Abstract

Purpose

Severe misunderstandings have been proved to cause significant delays and financial overruns in large engineering projects with teams consisting of people from Western and Asian cultures. The purpose of the study was to determine if differences in shared cognition may explain some of the crucial misunderstandings in intercultural production teams.

Design/methodology/approach

We have used the SPGR (systematizing the person-group relationship) survey methodology, supported by interviews, to study mental models in six South Korean teams that includes Norwegian engineers (52 individuals). In doing this, we use the theoretical framework of Healey et al. (2015), where X-mental representations involve actions that are automated and subconscious and C-mental representations involve actions that are verbalized reasonings and conscious. People may share mental models on the X-level without sharing on the C-level, depicting a situation where teams are coordinated without understanding why (surface discordance).

Findings

Our findings are that people with different cultural backgrounds in the intercultural team may learn to adopt to each other when the context is standardized, without necessarily understanding underlying meanings and intentions behind actions (surface discordance). This may create a perception of team members not needing to explicate opinions (sharing at the C-level). This in turn may create challenges in anomalous situations, where deliberate sharing of C-mental models are required to find new solutions and/or admit errors so that they may be adjusted. Our findings indicate that the non-sharing of explicated reasonings (C-mental models) between Norwegians

and Koreans contributed in this fashion, despite agreeing implicitly on how to perform standard tasks (sharing X-mental models).

Research limitations/implications

The study is limited to Norwegians and Koreans working in production teams. Future studies could benefit from more cultures and/or different team contexts. We believe however that our findings may concern also other standardized environments, and corroborates previous perspectives on intercultural teams needing to both train together (develop similar X-mental representations) and reflect together (develop similar C-mental representations).

Practical implications

Practical implications of our study involve the suggestion of using cross-cultural training at a deeper level than has previously been suggested, training in both social interaction patterns as well as verbalizing logical reasoning together. This entails reaching a shared and joint understanding, not only of actions but of values, feelings and teamwork functions. This can be enabled by group conversations and training in dynamic team patterns. Important is however that standardized contexts may dampen the perception of the need to do both.

Originality/value

Our study contributes to current research on intercultural teams by focusing on a dual-mode perspective on shared cognition, relating these to contextual factors. In this, we answer the call in previous research for more information on contextual matters and a focus on interaction in intercultural teams. We also show how the differences between X-mental shared mental models and C-mental shared mental models play out in a practical setting.

Keywords: team development, intercultural teams, project management, shared mental models

Introduction

Over the last decade, many cross-cultural projects between Norwegian manufacturers and Asian shipyards have been delayed and ended up as near financial disasters: for instance, the building of Skarv FPSO overran by 32 per cent (South Korean and Singaporean contractors), while Goliat FPSO overran by a 49 per cent cost increase (delivered from a South Korean yard). Evidence points to misunderstandings and cultural issues as important reasons (Ahn, 2015; Fagerlund & Busengdal, 2016).

In this paper, we employ the concept of shared mental models (SMM) to elaborate on misunderstandings and mishaps between people from Asian and Western cultures. SMM has the potential for increasing coordination and adaptation (J. A. Cannon-Bowers & Salas, 2001), but for intercultural teams there are relational and communicative challenges (Matveev & Milter, 2004). Despite apparent language challenges, we know however less of relational challenges in these ventures (Sjøvold, 2007). In this paper, we employ the dual-mode perspective of (Healey, Vuori, & Hodgkinson, 2015), denoting X-system mental models as implicit and spontaneous cognition, while C-system mental models denote conscious and explicit cognition. These point to different forms of relating to and understanding each other. We have used the SPGR (systematizing the person-group relationship) methodology, supported by interviews, to investigate mental models in a South Korean team that included Norwegian engineers. The purpose of the study was to investigate if a dual-mode understanding of SMM may explain some of the crucial misunderstandings in these cross-cultural teams.

Theoretical background

Shared mental models

In this paper we adopt the definition of an SMM as "…knowledge structures held by members of a team that enable them to form accurate explanations and expectations for the task, and in turn, to coordinate their actions and adapt their behavior to demands of the task and other team members…" (J. Cannon-Bowers, Salas, & Converse, 1993, p. 221). The importance of SMM is relatively undisputed (Healey, Vuori, & Hodgkinson, 2015), as a number of researchers agree that a similar SMM will enable teams to coordinate their activities more effectively (J. A. Cannon-Bowers & Salas, 2001; J. A. Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; Marks, Mathieu, & Zaccaro, 2001; Zaccaro, Heinen, & Shuffler, 2009). Theorists with a cognitive perspective suggest that team mental models may be defined as "team members' shared, organized understanding and mental representation of knowledge about key elements of the team's relevant environment" (Mohammed & Dumville, 2001, p. 90). The four key elements typically cited are technology/equipment, task/job, team interaction (knowledge of team interactions) and team (knowledge of team members) (Cannon-Bowers et al., 1995; Lim & Klein, 2006). It is generally acknowledged that these factors reflect two major knowledge domains: knowledge of the task at hand and knowledge of team interaction.

