes harder for group members to correctly recognize others' expertise. Additionally it also turns out to be less likely that expertise becomes differentiated as group size increases.

Task type/complexity

In a study of new product development teams Akgün et al. (2005) investigated how the type of task, or more particularly the complexity of the task affected TMS. As expected, they found complexity to be a mediating factor between TMS and team outcomes. The impact of TMS is reduced when the major parts of a task are clearly defined, when constrains are known, and when the task is reliant on an established body of knowledge. Non-routine task on the other hand, where the uncertainties are greater, are considerably more incidental to well-developed TMS. In these types of work environments the importance of TMS increases due to the fact that the non-repetitiveness of the tasks intensifies the need of being able to acquire new knowledge and allocate responsibilities appropriately.

Task/membership change

Lewis et al. (2007) studied what the implications of group membership change could have on the formation and development of TMS. In their study, they compared the procedures and outcomes of intact groups, partially intact groups, and totally reconstructed groups. They looked at TMS from two differing perspectives. Firstly, they studied the stability of the TMS structure. Here they found no substantial difference between partially intact groups and intact groups. The explanation of this result appeared to be because of new members were able to effectively adapt and take over the role and specialization of the departing member (Lewis et al., 2007). Secondly, they also studied how well these differing groups performed in regards to their ability to efficiently take advantage of member expertise. In this aspect of TMS, intact groups outperformed the partially intact groups who performed similarly to totally reconstructed groups. Partially intact groups had a tendency to rely totally on

the TMS structure that had been built up prior to membership change, which resulted in inefficient TMS processes and thus also poorer performance. The negative effects could however be significantly reduced. This is possible if the members of the partially intact group, and especially the original members, were given the chance of reflecting upon the change and what the effects of the change could mean with regards to work processes (Lewis et al., 2007; Moreland and Levine, 2002).

Another "changing" aspect that has been hypothesised to influence the performance of TMS is task change (Ren and Argote, 2011). Lewis et al. (2005) theorised that a group with an existing TMS structure and previous experience in performing a particular task, would probably be able to use this fact to their advantage and perform better in subsequent similar tasks, if compared to groups with no previous TMS structures. The result in their study implied otherwise. The groups that had completed a task together and thus established a TMS were not able to perform better in the subsequent task. Nonetheless, some positive effects were observed in other areas concerning TMS. For instance, they observed that groups with previous experience together displayed augmented understanding of the underlying principles of the succeeding task.

FTF versus CMC

In an increasingly more globalised world, the environmental contexts within which organizations operate have become more dispersed. With geographical dispersion comes the fact that face-to-face (FTF) communication becomes impractical to maintain to the same extent as when teams operate from the same physical location. Instead different kinds of computer-mediated communication (CMC) are used as the primary means of communication. The choice of communication has been shown to influence the development and efficient use of TMS in different kinds of settings (Brandon and Hollingshead, 2004; Jarvenpaa and Keating, 2011; Lewis, 2004, Yuan et al., 2009). Hollingshead (1998) speculated upon the reasons for why FTF communication seemed to increase the effectiveness of TMS. The reason for these findings was hypothesized to have its basis in nonverbal and paralinguistic cues, which are present to a greater extent in FTF communication.

Environmental turbulence

The research regarding the influence of environmental turbulence on TMS has been built on the assumption that changing task frequently influences how often the TMS has to be accessed, reviewed, and revised (Akgün et al., 2006). On the grounds of Akgün's et al. (2006) study, environmental turbulence was shown to have a negative effect on TMS outcomes such as team learning and effectiveness. Teams in unstable environments have to search for knowledge resources more often and consequently the importance of TMS is higher in situations where the working environment is volatile (Ren et al., 2006).

Relationship conflict

Rau (2005) studied the mediating effects of relationship conflict when in comes to the consequences of TMS. Conflicts between team members were found to have an adverse effect on members' ability to use knowledge of who knows what in order to enhance performance.

2.8 Summary of the theoretical framework

Transactive memory systems were conceptualized on the basis of observations regarding shared awareness of "who knows what" in a dyad (Wegner, 1987). The concept later developed and according to Ren and Argote (2011), the current knowledge about TMS can be represented in a framework consisting of four different segments. The segments in Ren and Argote's (2011) framework are termed "TMS Antecedents", "TMS Components", "TMS Consequences", and "Moderators of TMS and outcomes". Antecedents represent factors that are prerequisites for the development of the concept, and the degree to which these prerequisites are fulfilled influences how well TMS can be established. Components represent the factors that constitute TMS in groups and which are measured in order to determine the strength of the system. Consequences represent factors that can be associated with effects and benefits when TMS is present. Finally, moderators are factors that influence the strength of the consequences and mediate the relationship between the components and consequences of TMS.

3 Methodology

This chapter of the report aims to identify and explain how different parts of this thesis have been conducted and why certain types of decisions and methods have been selected.

3.1 Research design and strategy

The research design and strategy have been chosen in order to be able to properly answer the research questions that have been stated earlier in this study. A descriptive case study design was deemed to be the most appropriate design to meet this requirement. This design is appropriate to use when the aim is to detect or document a certain phenomenon in one or multiple cases (Fellows and Liu, 2009). In the interest of further aligning this thesis with the research question, a qualitative research method was supposed to be the most applicable. The qualitative research method is differentiated in literature from the quantitative method (Bryman and Bell, 2011). The quantitative method is signified by the usage of statistical tools and the investigation of correlations of high structure data. Contradictory, qualitative methods are affiliated with the research of low structure data obtained mainly by conducting interviews or different types of observations. The opportunity for observations was not possible to a satisfying degree in the cases that were investigated. Thus, this thesis is based on qualitative data from the interviews that were conducted and additionally on information gained from the study of literature.

3.2 Literature review

The theoretical framework of this report is entirely based on historical and present research on the topic at hand. Articles and books have been chosen based on their importance in the field and in order to give a comprehensive view of the concept of TMS and how it has evolved over time. Due to a lack of research in the specific context that this report operates in, literature has ben accumulated from a multiple of field such as: management, sociology, phycology, and communication. Similarly, a considerable part of TMS research is derived from research of small groups and not always applicable to organisational settings. Issues like these are important to consider and have been taken into account in the analysis of the results in the report.

Relevant literature has been accessed through databases available via the library of Chalmers University of Technology. This review was based on the combination of keywords such as: cultural barriers, language barriers, TMS. Furthermore, additional literature has been analysed in order to give a theoretical view of how the Swedish construction industry stand in relation to the issues discussed in this report.

3.3 Case descriptions

As previously stated, this thesis is based on a descriptive case study approach. Two different cases make up the report. The opportunity to be able to have two different cases enables a more comprehensive analysis as the data from the two can be compared. Furthermore, it should give a more extensive representation of how conditions may vary throughout the industry. The two cases and the responsible companies will be explained separately further down under this heading. In circumstances where specific information from one of the cases has to be stated in the report, the cases will be referred to as *Construction site 1* and *Construction site 2*. The case study sites will not be compared explicitly as the study is based on the results

gained from the interviews. Moreover, the interviewees were also encouraged to give descriptions about other previous projects and information about if and how the cases differ from industry norms. Occasioned by this fact some of the information in the interviews is case specific and has to be observed in that context.

