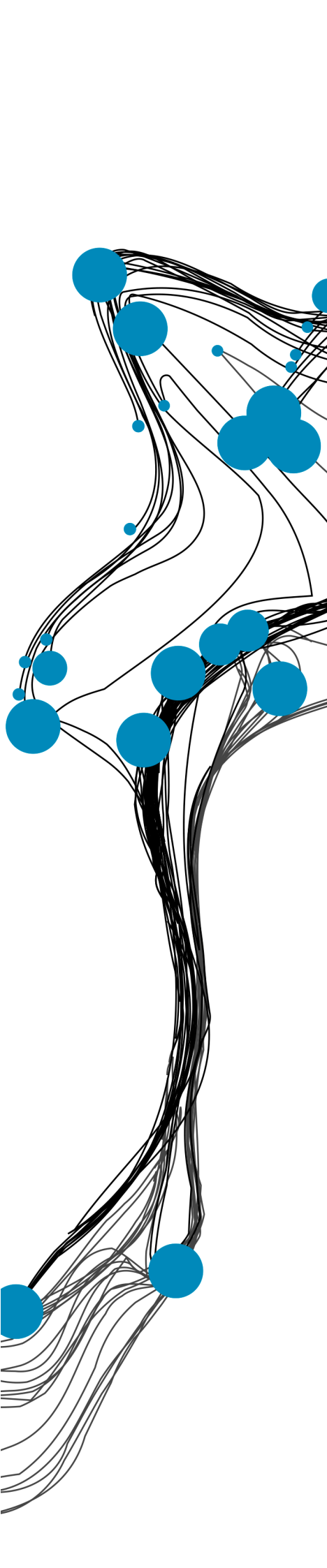




MASTER THESIS

TMS PREDICTORS IN DEPARTMENTS AND SMALL ORGANIZATIONS

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Abstract

In today's fast changing business environment knowledge is becoming increasingly important which emphasizes the need to find ways to effectively use knowledge that already exists in organizations. Transactive memory systems (TMS) consist of connected individuals that exchange knowledge based on the understanding "who knows what," which helps to make knowledge more findable and accessible. As such, TMSs can help to facilitate the effective use of knowledge because its members share the responsibility for encoding, storing, and retrieving knowledge. Because TMSs provide several benefits, such as effective knowledge use and improve performance, it is important to understand how these systems can be facilitated. So far little research has been conducted into TMS predictors in organizational contexts. As such, the focus of this study was to explore TMS predictors in departments and small organizations. This study specifically focused on the predictors colleague familiarity (through employment duration and the number of different colleagues collaborated with), trust, psychological safety, and group identification. In addition to that, this study also explored the moderator role of knowledge exchange norms on the relationship between group identification and TMS. The likely presence of TMS was indicated through a proxy variable of TMS. The findings of this study demonstrated that both trust and psychological safety were significant variables in predicting the TMS proxy variable. These findings indicate that it might be valuable for managers to increase the levels of trust and psychological safety to facilitate TMSs in their departments and small organizations. Moreover, future research should continue to explore antecedents that can facilitate TMS.

Introduction

In today's fast changing business environment knowledge is becoming increasingly important and is expanding at an increasing rate (e.g. David & Foray, 2003; Gold, Malhorta, & Segars, 2001). For organizations to keep up with the current knowledge society, they need to effectively use existing knowledge (Brauner & Becker, 2006; David & Foray, 2003; Gold et al., 2001; Mårtensson, 2000; Peltokorpi, 2004). In *transactive memory systems* (TMS) people share the responsibility for encoding, storing, and retrieving knowledge (i.e. knowledge exchange) based on the understanding of “who knows what” (Moreland, Swanenburg, Flagg, & Fetterman, 2010; Ren & Argote, 2011). This understanding allows for the effective use of existing knowledge, because employees can ask their colleagues for information, help, or advice based on knowing who is an expert on a certain subject. As a result, employees do not have to learn knowledge themselves that may already exist within the organization.