Agreeing while not agreeing

Healey et al. (2015) propose a dual-mode shift in the concept of SMM. This dual mode is, for Healey et al. (2015), a matter of dual-system cognition. They use the term 'X-system processes' to refer to implicit cognitive processes that are automatic and spontaneous and that occur without conscious awareness. The X-system is distinct from the C-system, which is responsible for cognitive processes that are reflective—

that is, controlled, deliberative and conscious. An important feature of X-system processes is that they are what Healey et al. (2015, pp. 412) call "affectively charged": they involve emotions and feelings, also known as hot cognition. C-system mental models are typically assumed to involve cold (i.e. unfeeling) cognition.

X-system representations offer faster team responses than C-system representations but, not being part of the conscious team awareness, are prone to misunderstandings and disagreements if not shared (Healey et al., 2015). Another issue is that a person may individually have a contradiction between his C-system mental model and X-system mental model. This can lead to a situation in which team members agree on a mental model on the C-level, but in reality disagree because their X-level models are different (illusory concordance). Also the opposite may occur – that teams perform coordinated actions without explicitly agreeing on how to do this (surface discordance – agreeing on the X-level but different C-level). Healey et al. (2015) argue that although the sharing of team mental models and task mental models is important at the C-level (in other words, talking about it, expressing it), sharing deliberative task and team mental models is often insufficient for effective team performance; to function effectively, teams must also share task and team cognition at the reflexive level. Sharedness of X-system representations occur through similarities in patterns of social interaction, while for C-system shared representations occur through similarities in verbalizations of logical reasoning (Smith & DeCoster, 2000).

Intercultural Teams and Shared Mental Models

The intercultural team is in contrast to the superordinate identity of a single organization workteam, where the divisive forces challenge the emergence of shared mental models (Liu, Adair, Tjosvold, & Poliakova, 2018). Intercultural teams are

defined as task-oriented groups consisting of people of different nationalities and cultures (Marquardt & Horvath, 2001). Despite the benefits, the cultural differences may be hard to overcome and may cause inefficiency and even conflict (Marquardt & Horvath, 2001; Matveev & Milter, 2004). Cultural diversity in teams may be both an asset and a liability, depending on both how the team manages processes and the context it operates in (Stahl, Maznevski, Voigt, & Jonsen, 2009). So far, the SMM concept to our understanding has been little employed in understanding shared cognition in intercultural teams. We have some models of shared cognition in multicultural teams (e.g. Gibson, Zellmer-Bruhn, and Schwab (2003); Taylor, Tinsley, and Adair (2006)), but we do not know how these develop (Anne Liu & Adair, 2015). Anne Liu and Adair (2015) proposed a three-stage process model of emergent multiculturally-shared mental models in multiparty negotiation, with the suggestion that multiple methods (both quantitative and qualitative) are employed to understand this better. The dual-mode understanding of SMM is a further development to understand shared cognition for intercultural teams.

Challenges arise from relational and communicative differences. Matveev and Milter (2004) argue that these challenges may be mitigated with heightened intercultural competence (cultural knowledge, skills and personality orientation), which at least for the explicit form of knowledge would be similar to a development of the C-SMM through a development of similarities in verbalizations of logical reasoning (Smith & DeCoster, 2000). Messner (2015) argues in a similar vein that intercultural communication can improve with the help of intercultural training. Training together would be similar to a development of the X-SMM, developing similarities in social interaction patterns (Smith & DeCoster, 2000). Despite the possibility of training, it is acknowledged that the context for intercultural skills to

develop is important (Ghemawat, 2007). Still, this area is under-researched. This paper seeks to address Messner (2015) call for more research on contextual influences. Messner (2015) p. 126) states that "more information is required concerning how and in what context international workers enact these identified skills during their international experience". In this paper, we will address the way different forms of shared cognition come into play for intercultural teams.

The Aim of this Study

We have chosen to study intercultural groups of Norwegians and Koreans in South Korea to investigate shared mental models of intercultural teams. The assumption is that people with different cultural backgrounds enter the intercultural team with different mental models. On the basis of the previous theoretical background, we formulated the research question: Do shared mental models of intercultural teams influence on the ability to avoid time-prolonging misunderstandings in large projects? If so, how do they do this in different contexts?