Case description *Construction site 1*

A construction project performed by one of the largest construction companies in Sweden on the outskirts of Gothenburg, Sweden. At its peak it occupied around 100 employees at the site. 90 % of the professional workers were part of the foreign workforce and employed through a small Swedish employment agency. All of those employees originated from Poland, but they were all employed only through the Swedish firm and thus hired under Swedish terms of employment. The small Swedish employment agency was only appointed to provide a labour force and not contracted as subcontractor to one specific part of the project.

Case description *Construction site 2*

This project was performed by another construction company that was likewise counted as one of the largest in Sweden. This particular project was a housing project in the city of Gothenburg in Sweden that occupied about 60 employees. 8 % of the professional workers were part of the foreign workforce and employed through one of the Swedish subcontractors. All of those employees originated from Poland, but they were all employed only through the Swedish firm and thus hired under Swedish terms of employment. The subcontractor that employed the foreign workforce at this site was contracted as subcontractor to one specific part of the project.

3.4 Interviews

The interviews were conducted fact to face in a semi-structured demeanour. This allows for more open ended questions and subsequent discussion that allows for a relative high degree of flexibility in exploring interesting areas with follow-up questions (Flick, 2009; Marshall and Rossman, 2010). All the interviews were performed by following the same interview guideline (See *Appendix 2*), with only minor alterations in order to adapt to the circumstances at the workplace. The aim of the interview questions was to be able to identify the status of antecedents of TMS at that particular project and other projects the interviewees had taken part in, but also to identify the interviewees' thoughts on possible improvements with regards to how the antecedents could be better supported at the construction site. As previously mentioned interviewees were encouraged not only to give descriptions about their current projects, i.e. the primary cases studied in this report, but also previous projects and information about if and how the cases differ from industry norms. In order to create an open and trustful climate the interviewees were informed that all their contributions would be anonymous. The results from the interviews are presented in Chapter 5.

Each interviewee was allocated 30-45 minutes and interviewees were selected mainly due to their responsibilities and their function in the interplay between the Swedish and the foreign part of the employees at their current workplace. The interviews were all held in Swedish and a brief description of the interviewees and the case they can be associated with is presented in Table 1 below.

Table 1 Description of the interviewees' and the case they can be associated with.

Construction site 1		
Role	***Personal information***	***Job description***
Production supervisor	Age: 42 years, Gender: Male, Nationality: Swedish. 5 years experience in current occupation.	Supervises all concrete work and manages the workforce on site on a daily basis.
Production leader/ Production supervisor	Age: 64 years, Gender: Male, Nationality: Swedish. 10 years experience in current occupation.	Manages subcontractors, orders material, and spends 50% of his time on management on site.
Owner of employment agency/ Production supervisor	Age: 43 years, Gender: Male, Nationality: Polish/Swedish. 15 years experience in current occupation.	Owner of the employment agency that hires the foreign workforce at *Construction site 1*. Doubles as a production supervisor at the project.
Construction site 2		
Role	***Personal information***	***Job description***
Production supervisor	Age: 29 years, Gender: Male, Nationality: Swedish. 3 years experience in current occupation.	Supervises different parts of the construction process and is in charge of communication and management of the foreign employees on a daily basis on site.

3.5 Analysis of the results

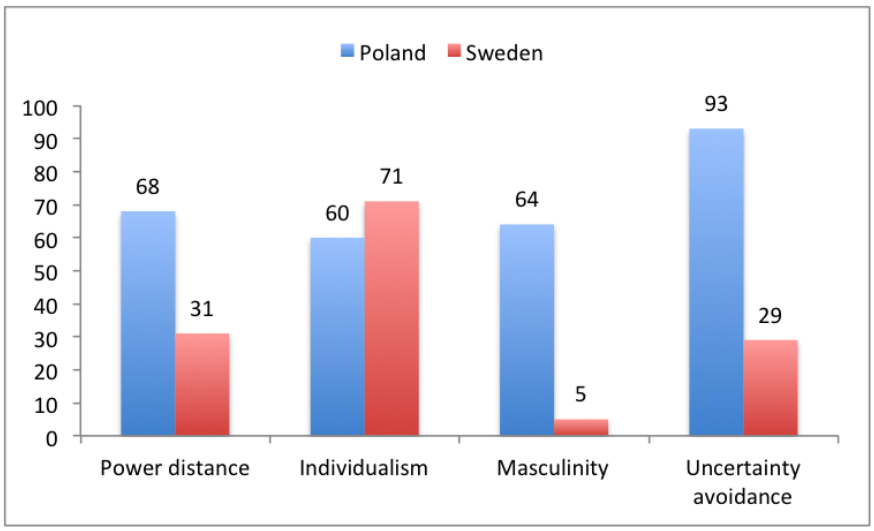
The results in this report are based on the theoretical findings and information that has been obtained through the interviews. Recordings, transcriptions, and notes taken during the interviews were all considered and evaluated in order to represent the information as accurately as possible (Flick, 2009). In order to not restrict interviewees' ability to express their views the decision was made to conduct the interviews in their native language. This is important to consider as it necessitated a translation element to the process of transcription.

Information that had been acquired in the interview stage was compared to information from the study of literature and this provided a foundation for the analysis and discussion. For reasons of consistency and clarity the analysis of the results is arranged in a manner that would reflect the research questions and the structure of the theoretical framework.

4 Contextual background

This chapter depicts the particulars of the cases studied in this report, especially from a cultural perspective. This information is directed towards complementing information presented in the introduction and theoretical framework in order to inform the consecutive discussion and analysis. In accordance with to the two primary cases that were studied in this report, which have been described in Section 3.3, the foreign workforce consisted of employees that were originally from Poland. Consequently, the cultural conflict between supposedly Polish and Swedish values represents and correlates best with the findings and subsequent analysis in this thesis.

Table 1 Comparison between Poland and Sweden based on Hofstede's cultural dimensions.



Hofstede's cultural dimensions offer an opportunity to compare two national cultures in a relative manner (Hofstede, 2001). The model includes different cultural dimensions whit relative scores in each dimension. The dimension "*Power distance*" describes how inequalities in power are perceived and approached. Higher scores result in stricter and more comprehensive hierarchical structures whilst lower scores imply an attempt to distribute power more equally. The dimension "*Individualism*" regards individual's self-image and if it is expressed in terms of "I"; higher scores of individualism, or in terms of "we"; lower scores of individualism and thus a more collectivistic society. The dimension "*Masculinity*" reflects to what extent a culture values achievement, heroism, assertiveness, and material rewards, while lower scores imply a more "feministic" society that values cooperation, modesty, and quality of life. The dimension "*Uncertainty avoidance*" depicts to what extent people are prone to feel uncomfortable in situations where there is built in uncertainty or a high level of ambiguity. Cultures that score high have strict codes of behaviour and try to avoid uncertainty, whilst cultures that score lower are more comfortable in uncertain situations.