In teams and dyads TMS existence has been found to lead to several benefits such as improved performance, efficiency, and problem solving capabilities (Argote & Ren, 2012; Lewis & Herndon, 2011; Liao, Jimmieson, O'Brien, & Restubog, 2012; Moreland et al., 2010; Nevo & Wand, 2005; Peltokorpi, 2008). TMS existence increases the findability and accessibility of knowledge in groups. In organizations TMS existence can, therefore, help to increase dynamic capabilities – the ability of organizations to reassign or rearrange resources to address changes in the future –, increase competitive advantage, improve performance, and help employees to address the right people to solve problems or ask for advice (Argote & Ren, 2012; Moreland et al., 2010; Nevo & Wand, 2005; Peltokorpi, 2008). After simulating the effects of TMSs in groups of different sizes, Ren, Carley, and Argote (2006) found that larger groups benefited more of TMSs in terms of efficiency compared to smaller groups. They argued that finding information in larger groups can be very time consuming when people do not know who knows what. As such, TMS existence can especially help to reduce search times in larger groups by giving directions to people on where to search needed knowledge. Not surprisingly, Ren and Argote (2011) noted the importance of extending TMS research to organizational contexts.

In order to facilitate and support TMSs and to take advantage of its benefits, it is important to understand which factors predict TMSs (Ren & Argote, 2011). Existing research covering factors that relate to TMSs has mainly focused on dyads and teams (Argote & Ren, 2012; Lewis & Herndon, 2011; Ren & Argote, 2011). Findings from these studies cannot directly be used in organizations and departments because there exist some differences between the team/dyad and organizational/departments contexts (P. Jackson, 2012; Peltokorpi, 2008). First, organizations and departments usually consist of more people and contain different hierarchies, which makes the functioning and emergence of TMSs more difficult (Argote & Ren, 2012; Peltokorpi, 2004, 2008, 2012). Second, in contrast with dyads and teams, members of larger groups typically do not all work

on the same projects and tasks, they may have different goals, and are not necessarily required to know or work with every member of the same group (P. Jackson & Klobas, 2008; Peltokorpi, 2008). Therefore, it is possible that members of the same group cannot access or know about each other's expertise. Third, in larger groups that contain subgroups (e.g. organizations or departments that contain teams), it is likely that the TMSs are organized into subgroups as well. These subgroups may or may not be connected (Anand, Manz, & Glick, 1998; Nevo & Wand, 2005; Peltokorpi, 2008). Knowledge exchange frequencies in and between these subgroups may vary (Ren & Argote, 2011) which can result in differences in the extent to which a TMS exists within the entire group. For example, members in some subgroups may be well connected and have a good understanding of what others know, while members in other subgroups may not.

In addition to the fact that these differences imply that we cannot directly use the current literature for organizations, these differences also make it more difficult for TMSs to develop and operate in organizations. Without TMSs, however, people may be unaware of where knowledge resides, which can result in loss of time, energy, existing knowledge, and other resources (Moreland et al., 2010; Smith, 2001). So far, little research exists about TMSs in organizational contexts (Argote & Miron-Spektor, 2011; Moreland et al., 2010). Therefore, the goal of the current research was to study predictors of TMS existence in departments and small organizations. Because TMSs are embedded in social interactions (Argote & Ren, 2012; Liao et al., 2012) the choice was made to focus on social factors that have been found to be of importance in the team TMS literature (Akgün, Byrne, Keskin, Lynn, & Imamoglu, 2005; Liao, O'Brien, Jimmieson, & Restubog, 2015; Ren & Argote, 2011), namely: familiarity, trust, psychological safety, and group identification. Additionally, in light of group identification, this study also focused on knowledge exchange norms as a moderator.

Since some parts of knowledge are personal (e.g. experience and interpretations) (Brauner & Becker, 2006; Davenport, De Long, & Beers, 1998; McDermott, 1999) and can only be made available by improving the findability and accessibility of the people who hold that knowledge (Brauner & Becker, 2006), it is important that people know about each other (i.e. be familiar with each other) so that they can find and access each other's expertise (Boh, 2007; Borgatti & Cross, 2003; Gold et al., 2001; Lewis, 2003; Moreland et al., 2010; Su & Contractor, 2011). Familiarity has been found to be of significance in TMS research (Anand et al., 1998; Ren & Argote, 2011). As such, the first TMS predictor to be studied was *colleague familiarity*.