Our assumption was that X-SMM and C-SMM come into play differently. People construct explicit attitudes based on situational factors, including accessible information, logical reasoning, and social context (Schwarz & Bohner, 2001) (sharing at the C-level). On the other hand, are implicit attitudes (X-system representations) activated automatically without the individual´s awareness, and less likely to change following single instance of new information (Healey et al., 2015). Anomalous happenings, such as certain errors and/or misunderstandings, can thus be met differently depending on the kind of SMM. A dual-mode concept of SMM is the basis for our investigation, which to our knowledge has not previously been tested out in a

practical setting. The practical aim is to determine if differences in mental models in intercultural teams may explain halts and deviations in production.

Methodology

We applied a multi-method design with intercultural teams consisting of Koreans and Norwegians working in a South Korean shipyard. To gather data on differences in mental models, a standardized survey instrument was used. The quantitative data gathered through this survey were supplemented by interviews.

The Survey Instrument: Systematizing the Person-Group Relationship (SPGR)

SPGR is an acronym for systematizing the person-group relationship and is an operationalization of the spin theory on groups (Sjøvold, 2007). The instrument is suitable for our study because it is validated for use in both the Korean and the Norwegian culture and has been used in previous research to investigate cultural differences between Korea and Norway (Sjøvold & Park, 2007). Respondents complete questionnaires in their own language, either online or on paper, rating their group members according to items of behaviour. Respondents rate their team members' behaviour on a 24-item scale that is constructed according to a semantic differential (Osgood, Suci, & Tannenbaum, 1957; Snider & Osgood, 1969). One item consists of a set of behaviours—for instance, 'Results-oriented, goal-achieving, task-resolute'. Items are rated according to how often this behaviour is shown (rarely, sometimes or often). The Cronbach's alpha for the questionnaire used in this study varies from 0.78 to 0.92, dependent on the subject in question. The theoretical model for SPGR builds on a three-dimensional factor-analytic space that defines 12 vectors representing different aspects of team functioning. Three of the dimensions relevant for

our discussion in this paper, are control (C) vs nurture (N), dependence (D) vs opposition (O), and synergy (S) vs withdrawal (W). The vectors are labelled according to the dimensions to which they belong. (See coding in Tables 1 and 2.). Significant differences are assessed via t-tests.

Participants

The survey was completed by every member of six teams, each consisting of 5–14 individuals. In total, the survey was distributed to 52 team members. The average response rate was 84 per cent. Five of the teams had both Korean and Norwegian team members, and one team consisted of Koreans and other Scandinavian expatriates. Of the six teams, one was a management team consisting of managers, while the remainder consisted of technical experts and workers. Respondents completed the survey in their native language. Both the Norwegian and the Korean versions have been validated by translation-back-translation (Sjøvold & Park, 2007). The survey was distributed electronically.

Mapping Mental Models: SPGR Analysis

SPGR ratings are used in this paper both to measure perceived differences in behaviour in general and to identify perceived differences in the specific context of the work teams. In addition, we calculate a measure to identify the degree to which team mental models are shared within the group. The survey measures the perceptions of internal relationships within the group. Differences here may be an indication to differences in mental models (Fagerlund & Busengdal, 2016; Sjøvold, 1995), which has to be ascertained with interviews. The two measures are explained below:

1. Using the SPGR instrument, we measured perceived differences in behaviour at the cultural level by asking the respondents to rate their colleagues in a general situation. The results for the 12 SPGR vectors are presented in Table 1.

2. When investigating perceived differences in behaviour at the team level, we instructed the respondents to rate their fellow team members' behaviour in the specific context of the project team and in the execution of a demanding task. The results for the 12 SPGR vectors are presented in Table 2.

The first measure is used to check for differences embedded in culture in general, as opposed to being an artefact of the specific team dynamics. The second measure is used to investigate how the specific team dynamics may influence perceived behaviour. The difference is that for the first measure, raters are asked to rate Norwegians and Koreans in general while for the second they rate their team members.

Interviews

A total of 24 individuals were interviewed. The interviews were conducted in a semi-structured way and lasted between 36 and 71 minutes. Interviews were conducted by members of the research team in both Norwegian and English. They were recorded, transcribed, coded and analysed. The objective of the interviews, as described by Kvale (1996), was to obtain a phenomenological understanding of the interviewees' thoughts on the subject. This involved exploring the subjective experiences of the respondents, focusing on issues regarding collaboration both within and across boundaries.

Thirteen of the interview subjects were Norwegian expatriates working in Korea, one was a Danish expatriate and ten were Koreans working in their home country. The interviewees were a mix of middle management experts or employees with one member from top management. All interview subjects were selected on the criterion that they collaborated with Koreans and Norwegians on a daily basis. Interviews were conducted on site in a closed office.