According to Table 2 above, Polish culture scores higher in "*Power distance*" which suggests that it is more accepting of centralized hierarchical systems whilst Swedish culture represents an attempt to decentralize power with an emphasis on equal rights, coaching leaders, and direct and participative communication patterns (Hofstede, 2001). Both cultures score relatively high in "*Individualism*" which means that both

societies revolve around the independence of the individual. According to Hofstede et al. (2010) the combination of Polish culture scoring high in the categories "*Power distance*" and "*Individualism*", fosters a "tension" that has to be managed in order to be prosperous. Supervisors should have personal contact with everyone and focusing on communicating that everybody's opinion is of importance. Polish and Swedish culture score differently when it comes to "*Masculinity*". Poland is regarded as having a masculine society where there is a higher probability that the typical manager is decisive and assertive. Sweden on the other hand has a more feministic society where managers ability to create equality, consensus, and supportive decision making processes, is valued and deemed more appropriate. Lastly, there is also a relatively high discrepancy in the scores of "*Uncertainty avoidance*". As stated by Hofstede (2001), Polish culture is thus one where people distance themselves from uncertainty and ambiguity considerably more than what is predisposed in Swedish culture.

5 Findings

This chapter of the thesis encompasses the data that was gathered during the interviews. The chapter is divided into two main segments that correspond to the categories of TMS antecedents, in accordance with part of the framework presented by Ren and Argote (2011), which has been studied. The categories *Team composition inputs* and *Team-level inputs* are further divided into the individual antecedents.

5.1 Team composition inputs

This section presents the portion of the interview results than can be categorized under the topics of "Member demographics", "Member technical competence", and "Team member assertiveness".

5.1.1 Member demographics

At each construction site the professional workers were all male, both in the case of the foreign workforce and the Swedish subcontractors. The same was true for the managerial staff at both sites, with the exception of one female production supervisor at *Construction site 1*, which they stated as still being quite rare in Sweden. Although rare, the interviewees did not feel that she was treated any differently or less respected by any employees. Most professional workers at *Construction site 1* were between the ages of 35-50 years old. The same could be said of the managerial staff. The age distribution at *Construction site 2* was roughly the same. This type of demographic spread with regards to age and gender was said to be relatively representative of the industry.

The number of foreign workers on site differs not only from one project to another, but also during the timeline of one specific project. The foreign workforce at *Construction site 1* accounted for more than 90 % of the total workforce at the time the interviews were held. This number had been roughly the same throughout the whole timeline of the project, expect in the very beginning when there was a higher amount of Swedish employees. The situation at *Construction site 2* was somewhat different as the subcontractor with the foreign workforce constituted only 8 % of the workforce at most.

5.1.2 Member technical competence

There was a shared view among all the interviewees that the competences of foreign workers were highly comparable to that of typical Swedish professional workers. Nevertheless there were some differences in how experienced the two groups were when it came to particular working methods or tools. As an example, there were differences in the type of formwork that the workers were more accustomed to using, and thus also the proficiency level they had when certain types of formwork were being used. Often compromises took place and it became a combination of how Swedish employees used to do something, and new solutions proposed by the foreign workforce. Furthermore, as one production supervisor at *Construction site 1* explained the circumstances to be:

> *"The skill level varies but it is the same with Swedes, it is a mishmash. Generally maybe Poles are better when it comes to concrete, stonework, and masonry where they can be much better than Swedes. Rebar work also, however when it comes to carpentry Swedes can be much better."*

The skill level also seemed to alter with how the workers were employed. This appears to be most prominent in the case of the foreign workers. Both interviewees at *Construction site 1* had, at previous projects, experienced a shortage of competence but only if the foreign workforce had been hired through a big employment agency that the company frequently uses in many projects. Employees from those types of big agencies often have even worse language skills and in many cases interpreters have to be used. Neither of the interviewees felt that there was a need for designated interpreters at their current projects. As mentioned previously the foreign workforce at *Construction site 1* was hired by a much smaller Swedish based employment agency, which the interviewees described as much less problematic from a competence point of view. However, as one of the production supervisors there mentioned:

> *"…at [previous project name] we hired people from [big employment agency company name] and if we were not happy with someone, we only had to inform [big employment agency company name] and they would be replaced. So most of those we had left at the end were real professional workers."*

The production supervisors at both sites had varied educational and professional backgrounds. Some of them had construction-related educations at bachelor or masters levels combined with specific production supervisor related courses provided by the company. Others had vocational training and had formerly worked as professional workers and then been retrained to become production supervisors.

Competences also seemed to play a central role in the recruitment process of the foreign workforce that operated at *Construction site 1*. The owner of the employment agency described that they subdivide their workforce into concrete workers and carpenters. Furthermore, some employees with more experience in certain areas are allocated further responsibilities accordingly. This type of division is quite usual in the Swedish infrastructure segment of the construction industry, according to the interviewees at *Construction site 1*. Several employees that have worked in other countries may have further specializations in one of those fields in accordance with how the workforce is subdivided in those countries. However the general feeling among the interviewees was that the division was enough to be able to have a workforce that complemented each other's skills.

5.1.3 Team member assertiveness

In both of the studied cases, the interviewees tried to convey the importance of adjusting your style of leadership and communication to the person you interact with. Nobody believed that there was some fundamental difference between the foreign and Swedish workforce with regards to the degree of assertiveness that the groups respond to. However, there seemed to be consensus about the importance of being especially distinct and clear when communication barriers exist.

> *"I think it is important to realize when working with foreign labour that you as a supervisor can not lead in the same way. You have to be more over explicit and if you have explained something you have to come back in a few hours and see that it has been done appropriately. I think you have to do this, very humbly, then it is not a case of being suspicious, but instead it is a way of looking at the entirety."*[1]

[1] Production supervisor at *Construction site 1*

5.2 Team-level inputs

This section presents the portion of the interview results than can be categorized under the topics of "Task interdependence", "Goal or reward interdependence", "Group training", "Team familiarity", "Shared experiences", "Communication", "Technology/Virtuality", and "Imposed knowledge structures".

5.2.1 Task interdependence and Goal or reward interdependence

The construction industry requires a high level of coordination as it involves a substantial amount of different shareholders and participators. They all have to align their efforts in order for each task to fit into the complex sum of activities. The situation is no different out on the construction sites. The main similarity between the two studied cases in this regard, was the fact that most of the tasks that were performed by different subcontractors were dependent on one another. This interdependence is noticeable either as a dependence on previous work or as influencing future work. The biggest difference between the two studied cases in this regard, was the fact that the foreign workforce at *Construction site 1* constituted the bulk of the workforce, practically from the beginning to the end of the project. Other subcontractors were only hired for complementary tasks and for work that required special competence.

At *Construction site 2* the foreign workforce were employed by a subcontractor that had been contracted to perform a specific task that was the final in in that part of the project. Thus, there were no future subcontractors dependent on their work. Nonetheless, their work was dependent on the work of previous subcontractors and also to a relatively small degree on the work of subcontractors that worked at the site at the same time. This setup of interdependencies brings forward communication challenges that have to be solved on site. In order to cope with these challenges and facilitate these transitions the production supervisors have been allocated the responsibility for parts of the project in such a way that they supervise a chain of events. The production supervisor at *Construction site 2* explained the situation in further detail:

> *"When people from the same company are responsible for two separate task that are linked together, they have the opportunity to talk amongst themselves if they are on site simultaneously. This would be easier but is not the case now. Hence I have been responsible for the whole chain of tasks"*

5.2.2 Group training and Shared experiences

The use of group training proved to be virtually non-existent. At both companies there exists no formal training opportunities that involve the foreign workforce. Almost all of the workers at the sites are employed through subcontractors, which means that they take no part in internal training activities. There are some training opportunities for managerial staff that focus on leadership training, but the amount of training individuals have varies and there is no emphasis on training teams or working colleagues together. Furthermore, the existing training courses, even for managerial staff, do not consider the challenges that arise with the management of foreign labour. The production supervisor at *Construction site 2* suggested that it might be easier to work if he would take some language courses but he did not think of that as a viable option.