Next, considering that TMSs are embedded in social interactions (Argote & Ren, 2012; Liao et al., 2012), it seems important that individuals can trust their colleagues and feel psychologically safe (Moreland et al., 2010). Trust has been argued to play an important role in both the functioning and the development of TMS and is therefore considered to be very important in TMS literature (Ashleigh & Prichard, 2012; Moreland et al., 2010). However, the relationship between trust and TMSs is complicated and understudied (Ashleigh & Prichard, 2012). Therefore, several authors (e.g. (Ashleigh & Prichard, 2012; Ren & Argote, 2011) have emphasized the need for further research into

the relationship between trust and TMSs. Further, psychological safety facilitates an environment in which employees can learn and grow (Frazier, Fainshmidt, Klinger, Pezeshkan, & Vracheva, 2017) and is considered to be a factor that can encourage participation in TMSs (Hood, Bachrach, Zivnуска, & Bendoly, 2016). Since members of a TMS need to continuously update their own knowledge and knowledge about each other's expertise learning is imperative for its existence. Thus, next to colleague familiarity, this study will also focus on *trust* and *psychological safety* as predictors of TMS existence.

Finally, Liao et al. (2012) argued that because TMSs are social cognitive phenomenon, social identification processes are important in TMS development and operation. Moreover, TMS existence and maintenance in organizations or departments more difficult because it is a greater challenge to remain up to date about the expertise of all colleagues due to the larger group size (Argote & Ren, 2012; Peltokorpi, 2008, 2012). Therefore, it is expected that TMS existence in departments and organizations requires more effort from its members than it does in teams and dyads. Ren and Argote (2011) therefore suggested to focus on group-identification as a motivational factor for members in behaviours necessary for TMSs (Liao et al., 2012; Ren & Argote, 2011). As such, this study will also focus on *group-identification* as predictor of TMS. Complementary, since group-identification stimulates behaviours of individuals towards the norm of the group (J. W. Jackson, Miller, Frew, Gilbreath, & Dillman, 2011; Liao et al., 2012), it seems important when studying group-identification, to consider group norms that address behaviours that are important for TMSs. Knowledge exchange behaviours are crucial for TMS existence (Peltokorpi, 2008) since it is not possible to get accurate perceptions of who knows what and to use knowledge that resides with others without knowledge exchange. Therefore, this study will also investigate *knowledge exchange norms* as a moderator on the relationship between group-identification and TMS.

Assessing TMSs on a group level requires many organizations and their employees to participate, which is beyond the scope of this master thesis. Even though a TMS is a property of a group, each individual knows the system from one perspective (Lewis, 2003; Wegner, 1987). Therefore, the assumption was made that studying TMSs through employee perceptions would provide a sufficient first understanding of TMS predictors in departments and small organizations. Altogether, the goal of the current study was to investigate to what extent colleague familiarity, trust, psychological safety, and group identification predict TMSs in the context of departments and small organizations and to what extent knowledge exchange norms serve as moderator between group identification and TMSs. As a result, this study will help us understand how TMSs in departments and small organizations can be facilitated.

Theoretical Framework

This study aimed to investigate to what extent colleague familiarity, trust, psychological safety, and group identification predict TMSs in the context of departments and small organizations and to what extent knowledge exchange norms serve as a moderator between group identification and TMS. First it is described what a TMS exactly is. Next, the predictors colleague familiarity, trust, psychological safety, and group identification are defined and their relation to TMSs is described. Finally, the moderator role of knowledge exchange norms is specified.

Transactive Memory Systems

The awareness of who knows what and the usage of this awareness to process knowledge is referred to as a transactive memory system (TMS) (Argote & Ren, 2012; Lewis, 2003; Ren & Argote, 2011; Wegner, 1987). The concept TMS originates from studies researching how people in dyads use each other as external memory (Wegner, 1987; Wegner, Giuliano, & Hertel, 1985) and has been extended to groups and organizations (P. Jackson, 2012; P. Jackson & Klobas, 2008; Peltokorpi, 2012). A TMS consists of two components, namely a structural component (*TMS structure*) and a set of processes (*TMS processes*) (Argote & Ren, 2012; Lewis & Herndon, 2011; Liao et al., 2012; Ren & Argote, 2011; Wegner et al., 1985). The TMS structure and TMS processes are intertwined because they operate in a cycle (see Figure 1; Lewis & Herndon, 2011; Liao et al., 2012; Yuan, Fulk, & Monge, 2007). The TMS structure consists of individuals who are connected through knowing who knows what or who is expert in a certain area (Argote & Ren, 2012; Lewis, 2003). The set of processes consist of communication that facilitates the encoding, storage and retrieval of knowledge (Ashleigh & Prichard, 2012; Liao et al., 2012; Ren & Argote, 2011; Wegner, 1987; Wegner et al., 1985). Through these processes people learn about who knows what, store knowledge with the right people and retrieve knowledge when needed. The retrieved knowledge can have different forms, for example, information, help, or advice. Thus, in a TMS, group members learn what others know and communicate or exchange knowledge based on the formed TMS structure (P. Jackson & Klobas, 2008; Lewis & Herndon, 2011).