To design the interview guide, the principles of McCracken (1988) were followed. This involved creating the guide based on a thorough literature review,

performed by the research team in the spring 2014, combined with a self-examination of our knowledge and experience on the topic. During the interviews, the interviewees were encouraged to talk as freely as possible, but the conversation was guided to focus on the topics of interest, using planned prompts. This allowed us to digress from the topic when we encountered interesting themes, not anticipated in advance. The interview guide involved themes such as (differences in) national culture, (differences in) leadership style, team cooperation and coordination (purpose, task, dynamics, roles).

The data transcripts were analysed in two steps, inspired by a grounded theory approach using multiple stages of data collection and refinement and interrelationships of categories of information (A. Strauss & Corbin, 1990). Firstly, a part of the research team analysed the transcriptions according to McCracken (1988) analysis process:

- Developing observations by reading through the transcripts without looking for relationships.
- Developing the observations through own meaning, in relation to findings in the transcript, and lastly in accordance with the literature review.
- Examining the interconnection between second-stage observations and theory.
- Comparing all observations.
- Putting together themes and patterns, and subjects them for the final analysis.

For this part of the analysis of the interview data there was used a collaborative cloud-based software for analysing qualitative data, called “Dedoose”. This program was used for coding the transcripts and developing themes.

The transcripts were then analyzed by another part of the research team, employing own categories using a form of open coding (A. L. Strauss, 1987). In addition, SPGR results were employed as own categories, with an attention to Koreans´ and Norwegians´ different (or similar) perceptions with regards to team dynamics. Previous categories were reassembled to emerge into a new analysis. Finally, both sets of themes were then discussed and analysed together by the whole research team with categories analysed according to the research literature, as a form of selecting coding (A. Strauss & Corbin, 1990).

Results

The findings from the SPGR surveys show first that the two nationalities perceived few differences in behaviour in a general context, but in the context of their team in project execution, their mental models of team behaviours differed significantly. The interviews indicate how both groups used several techniques to overcome problems arising from differences in perceived behaviour in order to improve joint collaboration. Their perceptions of differences increased, and caused problems, when situations in project execution differed from normal procedures. We will advocate that collaboration was, in some sense, automatized, being less sensitive to situational changes.

Quantitative results

General SMM

When comparing the results of Norwegian and Korean team members' ratings of the behaviour of the others as general colleagues in the same company, we see that there are no significant differences in 11 of the 12 vectors. The only significant

difference is found for vector C2, task orientation, where Norwegians score higher than Koreans (See Table 1).

Table 1 here

We may therefore suggest that Koreans and Norwegians perceive each other's behaviour as similar in general. This would imply that they generally get along fairly easily and resolve any potential misunderstandings fairly quickly. The only systematic variation at this level of analysis is that Norwegians rate their Korean colleagues as more task-oriented than the Koreans rate the Norwegians.

These ratings were performed to describe the general human interaction without the stress and work-related emotions bound to the more pressured project execution. In the next section, we will see not only that the difference identified in relation to task orientation is reinforced when ratings are performed in the specific project team context, but that additional differences also appear (Table 2).

Work Tasks SMM

Next, we asked the participants to rate each other emphasizing the context of their project team when in action. The results for our six groups, where the Norwegians' and Koreans' ratings are separated, are shown in Table 2.

Table 2 here

In this situation, we see that the perception of team behaviour varies greatly from what was presented in Table 1. Note that in Table 1 the results are from

Norwegians rating Koreans and vice versa, but in Table 2 the results are from when Norwegians and Koreans rate the whole team (all team members). The results in Table 2 are Norwegians' and Koreans' perception of the sum behaviour of all members of their team. In Table 2, we see that the previously identified difference in C2, task orientation, is reinforced, and the only behaviours that are not significantly different in the team context are S2, empathy, N1, caring, and C1, ruling. Along these vectors, findings suggest that team members get along fairly well in their human interactions since they rate each other equally on supporting (S2) and nurturing (N1) behaviour. They also equally see and accept behaviour supporting structure, rules and procedures (C1), indicating that these aspects of team interaction are shared and understood as important.

It is along two of the SPGR dimensions that the more interesting significant differences appear: dependence versus opposition (D-O) and synergy versus withdrawal (S-W). While Norwegians emphasize loyalty to both the task (D1) and the group (D2) in their perception of the team, Koreans, in contrast, emphasize opposition (O1) and assertiveness (O2). The same is true for the synergy versus withdrawal dimension. Where Norwegians see cooperative, constructive teamwork (S1), Koreans see resignation (W1), passive rebellion (W2) and derailment (N1). In addition, Norwegians see their team generally as more engaged (S1) and task-oriented (C2) than their Korean colleagues.