However, one production supervisor at *Construction site 1* mentioned that there are a lot of examples in everyday working life where new unfamiliar situations arise and where new methods of working have to be explored. In order to support effective learning in those types of situations the production supervisors work even closer with the affected workers.

In order to facilitate the integration and assimilation of all employees at *Construction site 2* the locker rooms and break rooms were shared by all employees. Separate break rooms for professional workers and white-collar workers that have been quite common in the industry, was seen as an out-dated arrangement. The goal of the contractor is to share spaces to as high degree as possible and a separation is only implemented when external factors, such as for example space, prohibits sharing. *Construction site 1* had separate break rooms for the professional workers and white-collar workers. Professional workers had break rooms directly adjoined to the site whereas break rooms for white-collar workers were located a couple of hundred meters away. This kind of large separation was necessitated due to space restrictions on site, which meant that all employees could not fit in the barracks on site. However, a separation of break rooms was described as common in the case of this contractor. Even without space restrictions, barracks are arranged to separate the two groups.

A normal working day at *Construction site 2* lasts from 06:45 to 16:00, which applies to all employees at the site including the foreign labour. Moreover, they all have breaks at the same time. Inversely, the foreign workforce at *Construction site 1* work longer days compared to most of the employees and subcontractors at the project. Their target is to work almost 50 hours instead of 40 hours each week until they can have one week off, to allow for those with families abroad to visit them. The owner of the employment agency that employs these foreign workers has the same working times. This is due to the fact that he doubles as a production supervisor on site. So does on of the contractor's production supervisors. The possibility to have changed or extended working ours is not standard at each one of the contractor's projects and is decided by the executives on a case-by-case basis.

Meetings are one type of activity that the contractors use to gather all concerned employees and distribute different types of information. At both projects all subcontractors, which includes the foreign employees, are invited to meetings. At *Construction site 1* the entire production staff, was summoned to attend weekly meetings that take place every Monday. Topics such as the status of the project thus far and plans for the coming week are among those discussed. The meetings are usually held firstly in Swedish by one of the contractors more experienced production supervisors. Secondly, the owner of the employment agency that employs the foreign labour translates what is being said directly into Polish. This means that the people who do not speak Swedish also understand all the information and engage in potential discussions. If the owner cannot be present, other options they have tried is to let a foreign employee that at least knows a little Swedish to translate. If that does not work another option is to conduct the meeting in English and let someone translate everything into Polish. Sometimes they have also decided to postpone the meeting instead, if they feel that it is possible and there is no immediate urgency to distribute any information.

Equivalent meetings are also held at *Construction site 2*. However, at this project the meetings are only conducted in Swedish. The subcontractor that employs the foreign workforce does not always attend the meeting as they have agreed with the production supervisor that is in charge of them to provide them with the necessary information

after the meetings. Furthermore, all the minutes from meetings are sent out by email to all subcontractors at the project. Interviewees from both projects mentioned that the number of these types of meetings varies throughout the lifetime of the project. More meetings and gatherings are necessary in the beginning of each project. Additionally, many of the meetings in the beginning have to be conducted with relatively short notice to address urgent problems and similar matters.

Both contractors also try to maintain a good "working atmosphere" by arranging different types of activities outside of the normal working tasks so that all employees and subcontractors can interact and get to know each other. These activities include for example different types of parties and dinners to celebrate various festivities and holidays, or collective barbecues when certain types of project milestones are completed. However, many times all employees do not attend these gatherings as they often live far from the construction site or the place that the gatherings are held. This is a common problem both for foreign and Swedish subcontractors.

5.2.3 Team familiarity

> *"You have to form your own opinion about the people you work with, because at the next project there might be people that I have not worked with previously and it is a lot easier if you know them. Regardless of if they are part of the foreign workforce or Swedes. That way you know what type of competences they have. Otherwise it takes a bit more time if new people are constantly coming in and replacing the old ones."*[2]

Many interviewees mentioned the prior team familiarity was one factor that they felt improved the chances of successful communication and integration of the foreign workforce. At *Construction site 1* the collaboration between the employment agency and the contractor has contributed to the occurrence of a high degree of prior team familiarity. Almost 50 % of the employees at the employment agency that had worked with this project, had been working together at a previous project, and for 25 % of those people, this is the third consecutive project where they have worked together. Some of them have also worked together at other companies or even in other countries. According to the owner of the employment agency this is a deliberate employment strategy taken in order to increase the probability of successful collaboration between the employees.

Furthermore, both of the interviewed production supervisors at *Construction site 1* had worked at the same three consecutive projects. One of the production supervisors was also about to move on to another project and bring a couple of employees from the employment agency with him. Many of the subcontractors on the site have collaborations similar to that of the employment agency, which allows for the employees of those subcontractors to encounter the same foreign workers multiple times in different projects.

Similarly, the different subcontractors including the one that employs foreign workers at *Construction site 2* are often appointed as subcontractors at different projects that the contractor undertakes. The interviewed production supervisor had not been involved with the foreign workers previously but mentioned that some of the managerial staff had encountered them before.

[2] Production supervisor at *Construction site 1*

5.2.4 Communication and Technology/Virtuality

> *"The daily communication depends on what I have to convey. When we start something new, I have of course prepared drawings and usually I bring [owner of the subcontractor with foreign labour] or someone else that also speaks English or Swedish with me. Even if they are not going to take part in the work itself I bring them with me as translators. Then I can express what I want through the drawings which usually works without any problems."*[3]

Daily communication at construction sites relies heavily on communication through the use of drawings and other types operation planning documents. This is also the case when it comes to communication between Swedish production supervisors and the foreign workforce. The difference that was described as the most prominent and most influential in affecting the interactions is the fact that the production supervisor cannot have the same certainty that the message has been understood and interpreted properly. Different supervisors described different methods to surmount or at least minimize negative consequences that could arise when severe language barriers exist. One method that is used in most cases is the use of additional supervision and inspection where the production supervisors stays on site or returns after a while to inspect if the information has been interpreted correctly. The need for increased supervision declines with time as the parties learn about each others abilities and get more experience about instances where communication and supervision have to be increased.

> *"Now when we know each other well, one often knows that it [the communication] is going to work but sometimes I still have to check after the fact. You cannot just give them the drawings and then not look. Instead I want to see how things proceed and check that they have set the rebar and formwork properly, and things like that. That is often how it works like in the beginning, then of course things start to work better after a while."*[4]

One of the production supervisors at *Construction site 1* mentioned that it is often possible to discern whether someone has understood a message. The supervisor mentioned that with time one learns about the face expression people have in different situations. A lot of clues also come from what type of questions or information that people ask or give, after having been presented with certain information. Naturally, the communication barriers that exist generate a situation where the foreign employees that can speak some Swedish or at least English, are frequently given a bit more responsibility, as they are more involved in the communication.