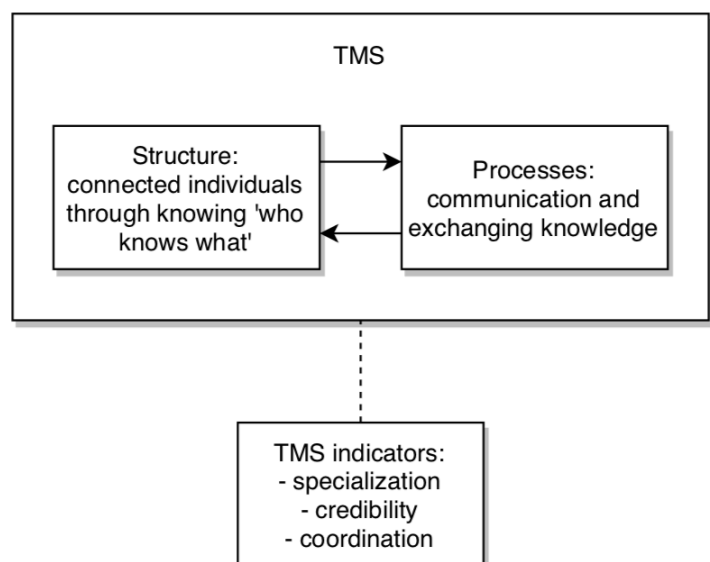


Figure 1. Transactive Memory System

TMS proxy variable (indicators).

Three behaviours have been identified in groups in which a TMS was well established, namely *specialization*, *credibility*, and *coordination* (Liang, Moreland, & Argote, 1995; Moreland & Myaskovsky, 2000). These three behaviours are widely used as indicators for the existence of TMS because they are expected to be observed in groups in which a TMS is operating (Moreland et al., 2010). Several authors (Argote & Ren, 2012; Ellis, Porter, & Wolverton, 2007; Lewis, 2003; Lewis & Herndon, 2011) have suggested that the awareness about the expertise of others and using that information to access the needed knowledge through knowledge exchanges (i.e. the existence of a TMS), enables members of groups to focus on and take the responsibility for the specialization of their own expertise (specialization). Furthermore, when members provide answers to questions of colleagues and perform tasks that are related to their expertise, other members come to rely and trust that they are experts in that area (credibility). Finally, being aware of who knows what allows for consultation of colleagues who are experts in the required domain in light of tasks and problems. In this manner, members are able to better coordinate tasks and problems (coordination). Lewis and Herndon (2011) emphasized that these indicators do not represent TMS or its components itself and cannot be analysed or interpreted in isolation as indicative of TMS, because by themselves they may not be indicative of TMS existence. For example, coordination by itself could also be a result of well-functioning structured routines and plans and may, thus, be indicative of something other than TMS (Lewis & Herndon, 2011).

The combination of specialization, credibility, and coordination has been widely used to infer the existence of a TMS (i.e. the combination of structure and processes) (Lewis, 2003; Lewis & Herndon, 2011; Ren & Argote, 2011) and to make conclusions about TMS (Hood et al., 2016; Zheng, 2012), TMS existence (Liao et al., 2015), TMS emergence (Lewis, 2004), and the extent to which a TMS has developed (Tang, 2015). In this study, these three indicators combined will be further referred to as the TMS proxy variable which is assumed to represent the likely existence of a TMS. As such, the focus of this study will be on the question to what extent colleague familiarity, trust, psychological safety, and group identification predict the TMS proxy variable in departments and small organizations. Additionally, this study focuses on the moderator role of knowledge exchange norms on the relation between group identification and the TMS proxy variable. In the following sections, it is explained why these factors are expected to predict the TMS proxy variable.