The quantitative data we are able to gather with SPGR will not catch the underlying causes nor their consequences for joint team cooperation. We may, however, infer that the differences presented in Table 2 indicate differences in SMM, and that this is masked in normal daily colleague interaction (Table 1). We argue that this is an attest to a sort of implicit coordination between the Koreans and the

Norwegians, however without the explicit agreeing on how. In other words, this is similar to what Healey et al. (2015) would call a surface concordance. It refers to situations in which C-system mental models are dissimilar across team members, while relevant X-system representations are similar.

The interviews allow us to investigate this phenomenon in further detail. We will explore the afore-mentioned differences in vectors O1/O2 as an issue of voicing/speaking up; differences in vectors D1/D2 as an issue of hierarchy and authority relationships; differences in vectors S1/C2/W1/W2 as an issue of speed/efficiency; and similarity in vectors C1/N1 as an issue of using heuristics in collaborative efforts.

The Interview Results

Voicing/Speaking Up

The quantitative results indicate differences in the perceptions of voicing their own opinions. Many interviewees described communication as complicated because Koreans may answer yes when requested to do something, while hinting that they disagreed with the proposed approach or the feasibility of the request. Inexperienced Norwegians would miss these cues and believe that the Korean had agreed to do something, only to find that it had not been done. More experienced Norwegians had learned how to avoid this problem by having a more detailed conversation about the approach. A frequently mentioned point was that Koreans were hesitant to admit mistakes and would sometimes try to fix the problem secretly, without involving others.

> You'll sometime realize that he has been quietly trying to solve the problem by himself and only reported it when he realized that there was no way it would go away. (Norwegian Manager)

A recurring comment was the Koreans' strict attendance to hierarchy. For instance, a Norwegian worker could report an error many times without it being attended to if it was not reported correctly according to the hierarchy. A Norwegian manager recounted the following:

> If one as an engineer approaches another engineer-designer at the yard (Korean) and says that something is wrong, has to be redone, he takes it personally. He has to redo the job and go to his manager, which is very difficult for a Korean. The right way to do it is to go via his leader and say that it has to be redone—and then they can make their subordinates do it.

The reluctance to admit mistakes was explained by fear of being fired, as might happen in a local company. The reluctance to speak up, or voice your own opinion, was described as a communication problem. Norwegian managers knew of the strong adherence to hierarchy in Korea, but there was no mention of the importance to Koreans of not losing face. This difference between Western and Eastern cultures is well documented (Hofstede, 1984), but hardly any managers attributed Koreans' reluctance to speak up to these important situational cues. Concerns and/or mistakes were not voiced.

Speed of Execution and the Effective Use of Resources

A complaint Koreans had about Norwegians was that they did not have the same sense of urgency in bringing projects forward. Several interviewees pointed out that there was a difference in priorities, with Koreans more likely to value speed of execution while Norwegians valued optimizing resources. Some Koreans said that they

felt Korean engineers were in general more decisive and better at making independent decisions. They contrasted this with the Norwegian consensus culture, and felt that Norwegians always wanted to have prolonged discussions. Norwegians, on the other hand, felt that it was the other way around. They thought Koreans frequently wanted to discuss obvious decisions just for the sake of discussion. They felt that Norwegians generally were more independent. Norwegian managers all agreed that speed of execution was important to a higher degree than they were accustomed to. Things had to be speeded up when working with Koreans. According to one manager, this would necessarily lead to errors, but according to him, "when errors arise, we deal with them". Some managers argued that this focus compromised quality. One argument was that Norwegians sought optimization while Koreans sought satisfaction, seeking solutions that were acceptable, or good enough. This non-alignment caused situations of misunderstanding that had to be resolved, and in some cases caused irritation. For instance, many of the interview subjects said that the use of email was a symptom of a kind of incongruence that caused irritation. Koreans were used to marking all their mails as urgent. This was not only unusual for the Norwegians, but also more of a symbol with little meaning; they responded when they felt ready to do so. Koreans however, expected urgency in responding. For instance, was there an expectation that leaders would respond to mails even in meetings, if only to reply that they had received the email and would respond more precisely in a few hours. Koreans attributed this to leadership style, that Norwegians were too "backward leaning", while the Korean leaders would respond immediately when needed and also "very directly". One Korean manager said the following of this communication difference:

> I am a little upset because it takes time or sometimes it needs more meetings. But in Korean culture, if I need some urgent issue from my manager, then he briefly decides and informs me—immediately and also very directly. Another difference is that in Korea, every email is marked as urgent. However, in the Europe offices they don't care about time. They say they only care about the quality. Here, quality and efficiency are equally important; the schedule must be kept.