A big part of everyday communication encompasses all the little problems or concerns with regards to everyday tasks that the workforce may have. Many interviewees indicated that the Swedish part of the workforce often is less reluctant to ask questions than the foreign part of the workforce. This results in a situation where Swedes are more inclined to solve problems by themselves. The production supervisors think that it is good to have a relatively autonomous workforce even though they admit that this can be problematic in a few cases. On the other hand, the

[3] Production supervisor at *Construction site 1*

[4] Production supervisor at *Construction site 1*

foreign workforce consults the contractor's production supervisors a lot more. The interviewees think that one of the reasons for this is the fact that they have been told that it is better to ask about small problems that try to solve big problems. Moreover, another reason is thought to be the fact that many of the foreign employees may be used to stricter hierarchies and greater power distances between themselves and supervisors. Foreign workers are described as being very eager to do a good job and thus initially maybe a bit more unwilling to disagree with the supervisors and instead do exactly as they are told. However, the situation improves with time, as the supervisors are careful to convey the message that it is important for everybody that they have to question instructions if something is obviously wrong.

Many of the interviewees described that, compared to the Swedish workforce, there is a difference in the relationship that the supervisors have with the foreign workforce with regards to extra supervision. The foreign workforce seem to understand that the Swedish production supervisors take extra care in determining that the parties have understood each other. They often want supervisors, either to give overly explicit instructions with drawings and hand gestures or extra supervision. As one of the production supervisors at *Construction site 1* described the relationship as:

> *"They [the foreign workforce] are a bit different compared to the Swedes because they want you to control them much more than the Swedes do. Swedes can even be a bit upset when you control their work too much, but these gentlemen [the foreign workforce] they like when you control their work. Then it feels like they relax and then it is my responsibility after that. I think they [the foreign workforce] reason a bit like that."*

Construction work is often relatively complex but there are still many tasks of a more repetitive nature. Interviewees at both *Construction site 1* and *Construction site 2* expressed that they struggle to convey messages about when and why different types of changes to their task or methods will be implemented. Instead they work with trying to convey messages about the immediate future on a more continual basis.

> *"Because many times, and this is the problem with this kind of work where there are some repetitive tasks. If I know that 2 months or 1 month ahead, thing will change, that might influence what I am talking about now. To then get them [the foreign workforce] to understand that things will change in the future, that is hard and much easier to do with Swedes."*[5]

5.2.5 Imposed knowledge structure

Artificial role assignment is used to a varying degree on different construction sites. The factor that determines to what extent roles are specified and subdivided is the size of the project and the amount of people that are involved. According to the interviewees both of the cases studied in this report are too small and thus do not necessitate overly subdivided roles. In addition, there does not seem to be any appeal that there is a need to have this kind of information handed out on paper to every employee.

At *Construction site 2* the employees of all subcontractors were told to always contact the production supervisor that has been appointed to them by the contractor.

[5] Production supervisor at *Construction site 1*

Subsequently all of the production supervisors were allocated responsibilities that correspond to different task or stages of the production process. Thereby they also become responsible for the management of the subcontractor that had been contracted to that stage. Further subdivision of labour and roles was entirely up to the subcontractor and corresponded to the amount of experience employees had in a particular field.

There was a similar structure at *Construction site 1*. The contractor's production supervisors were divided in a comparable manner and thus allocated subcontractors based on the task or stage of the production that they were in charge of. However, there was some additional division of responsibilities for certain members of the management staff. One of the contractor's production supervisors was not only responsible for some subcontractors but had an additional overall responsibility for all the rebar-work on the site. Similarly, the owner of the employment agency that employed the foreign workforce, doubled as a production supervisor on site and was assigned the overall responsibility for all the parts of the process that involved forging. Both these designations were rooted in the amount of experience in that particular field that these employees had compared to other supervisors.

6 Discussion

Cultural and language barriers seem to affect construction sites in a multitude of ways. Some problems are rooted in and only upheld by the communication difficulties that linguistic differences imply. Other problems are rooted more deeply by cause of cultural differences between nationalities. This thesis has used a TMS framework as a "filter" and tool in order to analyse how these types of cultural and language barriers, which originate in labour migration, actually affect everyday working life in the Swedish construction industry. The method has not been used in this type of setting or evaluation previously, but results show that the theory encompasses many of the subjects that are important in everyday working life. Actually, all of the studied antecedents were represented in some way if interpreted in a similar manner as in this report.

Although not covered directly in this thesis, result also suggest the importance of the category "Moderators of TMS and outcomes" depicted in the framework of TMS developed by Ren and Argote (2011) (Read more in Section 2.7). The results in this report point towards the fact that the moderators "Group size", "Task type/complexity", "Task/membership change", and "Environmental turbulence" could be of particularly importance for the construction industry. The reason behind this assumption is based on interviewees' responses, which highlighted those areas even though the main topics were the antecedents of TMS. Consequently, a review of the moderators in the construction industry would probably be necessary to really capture a holistic view of the situation as it provides an input about the dynamic dimension of the industry more comprehensively than antecedents alone.

However, the main topic of this thesis was the antecedents, and the subsequent analysis will hence be subdivided into the two categories of antecedents "*Team composition inputs*" and "*Team-level inputs*", and then further in accordance with previous parts of this thesis. As mentioned in the beginning of Section 2.4, the antecedents under these categories have been paired together in this report rather than presenting them separately as in Ren and Argote's (2011) framework. That theoretical alteration was implemented in order to better fit the studied context, the findings, and the subsequent analysis and discussion. Although the modifications may seem only superficial at first glance, they do contribute theoretically to the knowledge about which antecedents that are more closely related in the studied context. Perhaps that could allow for a more comprehensive perspective and thorough examination of the antecedents, at least in similar project based circumstances. The remaining part of this chapter will thus be divided correspondingly.

6.1 Team composition inputs

This section presents the portion of the discussion than can be categorized under the topics of "Member demographics", "Member technical competence", and "Team member assertiveness".

6.1.1 Member demographics

A typical foreign construction worker does not seem to be very different from an average Swedish worker at least when it comes to other categories of demographics. It is a job that is almost exclusively male dominated and there is a wide age distribution among the employees. The biggest dissimilarity between the two projects was the amount of foreigners compared to Swedish employees. This is a variable that seems to

fluctuate a lot between different projects. Every construction project is different and they all require a particular setup of competences and thus also subcontractors. However, the contractors rely less on internal capabilities and spread the risks, which originate in work fluctuations, by relying on subcontracting. This corresponds well to recent trends observed in research (Sveriges Byggindustrier, 2015). This implies that the results are relevant from a theoretical point of view as there is a high probability that similar fallouts are replicable throughout the industry. Interestingly, the influence of subcontracting, which will be discussed further as significant for other antecedents and not only "member demographics", has not been discussed and researched in the studies connected to theoretical framework of this report. Its influence in this particular context in the construction industry is substantial, which probably means that it would be beneficial to incorporate it further into the framework of TMS. Perhaps it should not be considered as a separate antecedent, as it influences and is part of many of them, but at least as a concept to have in mind in an analysis.