Colleague Familiarity Related to TMS

The first factor to be discussed in relation to the TMS proxy variable is colleague familiarity. Familiarity represents the knowledge that people have about one another based on their prior experiences or interactions (Akgün et al., 2005; Ren & Argote, 2011). According to Lewis and Herndon (2011) member familiarity has been found to be positively related to TMSs. Findings from the studies of Akgün et al. (2005) and Zheng (2012) support this, by assessing the effect of prior

shared experience and member familiarity on the TMS proxy variable. However, the study of M. Jackson and Moreland (2009) did not find a significant effect of familiarity on the TMS proxy variable.

Familiarity has been pointed out to improve members' awareness about each other's expertise or experience (Lewis & Herndon, 2011; Ren & Argote, 2011). When people are more familiar with each other, they have had the opportunity to become aware of expertise locations (Akgün et al., 2005; He, Butler, & King, 2007). Moreover, prior experience with others results in "a range of beliefs" which affects the sharing of information (Akgün et al., 2005). The findings of Gruenfeld, Mannix, Williams, and Neale (1996) suggested that when group members were familiar, they were more able to share information and to consider alternative perspectives.

In this study colleague familiarity was operationalized through "employment duration" and "the number of colleagues employees collaborated with" in the recent period. When employees have longer company experience, it is likely that they have had more opportunities to become familiar with their colleagues and their expertise, because they have had more time to get to know each other. In this case, it can also be expected that they have had more time to learn how to effectively engage in knowledge exchanges (Akgün et al., 2005; Ren & Argote, 2011). P. Jackson and Klobas (2008) indeed found that when people worked longer in a company, they were more able to identify who knows what. Additionally, because knowledge exchanges in organizations require employees to quickly find knowledge from different sources to solve problems, employees often turn to the people they know (Poleacovschi, Javernick-Will, & Tong, 2017). Therefore, it is expected that when employees are familiar with more colleagues, it is easier for them to access knowledge. Familiarity (through prior experiences & interactions) increases through collaboration. As such, when employees collaborate with more different colleagues it is expected that this also predicts the TMS proxy variable.

Altogether, this means that we expect that longer employment duration and a more diverse set of colleagues collaborated with, predicts employee perceptions of the TMS proxy variable in small organizations and departments. Therefore, the following two hypotheses were formulated:

H_{1A} – Employment duration predicts the TMS proxy variable in departments and small organizations.

H_{1B} – The number of different colleagues employees collaborate with predicts the TMS proxy variable in departments and small organizations.

Trust Related to TMS

The second factor that is discussed in relation to the TMS proxy variable is trust. Throughout the literature, trust has been conceptualized and described in different ways but usually contains elements that describe the attitude, choice, and/or willingness to be vulnerable to others or act based upon expectations about others and/or their intentions, words, and decisions (Ashleigh & Prichard,

2012; Edmondson, 2004; Frazier et al., 2017; Mayer, Davis, & Schoorman, 1995; Mishra, 1996). These expectations can be related to perceptions about someone else's competence and reliability (*competence based trust*) and to perceptions about someone's intentions (*affective based trust*; Ashleigh & Prichard, 2012; Costa, Fulmer, & Anderson, 2018; Mishra, 1996).

So far, in teams and dyads, trust in general has been discussed to be an antecedent of TMSs, a dimension of TMSs, and a moderator between TMSs and performance (Ren & Argote, 2011; Zheng, 2012). Ashleigh and Prichard (2012) pointed out that trust should be seen as an explicit antecedent of TMSs because it serves many roles in TMS operation and increases openness in knowledge sharing. They argued that it helps members to contribute information, evaluate received information, coordinate the combining of expertise, and assign roles to the right people. Akgün et al. (2005) also argued that trust is critical for an effective TMS, because for a TMS to operate effectively, members have to trust the reliability, competence, and expertise of others. They found that both cognitive- and affective based trust were significant predictors of the TMS proxy variable. Tang (2015) also found trust to be of influence on the TMS proxy variable through investigating the mediation of both competence- and affective based trust on the relation between communication quality and TMSs.

Trust can stimulate the believe that people are reliable sources of knowledge which influences what they remember about who knows what (Ashleigh & Prichard, 2012; Tang, 2015). This holds especially for trust based on perceptions about someone's competence. Also trust based on perceptions about other's intentions can increase the likelihood that people take information at "face-value" (Ashleigh & Prichard, 2012). If an employee would trust a colleague to be a reliable source of knowledge he could remember her for later reference. Oppositely, if the reliability of that colleague's expertise is questioned, she would likely not be taken into account for later reference. Higher levels of trust also contribute to undistorted communication (Mishra, 1996). Distorted communication can result in unreliable perceptions about who knows what, which is detrimental to TMSs (Moreland et al., 2010; Yuan et al., 2007). Finally, trust has also been found to decrease fear of exploitation (Mishra, 1996) and to positively influence knowledge exchange (Ashleigh & Prichard, 2012; Ren & Argote, 2011). Oppositely, lack of trust has been suggested to be a barrier to knowledge exchange (Ashleigh & Prichard, 2012; Kukko, 2013) and to cause withholding information (Akgün et al., 2005).