Hierarchy and Authority Relations (Leadership Style)

Some of the interviewees point to a mismatch in expectations between the Koreans and Norwegians. According to the Norwegians, the Koreans needed quite detailed instructions regarding how to do things, and then they would execute these exemplarily. But they would not proceed on their own if they were not told to. This would also cause some confusion and tension: Norwegians in conflict situations would use indirect communications, while Koreans were accustomed to clear and direct communication. Nonetheless, the Koreans considered themselves to be more adept at making decisions than the Norwegians. This also translated into differences in leadership style. Norwegian leaders were seen by Koreans as more open and 'gentle' than Korean leaders. Korean leaders were said to use a more hierarchical and vertical leadership style, which in turn was judged to be good for efficiency. The Norwegian style, on the other hand, was judged to be good for creativity. However, they agreed that the difference was not that great, in that both groups were respectful and they communicated with each other with humility. One Korean worker stated that:

> The Norwegian management style is quite good. It is very open minded and respectful. It is well suited for engineering companies, where we need to generate new ideas. The Korean style is more vertical and it works well for creating efficiency. We achieve synergy effects by mixing both systems; we get both width and breadth. Only speed is not good, and only thinking is not good.

The difference was attributed to cultural differences, but there was an apparent paradox in their interpretation of communication style. Norwegians were also said to be quite extroverted in their communication style, in contrast to the more introverted Koreans. This behaviour, in combination with the perception of Norwegians as more gentle and Koreans as direct and hierarchical, seemed to cause problems. A recurring issue for Norwegian managers was that Koreans would perform tasks as told, but not continue if they were not told to. One Norwegian manager said the following:

> …if you sit down with them and explain, they will do these three things excellently. However, they return to you as soon as the job is done—and then you have to say to them that they of course have to continue with the other things. But they don't think that way. This is less of a problem in Norway.

On the other hand, some Norwegian expatriates expressed frustration at inefficiencies that were not corrected because people were just following orders. One Norwegian manager gave the following example:

> The workers in the shipyards just follow orders, and often do not think for themselves. It is not unheard of that a module not ready for painting is moved into the paint-shop and painted if it is scheduled for this. This can easily happen up to five times before the module is actually ready to be painted.

Using Heuristics as Workarounds

The collaboration context was relatively stable, which apparently enabled employees to use techniques to work around specific problems. Since the members of the two cultures in the case company had long experience with each other, they had gradually learned different ways to work around problems. Common misunderstandings, such as Koreans hinting at no while saying yes, were resolved as the Norwegians gained experience. Very practical decisions were also made, such as hiring older negotiators or using expatriates to deliver difficult messages to older

Koreans. This was important, since the negotiator's age made such a difference to the Koreans.

However, in some situations, simple techniques were not enough. The issue of hiding errors needed specific attention from the managers. The problem, as previously laid out, was that Koreans hesitated to report errors for fear of being fired or punished. This approach to handling errors seemed strange to Norwegian managers, who would rather take a non-authoritative approach. Even more importantly, there was a major safety issue with a failure to report errors. People needed to be open. There were signs of managers trying to establish a common understanding with regard to this issue, as reported by this Norwegian manager:

> As we established the trust that what has happened will not be used against you, there has been more and more openness and we have been able to address problems sooner and better.

This comment indicates an approach to reaching a deeper shared understanding. However, it is one-sided, as the Norwegian managers did not seem to understand the reasons behind the Koreans' fear of admitting errors. As the manager points out here, trust is established on the basis that errors do not lead to punishments, which has helped in addressing problems.

Discussion

The purpose of this study was to investigate if a dual-mode understanding of SMMs may explain some of the crucial misunderstandings in intercultural teams. On the basis of theories of group dynamics and shared mental models, we formulated the following research question: Do shared mental models of intercultural teams influence on the ability to avoid time-prolonging misunderstandings in large projects? If so, how

do they do this in different contexts? The findings show first and foremost that Koreans and Norwegians working together experienced few collaborative issues. When there were issues, people adjusted to each other by adopting techniques without necessarily grasping the underlying meanings. The findings indicate that team members' perceptions of the intentions and reasoning behind actions differed.

Importance of Shared Mental Models in intercultural Teams

A shared mental model may be thought of as a mental thought map that guides teams in the ability to coordinate their actions without the need for overt communication (Cannon-Bowers et al., 1995; Salas et al., 2009). Our results are based on intercultural teams with very different backgrounds and thus presumably different mental models. It may be argued that the groups in many instances agreed implicitly on how things should be done, but without converging on the deeper levels of values and taken-for-granted assumptions. Using techniques would, we will argue, over time lead to a shared mental model on the X-level. However, without reflecting explicitly upon their actions and intentions – they achieved not a shared C-level mental model – which contributed in concealing errors and/or mishaps making them escalate. Adherence to the X-SMM may have been promoted by the standardized context, with team members learning for most parts what to expect but not understanding why. This was not a problem as long as anomalies did not occur.