6.1.2 Member technical competence

Subcontracting of Swedish based firms and smaller employment agencies where the foreign labour is procured under Swedish terms of employment seems to be most constructive from a competence point of view. The other option of hiring them through big employment agencies increases the number of "posted workers", which results in higher turnover of employees and more uncertain competence levels. Steadier competence levels and thus also better output control have to be taken into account even if these options might be disadvantageous from a monetary perspective. Furthermore, the possibility of creating long-term relationships between the contractor and the firm providing the foreign workforce increases the likelihood that the firms can develop the appropriate competences. Consequently, the contractor can assign their employees to the project in a way that can complement competences and fill in gaps, which is important from a TMS perspective (Brandon and Hollingshead, 2004).

The differences in competences that exist between the Swedish and the foreign workforce are not very prominent and primarily influence the methods that are used, whilst the same results can be achieved. Indubitably the two groups, Poles and Swedes in this case, have differing experiences with different types of practices and materials, which is said to be noticeable in the field. Nonetheless, in most cases these variances do not necessarily translate into diminishing outcomes and the production supervisors accept that there are differences in how results are achieved. With time, the foreign workforce has the possibility to learn new skills and work with new methods that they have not encountered before. Though, it is also important to notice that Swedish contractors have the possibility to increase their skillset by exploring new vistas as well.

6.1.3 Team member assertiveness

As described in the results, the interviewees did not believe that there are fundamental differences between the foreign and Swedish workforce with regards to the degree of assertiveness that the groups respond to. Conversely, according to Hofstede et al. (2010) Polish people score higher than Swedish people in the cultural category "Masculinity", which means that they are more used to an assertive style of management. Thus it could be argued that there is a high probability that the foreign workforce is used to more assertiveness than their Swedish production supervisors. This corresponds well to their statements that distinct and clear messages, which are a big part of assertiveness, are important and valued by the foreign employees.

Assertive members of a team that occupy certain critical roles influences TMS positively and ensures more efficient and effective interactions, resource allocations, and flow of information between knowledgeable team members (Pearsall and Ellis, 2006). The role of production supervisors can certainly be viewed as a critical role in the studied context, and thus more research effort has to be made in order to understand the importance of assertiveness in this type of environment. However logical these assumptions and results may be, the results do still need to be viewed somewhat critically. Even though there seems to be relatively good theoretical grounds that support the influence of assertiveness on TMS, it is probably the least studied antecedent and its role in the theory must be strengthen in future research.

6.2 Team-level inputs

This section presents the portion of the discussion than can be categorized under the topics of "Task interdependence", "Goal or reward interdependence", "Group training", "Team familiarity", "Shared experiences", "Communication", "Technology/Virtuality", and "Imposed knowledge structures".

6.2.1 Task interdependence and Goal or reward interdependence

According to Brandon and Hollingshead (2004), the most important antecedent of TMS is cognitive interdependence, which is the combination of task and goal interdependence. The complex nature of construction projects generates numerous interdependencies that have to be managed, mainly by the contractor. A big part of this problem has to be managed on a daily basis out on the site. Production supervisors become the main assets in facilitating the transitions between different tasks. Subcontracting often extends the difficulties as subcontractors are contracted to perform only specific tasks and many firms come and go for variable amounts of time during the lifespan of a project. A subcontractor may have a task that influences another subcontractor a couple of months down the line or it could be that previous subcontractors might influence their work, or both. All these cases cause gaps that have to be filled by someone. Contractors approach this situation by allocating responsibility to production supervisors in such a way that they are responsible for a whole chain of interdependent events. This makes them the actual links between interdependent subcontractors and their positions are only reinforced by the fact that they are responsible both for the tasks and for management of the affected employees.

A foreign workforce influences these types of interdependencies only when they are located at the project simultaneously as other subcontractors they have interdependencies with. In that case, language barriers often obstruct the workers from effectively solving issues and working together. Subsequently, the contractor's production supervisor acts as an intermediary between the parties. In many cases this might reduce the effectiveness of the whole system as it takes extra time and effort to communicate in this way (Loosemore and Lee, 2002). Furthermore an intermediary constitutes an additional participant in the chain of communication, which increases the risks of incorrectly perceiving and translating the original message (Dainty et al., 2006). On the other hand it increases the control of the contractor's production supervisors, as it requires them to take part in some interactions that would otherwise happen without their knowledge.

6.2.2 Group training and Shared experiences

Group training is an important part of effective TMS (Liang et al, 1995) and cannot entirely be replaced by individual training complemented by team-building activities

(Moreland et al, 1996). Formal group training activities on site are non-existent. One probable explanation of this result might be the fact that subcontractors make up such a big part of the workforce. Contractors hire subcontractors that already should be equipped to complete their assignment, and long-term competence development is up to each and every subcontractor to manage internally. Unless some long-standing agreement exists between a contractor and a subcontractor, there are no strong incentives to be a part of another firm's internal competence investments. Practically this means that there is reservoir of untapped potential when it comes to the development of effective TMS through group training. If that opportunity is viewed as unreasonable to pursue by contractors, there will be implications from a theoretical point of view that would suggest that this particular part of the framework needs redefining in order to work in these types of circumstances.

One way of doing this is to expand the concept of group training to include situations where people have to collaborate and learn together in order to solve a problem or discover new ways of working. There are some instances out on the site that resemble certain aspects of training situations. Unfamiliar situations and unexpected problems are a big part of the industry. Those types of situations often necessitate cooperation between the contractor and the subcontractors. According to Hofstede et al. (2010) different nationalities react differently in uncertain situations. The foreign workforce, which consisted of Polish workers in both of the studied cases, might avoid uncertainty to a higher degree that Swedes according to these cultural differences. As previously stated, interviewees described that the foreign employees were indeed very cautious with taking own decisions and sought the guidance of the supervisors more than Swedes do. Although time could be saved on many occasions where decisions could be taken without consultation, the cautiousness of the foreign workforce allows supervisors to have more control until both parties learn when and where everyone may take their own decisions. Naturally, the degree to which this occurs varies with nationality and thus the scope and severity of the problem may change in other cases.

Sharing locker rooms and breaks is one factor that makes it possible for employees to have more shared experiences. Contractors seem to have different views regarding this issue. At one of the projects all employees shared locker rooms, break rooms, and also working hours. From a TMS viewpoint this allows for a maximization of shared experiences during a day at work, increasing the effectiveness of the system (Ren and Argote, 2011). As evidence from the interviews, not all contractors endorse this kind of setup and white-collar workers often had separate facilities even if no space restrictions existed. This creates a kind of barrier especially in the case of foreign workers as their only link to the contractor, the production supervisors, becomes separated from them. Furthermore, the foreign employees worked longer hours than most of the people at one of the sites. This could create some problems and unnecessary tension and it does not contribute to the development of TMS. Having one of the contractor's production supervisors also working longer hours, as they did on the site, can counteract these negative effects. However, this might not always be possible and financial incentives to let them work longer hours could be significant. Additionally, it allows those who have families abroad to visit when they get a week of as a compensation for working long hours. A motivational aspect like this, although not encompassed by the TMS framework developed by (Ren and Argote, 2011), has to be taken into account and studied further as it could theoretically be of greater importance for overall performance and team satisfaction. From a theoretical standpoint this could for instance imply an addition of "Team member motivation"

into the framework of TMS, presumably under the category of "Team composition inputs" in the same way as the antecedent "Team member assertiveness". As a matter of fact, there have been a few studies that have explicitly considered motivation in certain TMS related situations. Wittenbaum et al. (2004) investigated the importance of motivation in knowledge sharing conditions and Yuan et al. (2008) as well as Jackson and Klobas (2008) actually investigated motivation as an antecedent to TMS with somewhat varied results. Thus it could be argued that it is not completely unreasonable to consider the addition of motivation as a separate antecedent to a framework of TMS.