Altogether, it seems reasonable to expect that trust positively predicts the TMS proxy variable in departments and small organizations. Therefore, the following hypothesis was formulated:

H₂ – Trust predicts the TMS proxy variable in departments and small organizations.

Psychological Safety Related to TMS

The third factor that is expected to predict the TMS proxy variable is psychological safety. Psychological safety can be defined as the belief that people have about the safety of their environment to take interpersonal risks (Edmondson, 1999, 2004; Edmondson & Lei, 2014).

Psychological safety is closely related to, but distinct from trust (Edmondson, 1999, 2004). Where trust implies the willingness to give someone else the benefit of the doubt, psychological safety depicts someone's perception of the willingness of others to do that towards him or her (Edmondson, 2004). This is important in situations when it is possible to make mistakes or when it is desirable to express when deficiencies in knowledge exist (Edmondson, 1999; Hood et al., 2016).

Hood et al. (2016) found a positive relationship between psychological safety and the TMS proxy variable. They argued that psychological safety can alleviate the perceived interpersonal risks that come with social knowledge exchanges that are necessary for TMSs. Psychological safety has, indeed, been found to be positively related to information seeking, information sharing, and asking for help (Edmondson, 1999, 2004; Edmondson & Lei, 2014; Frazier et al., 2017; Wanless, 2016). Psychological safety can also help members to feel comfortable to take responsibility for certain areas of expertise (Edmondson, 1999; Hood et al., 2016). When employees feel that expressing lack of knowledge, expressing having problems, sharing their ideas, or being responsible for an expertise area can have negative consequences or costs (e.g. being judged or held accountable), they might decide not to share or seek the knowledge or help which is actually needed (Ashleigh & Prichard, 2012; Borgatti & Cross, 2003; Moreland et al., 2010).

Psychological safety has additionally been found to contribute to an environment in which people feel safe to learn and, therefore, engage in learning behaviours, by sharing uniquely held knowledge (Edmondson, 1999; Edmondson & Lei, 2014; Frazier et al., 2017). Employees in an organization may feel safer to express that they are not familiar with the fields of expertise of their colleagues when they feel psychologically safe (Edmondson, 1999). Knowing who is unfamiliar with the expertise (of some) of their colleagues provides opportunities to update their knowledge about who knows what (Hood et al., 2016). Peltokorpi (2004) argued that due to psychologically safe environments, more accurate and elaborate information exchanges contribute to the development of directories (i.e. knowing who knows what). Their findings, however did not confirm their expectations.

Altogether, it seems reasonable to expect that psychological safety predicts the TMS proxy variable in departments and organizations. Therefore, the following hypothesis was formulated.

H₃ – Psychological safety predicts the TMS proxy variable in departments or small organizations.

Group Identification Related to TMS

The fourth factor that is expected to predict the TMS proxy variable, is group identification. Group identification is a form of social identification and (Ashmore, Deaux, & McLaughlin-Volpe, 2004) is considered to be a multi-dimensional construct (Ashmore et al., 2004; J. W. Jackson et al., 2011; Lock & Heere, 2017; Van Der Vegt & Bunderson, 2005). It represents the extent to which an

individual feels identified with a certain group and influences how individuals behave with and respond to other group members (Liao et al., 2012).

Argote and Ren (2012) proposed that group identification is likely to affect members' motivation to share knowledge and invest in the behaviours necessary for TMS, and thus, will contribute to the specialized division of labour that characterizes TMS. Liao et al. (2012) argued that a shared common identity encourages members of a team to learn about each other's expertise through having shared goals and interests (Van Der Vegt & Bunderson, 2005). In a later study, Liao et al. (2015) indeed found a positive relation between team identification and the TMS proxy variable.