This was exemplified by the fact that issues were normally resolved over time, and that the more experienced workers bypassed problems. The stable context may have enabled an adjustment towards the situation that in itself made the need for explicit sharing of assumptions unnecessary. There was no need to understand the meaning, as acknowledged by the operators; with experience, they knew what to

expect in certain situations. They could get by through developing techniques and performing them—a sole focus on task—without discussing it and without understanding how they collaborated. This level of collaboration thus approaches what we have previously depicted as an X-SMM—a mental model shared on the reflexive level (Healey et al., 2015). This involves a shared understanding that is implicit and not conscious (Healey et al., 2015). The collaboration in the teams worked, but they did not know why these techniques worked. They agree about how but not about why, what Healey et al. (2015) call surface discordance. It "refers to situations in which C-system mental models are dissimilar across team members, while relevant X-system representations are similar". According to these authors, teams can achieve periods of unplanned coordination (p. 410) despite disagreements, and that intreateam coordination is more effective than full discordance (low sharedness of conscious and subconscious goals).

In addition, the necessity to talk and reflect together may have been compromised because the heuristics worked. To achieve a sharing of mental models at the C-level, there is a need to talk about and explicate team interactions (Healey et al., 2015). Performance hinges on the SMM model's accuracy (Lim & Klein, 2006) and how the team is jointly aware of this accuracy. Norwegians' understanding of the Koreans' perception of hierarchy did not extend beyond particular situations; in other words, they did not align their mental models at the C-level. For instance, Norwegian managers knew the importance of Korean hierarchy, as when hiring older people to engage in negotiations. However, they were seemingly not able to translate this to an understanding of Koreans' compliance and conformity to rules and decisions made higher up, as, for instance, with the painting of unfinished modules. Following our

argument, this would normally not make a big difference: the different mental models at the C-level had little or no impact, given the stable context.

We advocate therefore that, in a stable context, people with different mental models may adopt techniques to relate to each other without necessarily understanding the meaning. A stable context may, in this regard, be a context in which situations and events follow a pre-decided or pre-planned script in a linear fashion. One example of this is how Norwegian managers learned to talk their way through job tasks to avoid mistakes regarding Koreans' ambiguous 'yes' for 'no'. Both instances exemplify adopted techniques that are functional or viable from a Norwegian perspective, without understanding the Koreans' underlying intentions or meanings.

In What Way was a Shared Mental Model Important?

Techniques did not work always and everywhere. The prime example here is how the cohorts related to errors, or, in this context, unexpected anomalies. Koreans, relying on their mental models, did not report these matters, being afraid of losing face and of being punished. Norwegian managers, on the other hand, expected them to report at once. The problem here was not that errors were committed, but that there was no communication of them. Errors do, of course, happen; it is the escalation of one error leading to another that may cause serious problems (Antonsen, Skarholt, & Ringstad, 2012). This anomalous situation would have required a dialogue across the cultural boundaries to establish a common sense of meaning regarding the handling of errors, obtaining a full concordance shared mental model (Healey et al., 2015). Sharing at the X-level with automated responses may alone make team members less sensitive to situational inputs. When sharing at the C-level did not happen, there evidently

emerged a discrepancy and lack of mutual understanding that made the situation worse, with workers silently trying to fix the problem.

Some managers went beyond the hierarchy to establish trust through dialogue. As such, they made a step towards establishing a shared mental model also on the C-level. However, by resorting to techniques (automated responses), they seemed to remain at the X-level SMM. Koreans would only follow the routine decided by the manager, while the Norwegian managers struggled to understand what they perceived as an inability to think for themselves and would reportedly address Koreans' fear of punishment directly.

The importance of a dual-mode SMM – and how the context influenced

We infer from this that the different mental models were not causing difficulties per se, but, in anomalies in operating procedures, they negatively influenced the ability to resolve the issue. Our main argument is that, in situations characterized by uncertainty and tension (for instance when errors happen or trying to use knowledge in novel contexts), it appears that culture-dependent expressions lead to misunderstandings and escalate problems while, in normal situations where things are going as expected, rules and procedures seem to overrule cultural differences. The first situation calls for a full concordance SMM, in other words both consciously and subconsciously sharedness of mental model. The second situation calls for a surface discordance, i.e. sharing of how but not why. The latter may suggest that a stable context enables coordinated actions without deliberate sharing of a team mental model. Rules and procedures may thus replace group dynamics. However, this will probably also lead the team to fail in situations where practised procedures are no longer applicable.