Different types of events and gatherings are organized outside of the normal working day and they all constitute an opportunity for shared experiences. Parties, dinners, barbeques and other events of similar nature can be seen as good opportunities for employees to get to know each other. These kinds of shared activities should be beneficial from a TMS point of view (Ren and Argote, 2011). Besides increasing the amount of time the employees interact in general, they also constitute social contexts that employees would not otherwise be exposed to together. In a more relaxed environment like this foreigner might be more at ease and interact more freely and thus break down cultural barriers.

6.2.3 Team familiarity

A general opinion among the production supervisors was that prior team familiarity had a distinct effect on the effectiveness and efficiency of the work performed at the projects. Especially in the case of a foreign workforce as it impacts communication patterns and the degree of integration. Prior team familiarity has positive effects on the performance of TMS (Ren and Argote, 2011) but only in team compositions that are constructed with a high degree of distribution with regards to expertise (Lewis, 2004). As the results indicate, there is a relatively high degree of distribution of expertise in typical construction projects. The first level of division of labour concerns all the subcontractors that are allocated responsibilities in accordance with their area of expertise. Secondly, subcontractors subdivide their workforce into areas that correspond to the tools, methods, or materials that they are using most frequently. For example, the subcontractor responsible for the concrete at one of the projects had subdivided their employees into rebar workers for all the steel work and carpenters for building the formwork. Lastly, some employees with more experience in certain areas are further subdivided or allocated specific supervisory tasks. Although even further subdivision is possible and common in other countries, this kind of subdivision is described as adequate by the interviewees and should allow for prior team familiarity to have a relatively high impact on the performance of TMS. Further investigations have to be made in order to understand what degree of subdivision that is appropriate for the Swedish construction industry with its particular culture, management style, and accountability allocation.

Team familiarity is furthermore increased throughout the industry when contractors and subcontractors engage in relationships of a more collaborative nature. For different reasons it is often advantageous to hire the same subcontractors on consecutive projects, which is shown to be the case, at least in the projects studied in this report. This impacts on performance regardless of nationality, but it may have a bigger impact if a foreign workforce is employed as the barriers for getting to know each other are more severe in those cases.

It is also important to have in mind that there are many cultural differences that may have a weakened negative impact due to prior team familiarity. The original differences in Hofstede's (2001) cultural dimensions fluctuate with nationality. In accordance with the cases studied in this thesis, there is a relatively large divergence between Swedish and Polish people for example in the categories of "Power distance", "Masculinity" and "Uncertainty avoidance". Interviewees described that the foreign workforce gets more accustomed to the Swedish culture as they get to now each other. They become more comfortable with questioning authority, better at dealing with unfamiliar situations, and in general more aware of the message of equality that seems to be more prevalent in organizational life in Sweden.

6.2.4 Communication and Technology/Virtuality

Communication has been emphasized as important from a TMS perspective from the very beginning and repeatedly accentuated ever since (Choi et al., 2010; Lewis, 2004; Liao et al., 2012; Wegner et al., 1985; Yuan et al., 2009). In this thesis, it is also one of the barriers besides culture, which is investigated from a TMS perspective. The interaction between production supervisors and a foreign workforce in the construction industry, which was the studied environment, is heavily influenced by fact-to-face (FTF) communication. Although the use of technology and especially computer mediated communication is more established in the industry as a whole, its influence on this particular environment is insignificant. FTF communication is accompanied by the frequent use of drawings and other types of operation planning documents. These types of documents are helpful from a communication barrier perspective, as they require much less linguistic competence to discern the message. Furthermore, they are more or less universal and require considerably less effort from people to comprehend than learning a foreign language.

Nevertheless, there is still some ambiguity when the production supervisors use these tools to communicate with a foreign employee. On method the interviewees described as remedying of the problem, is the use of extra supervision and control. As might be expected, this method was necessitated more in the start-up phases of each project and if team familiarity was low, and subsequently the need for supervision subsided with time. One of the interviewees described that the use of extra supervision and control was actually appreciated by the foreign employees. He reasoned that it might be because they can "relax" when the burden of responsibility is transferred to the production supervisor in the event of an inspection. This is probably the case with all types of supervision but might be extra important when a foreign employee is new and less familiar with working methods and the management style of the supervisors.

Another method was to pay close attention to face expression, counter questions, and general interaction patterns that could be observed when information was presented to the foreign employees. These techniques should probably be part of every production supervisor's repertoire, even if communication occurs with an employee where no cultural or communication barriers exist. However, these abilities are recognisably of significant importance in facing those types of barriers that have been studied in this report, primarily in situations where team familiarity is low.

At both projects, interviewees mentioned that they struggle to convey messages about when and why different types of changes to their task or methods will be implemented. These problems are perhaps only rooted in communication challenges. A message that implies something about the present as well as something different about the future is more complex and the barrier that exists is therefore much harder

to surpass. Production supervisors have responded appropriately and work with trying to convey messages about the immediate future on a more continual basis.

Results also indicate that the foreign employees at both projects were less reluctant to take initiatives and solve problems without the consultation of a production supervisor. They are told that it is better to ask about small problems instead of ending up trying to solve big problems, but so is the rest of the workforce. However Polish people are, in this particular case, culturally predisposed to accept a greater power distance (Hofstede, 2001). This is probably one major factor that influences these types of behaviours. According to Hofstede et al. (2010) the combination of Polish culture scoring high in the categories "Power distance" and "Individualism", fosters a "tension" that has to be managed in order to be prosperous. Supervisors should have personal contact with everyone and focusing on communicating that everybody's opinion is of importance. As the results indicate, the production supervisors at both projects actually embrace a style of leadership that harmonises with the theory.

In summary, the cultural differences that exist are initially quite severe and require attention from the production supervisors. With time and with a kind of leadership style that focuses on the importance of the individual, the situation improves significantly and seems to be manageable with current competencies. Interviewees echo this statement, as they feel that additional recourses like for instance designated interpreters would be unnecessary at least in the circumstances they operate in. Instead they work on these issues, especially in the beginning of a project where more meetings, more supervision, and more interactions take place. This method resonates with theory, which implies that TMS is affected to a greater extent by communication in early stages of group and project development (Ren and Argote, 2011). However the problems still leads to a situation where production supervisors are prone to use those who know either both Swedish and Polish, or English and Polish, when they choose which communication path to take. So, companies are still dependent upon those with translational roles, i.e. "cultural gatekeepers" (Loosemore and Lee, 2002).

6.2.5 Imposed knowledge structure

As previously described role assignment is used to a relatively high degree, but it varies with the size of the project. Role assignment helps members locate expertise and relates to the task-expertise-person (TEP) units (Brandon and Hollingshead, 2004). The size of the studied projects in this thesis made it unnecessary, according to the interviewees, to explicitly hand over role and expertise information to all employees in writing. It was up to the responsible production supervisor to inform the workforce about to whom they should turn with certain types of problems and information. Although not necessary, it might be a big help for foreign employees to have this information especially if they might be unaccustomed to the way in which role assignment works in Sweden. On the other hand language barriers might impede such interactions to occur anyway and they might chose other communication paths where they know that the messages can be translated properly.