Group identification also contributes to feelings of interdependency (Ashmore et al., 2004; Mael & Ashforth, 1992). Interdependency has been pointed out to be an important antecedent for TMS (Hollingshead, 2001; Hollingshead & Brandon, 2003; Lewis & Herndon, 2011; Zhang, Hempel, Han, & Tjosvold, 2007). In teams, interdependency usually arises through sharing tasks and projects on which members of the team have to collaborate. In organizations, however, not all employees necessarily share the same tasks or projects which decreases the likelihood for task interdependency, suggesting the importance of group identification for TMS existence.

Altogether, it seems reasonable to expect that group identification in the context of departments and small organizations positively predicts the TMS proxy variable. Therefore, the following hypothesis was formulated:

H₄ – Group identification with the department or organization predicts the TMS proxy variable.

Knowledge exchange norms as moderator.

Knowledge exchange is a necessary behaviour for TMSs (Peltokorpi, 2008) and entails the sharing and seeking of knowledge with others (Wang & Noe, 2010). Without knowledge exchange it is not possible to get accurate perceptions of who knows what and to use knowledge that resides with others. Norms are perceptions of which behaviours and attitudes are considered to be important by the group (Fisher, Maltz, & Jaworski, 1997; Terry & Hogg, 1996). Knowledge exchange norms, therefore, are perceptions about which behaviours and attitudes are considered to be important by the group regarding the sharing and seeking of knowledge.

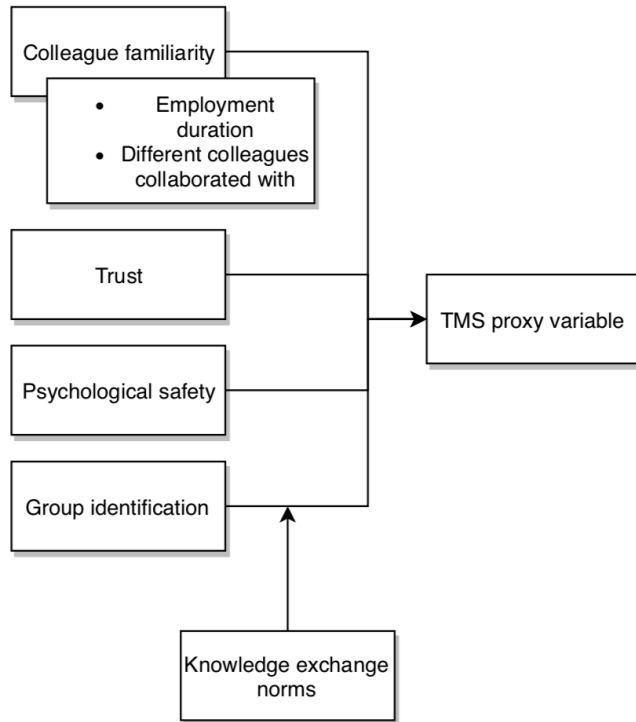
When people identify themselves with a group, they categorize themselves as being a part of that group which leads people to think of themselves in terms of the group norms and values (Terry & Hogg, 1996). Consequently, group identification can stimulate behaviours of individuals towards the norms of the group (J. W. Jackson et al., 2011; Liao et al., 2012; Lock & Heere, 2017). In this light, the presence of knowledge exchange norms may influence the impact of group identification on the TMS proxy variable. When knowledge exchange norms are strongly present in a group, the effect of group identification on the TMS proxy variable may strengthen, because group identification

influences the behavioural intentions of individuals towards knowledge exchange (Terry & Hogg, 1996). As such, final hypothesis in this study is:

H₅ – Knowledge exchange norms moderate the relationship between group identification and the TMS proxy.

Research Questions and Model

This study aimed to investigate predictors of the TMS proxy variable in departments and small organizations and aimed to answer the following research questions guided by the mentioned hypotheses. The model for this study is presented in Figure 2.



RQ₁ – To what extent do colleague familiarity (employment duration and the number of different colleagues collaborated with), trust, psychological safety, and group identification predict the TMS proxy variable in departments and small organizations?

Accompanied by H_{1A} , H_{1B} , H_2 , H_3 , & H_4

RQ₂ – To what extent do knowledge exchange norms moderate the relationship between group-identification and the TMS proxy variable in departments and small organizations?