This distinction or difference of context is unclear in previous research. According to Marks et al. (2000), SMMs may enhance team members' coordination and effectiveness in performing tasks that are complex, unpredictable, urgent and/or novel—a dynamic context. Marks et al. (2001) argue, however, that SMMs also allow team members to anticipate one another's actions and to coordinate their behaviours when time is of the essence and opportunities for overt communication and debate are limited (Mathieu et al., 2000). However, also important is that reaching a C-SMM involves debates and deliberate time to discuss and reflect. Although the sharing of team mental models and task mental models is important at the C-level (in other words, talking about and explicating team interactions), sharing deliberative mental models of the task and team is often insufficient for effective team performance; to function effectively, teams must also share task and team cognition at the reflexive level (Healey et al., 2015). A complex situation signals therefore a need for full concordance, or also a usage of cold cognition in addition to sharing social interaction patterns —i.e. both a C-SMM and X-SMM —while a standardized situation signals only a need for warm cognition—i.e. an X-SMM. The dynamicity in this is that practical contexts are both, and that C-SMM builds on X-SMM (Healey et al., 2015). Sharedness of X-system representations results primarily from similarities in individuals' general learning histories—that is, patterns learned from interactions with the social environment throughout the life course (Epstein, 1994; Smith & DeCoster, 2000). In other words – training together. Espevik, Johnsen, Eid, and Thayer (2006) showed in a study of operative attack teams on submarines, that knowledge of other team members significantly increased performance. This involved knowing each other through experience (what we have labelled sharing at the X-SMM level), but also

some overt communication throughout the task and de- and prebriefing before the exercise (sharing at the C-SMM level).

In this paper, we have discussed how shared mental models influence on intercultural teams´ performance. Contextual factors have shown to be important in these regards. The intercultural teams of this paper resorted to techniques and experience to achieve coordination, however without understanding why. They thus worked up what a shared mental model at the X-level – an implicit understanding of how things should be done. However, this needed to be developed over time – as team members from different cultures entered the teams with different X-systems. As we have argued, it probably also was dependent on some form of standardization of tasks and context – in that routines for social interaction could be applied. On the other hand, as also Healey et al. (2015) argues, the efficiency pressures (time pressure), may have led to an over-reliance on the X-system concordance not explicating or sharing at the C-level. Under time pressure individuals are more likely to solve problems based on intuition than logical reasoning (Dane & Pratt, 2007; Healey et al., 2015). At the plant, when errors happened or new contexts needed to be understood, previous knowledge was seemingly not easily transferrable into teams being coordinated and adaptable. In such situations, one could argue that heedful reasoning and rational logic could have prevented escalations or misunderstandings; consistent with C-system mental models. This could have consisted in team members activating and rehearsing their C-system mental models during team interactions by forming verbal arguments about how to perform the task at hand, self-monitoring those arguments, and deliberating about the task with teammates (Weick & Roberts, 1993). Efficiency constraints and standardized situations may have prevented both the available time and resources to do this, and understanding the necessary why.

Conclusion

The practical aim of this study was to determine if differences in mental models in intercultural teams may explain halts and deviations in production. If so, such understanding will help to avoid delays and financial overruns in the future. Our theoretical aim was to answer the call in previous research for more information on the influence of context on intercultural collaboration. The positive conclusion is that contexts may be standardized to such a high degree, that it will compensate for cultural differences. Thus, people from different cultures may learn how to adjust to each other solely by way of jointly adjusting to the context. The negative conclusion is that contexts will never be fully static and standardized. When the unexpected occurs, a reliance or learned dependence on certain relational response patterns without grasping the meaning behind them may cause further harm. This is because a stable context may hinder or block attempts to achieve SMM (C-level), because it is deemed unnecessary. The unexpected requires a heightened attention to team dynamics, which may have been dampened by standardizations. While we have no data to link this argument directly to project failures of a magnitude, it is probable that stable contexts with intercultural teams have the potential for serious problems because minor glitches are masked.

Practical implications of our study involve the suggestion of using cross-cultural training at a deeper level than has previously been suggested, training in both social interaction patterns as well as verbalizing logical reasoning together. This entails reaching a shared and joint understanding, not only of actions but of values, feelings and teamwork functions. This can be enabled by group conversations and training in dynamic team patterns.

Our study benefits from combining qualitative and quantitative data on a subject that is important but rarely researched. Future studies could involve interventions with training and dialogue sessions also on intercultural teams other than Norwegian/Korean.

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