Furthermore, Wegner et al. (1991) suggested that imposed structures could only benefit TMS if no previous team familiarity exists. However, the study was conducted on dyads in a laboratory setting and perhaps not applicable to organizational settings. The positive effects that arise due to prior team familiarity, discussed in Section 6.2.3, probably outweigh the negative effects that might be transferable from a dyad to an organizational context. However, this relationship has to be studied further in order to understand the precise degree of influence of both aspects.

7 Concluding remarks

This chapter summarises the analysis and discussion into conclusions aimed at answering the main issues in this report. Consequently, the conclusions will be divided to separately answer each of the research questions that were stated in the Section 1.3.

How do "Team composition inputs" and "Team-level inputs" influence TMS in construction projects where culture and language barriers exist between management and part of the workforce?

The general tendency of this report implies that the TMS concept is highly applicable to the construction industry. All of the antecedents of TMS that were studied in this report had an impact on organizational life. Although cultural and language barriers had severe impacts in some areas, other preconditions remained relatively unaffected.

The antecedents under the category "Team composition inputs" were only affected to a minor degree by the introduction of a foreign workforce in the cases studied in this report. Besides the obvious nationality difference, other aspects of member demographics remained unaffected. The same applies to the competences of the workforce. However, the results also indicate that there is a major factor that has to be considered as it still plays a big role in the industry. The use of "posted workers" and other temporary hiring-solutions often through the use of big employment agencies results in higher turnover of employees and more uncertain competence levels, which impacts TMS negatively.

The antecedents under the category "Team-level inputs" were affected in a clearer way with more obvious implications. The nature of the construction industry brings with it an inherent need for interdependencies. The effect of employing a foreign workforce influences these interdependencies, but varies with what type of assignment the particular workforce is hired to perform. Contractors approach this situation by allocating responsibility to production supervisors in such a way that they are responsible for a whole chain of interdependent events. This solution is particularly important and effective in organizational settings where language barriers may impede efficient communication between interdependent parties, which allows for the construction of TMS. Furthermore, the use of group training is deficient in the current organizational setting where the division of labour is enforced through frequent use of subcontracting. There are nonetheless other types of shared experiences, such as informal gatherings and other festivities, that are more widespread in the industry and allow for integration and subsequently also prosperous preconditions under which TMS can be established.

Prior team familiarity is another antecedent of TMS that is well supported in the industry, and even emphasised outside of the boundaries of single companies through the use of the same subcontractors in consecutive projects. Lastly, the culture and language barriers that exist have substantial impacts on daily communication paths and the quantity of interactions. The use of extra supervision and control, which is the preferred solution to these issues, could even be regarded as advantageous from a cultural standpoint as the foreign workforce seem to respond well and flourish under such management style. Drawings and other types of operation planning documents are used regularly as means of communication and constitute a relatively universal tool that is very effective even the case of communication with a foreign employee.

How can construction projects support effective TMS in terms of ”Team composition inputs” and ”Team-level inputs”?

Although there are possibilities of developing effective TMS in the studied setting, there are areas that can be developed further. Generally, the move towards the use of progressively more subcontracting in the industry has been positive from a TMS perspective. If the trend continues it will be important to consider the source through which the employees are hired, especially in the case of foreign employees. Despite the fact that big employment agencies have greater resources and access to a bigger “pool of competences”, the option is clearly less beneficial from a TMS point of view. Employees are often only hired as “posted workers” not under Swedish terms of employment. Swedish based subcontractors and smaller employment agencies that hire employees under Swedish terms of employment provide a better condition with regards to several antecedents of TMS. Companies that minimize the use of “posted workers” have greater control over competences and are able to take full advantage of that there are no time restrictions to their working periods. This solution gives the groups time and opportunities to really capitalize on shared experiences and integrate properly as it minimizes the turnover of employees. Furthermore, companies have to continue to develop and improve collaborations and possible partnerships with the subcontractors and other firms that provide the foreign workforce. The possibility of creating long-term agreements allows for better team familiarity and it gives the companies the opportunity to train their employees collectively in order to maximize interdependencies.

In addition, production supervisors are probably well off continuing their current management style that includes some extra supervision and control of the foreign workforce. It works quite well even from a cultural viewpoint as the foreign workforce feels safer and more confortable if their work is controlled. Problems with them not taking own initiatives and questioning authority can be solved with time and if there is an emphasis on an “inclusive” management style. Interviewees did not see a need for designated translators however they often rely heavily on those who are bilingual, also called “cultural gatekeepers” in this context. It is important for companies to realize the value of these key employees, and develop and maintain them as key competences.

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Appendix 1

Acquired from Lewis (2003).

Transactive Memory System Scale Items

Specialization

1. Each team member has specialized knowledge of some aspect of our project.
2. I have knowledge about an aspect of the project that no other team member has.
3. Different team members are responsible for expertise in different areas.
4. The specialized knowledge of several different team members was needed to complete the project deliverables.
5. I know which team members have expertise in specific areas.

Credibility

1. I was comfortable accepting procedural suggestions from other team members.
2. I trusted that other members' knowledge about the project was credible.
3. I was confident relying on the information that other team members brought to the discussion.
4. When other members gave information, I wanted to double-check it for myself. (reversed)
5. I did not have much faith in other members' "expertise." (reversed)

Coordination

1. Our team worked together in a well-coordinated fashion.
2. Our team had very few misunderstandings about what to do.
3. Our team needed to backtrack and start over a lot. (reversed)
4. We accomplished the task smoothly and efficiently.
5. There was much confusion about how we would accomplish the task. (reversed)

Note. All items use a 5-point disagree–agree response format, in which 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, and 5 = *strongly agree*.

Appendix 2

Interview guideline for this thesis

What is your job title and how long have you been at your current job?

Have you been working with foreign labour before?

How are you involved in managing foreign labour at the construction site?

How many foreign workers are employed at the project?

Are there differences in education, experience, language skills etc. between nationalities?

Are there certain personality traits like being decisive, outspoken, and/or direct that you feel support clear information sharing in this particular context?

Is information or training provided to cope with possible cultural differences or communication issues?

Do the foreign employees work side by side with Swedes or only in their own groups or tasks?

Do they work on one particular chain of tasks that doesn't affect everyone else, or is there more interdependence between the teams?

Are there any training activities that involve both the Swedish and the foreign workforce?

Does the whole workforce share locker/break rooms and work according to the same time schedule?

Have the workforce, both Swedish and foreign, been working on previous projects together?

Are there any activities outside the workday where the foreigners and swedes may interact?

How does everyday communication take place?

Are there assigned means of communication i.e.: foremen, translators, FTF English communication, drawings, e-mail, etc.?

Is there any explicit information about employee roles or expertise so as to assist other employees to ask for or share information with the appropriate person?

Are there any differences culturally concerning hierarchy, communication, working methods, gender roles, etc. that influence the interactions between swedes and foreigners?

Do you feel that the interactions between the swedes and foreign workforce could improve? If yes, how?