Accompanied by H_5

Figure 2. Research Model

Method

Design/Research Approach

The current study researched to what extent colleague familiarity (operationalized as employment duration and the number of different colleagues collaborated with), trust, psychological safety, and group identification predict the TMS proxy variable in the context of departments and small organizations and to what extent knowledge exchange norms serve as moderator on the relationship between group identification and the TMS proxy variable. Data on the predictors and the TMS proxy variable were collected through an online survey; as is often used in correlational research since this allows to reach a large set of possible participants (Boudah, 2010). The survey contained closed questions resulting in quantitative data. Because the goal of this study was to investigate the relationship between the predictors and the TMS proxy variable, and not to confirm causal relationships, a cross-sectional, non-experimental research design was used.

Respondents and Sampling

Two criteria were followed for the selection of departments and small organizations. First, since this study focused on departments and small organizations, an upper limit for the number of employees in the participating departments and small organizations was set at 50 employees; following article 2 of the Commission Recommendation of 6 May 2003 (2003, p. 39) for the definition for small enterprises. Second, since TMSs are considered especially valuable to tasks in which performance relies on diverse knowledge and access to deep and specialized knowledge (Lewis & Herndon, 2011), departments and organizations were considered for participation if the tasks they performed required expertise from different areas. Following the selection criteria, departments and organizations were approached based on convenience sampling. In total, five different departments and organizations were asked and agreed to participate. All employees of these departments and organizations were asked to participate independently.

The number of employees in the participating departments and organizations were 18, 32, 34, 53, and 46 ($M = 36.60$). Since 53 was very close to 50, it was decided, based on practical reasons, to include this department in the analysis. From the total 183 possible participants 59 respondents participated in this study resulting in a response rate of 32.2%. One of the respondents chose to not fill in the background information questions. Based on the other 58 respondents, the average age was 37.90 years ($SD = 12.86$) ranging from 22 to 64. In total 19 males (32.2%) and 39 females (66.1%) participated in this study. Average employment duration was 5.29 years ($SD = 8.38$) ranging from zero till 33 years. More than half of the participants (57.6%) in this study finished a bachelor or master at a University and another 11.9% finished a PhD. Only two participants (3.4%) did not have a degree higher than high school and none of the participants had a degree in Secondary Vocational Education (MBO), leaving 25.4% of the participants who had a Higher Vocational Education (HBO) degree.

Instrumentation

To gather data for this study, an online questionnaire was distributed among the participants collecting general information and perceptions on the TMS proxy variable, colleague familiarity, trust, psychological safety, group identification, and knowledge exchange norms. In order to distribute the online questionnaire and collect the data, Qualtrics research software was used. All questionnaire items were available in both Dutch and English to ensure proper understanding with respondents. Translation of the scales to Dutch was performed through backwards translation and was reviewed by several educational scientists.

General background information. Through this section of the questionnaire participants were asked about their age, gender, and educational level. This data provided general information about the background of the participants and the heterogeneity of the sample.

Transactive memory system proxy variable. Employee perceptions regarding the TMS proxy variable in departments and organizations were measured using the scale developed and validated by Lewis (2003), which reflects both the TMS structure and the TMS processes (Lewis, 2003). The scale represents an indirect measure of TMSs based on the assumptions that (1) we can infer that a TMS is operating in a group through the three indicators specialization, credibility, and coordination; (2) specialization, credibility, and coordination are observed together because a TMS is operating; (3) and specialization, credibility, and coordination are independent after controlling for TMS existence (Lewis, 2003; Lewis & Herndon, 2011).

Different reasons were considered in choosing Lewis' (2003) scale. First, this measure is suitable for situations in which it is difficult to measure TMSs directly through its components (structure and processes), in which it is difficult to specify tasks, or in which members do not always share tasks (Lewis, 2003; Lewis & Herndon, 2011). This was the case in the current study, as this study focused on organizational contexts. In these contexts, people do not necessarily work on the same projects and tasks and the groups are generally larger. Second, the used scale can be used in a variety of groups (Ren & Argote, 2011), making it suitable for a study covering different departments and small organizations. Supporting this, Peltokorpi (2008) stated that this scale can be used to measure TMSs in small organizations through regression analysis. Third, since this scale is one of the most widely used in TMS research, it contributes to the existing body of knowledge (Ren & Argote, 2011).

The scale contained 15 items measuring the three TMS indicators specialization, credibility, and coordination and uses a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). Reliability analysis revealed a good Cronbach's α of .81, meaning that the scale had good reliability (Field, 2009). Since the items in the original scale focused on TMSs in teams, the items were adjusted to fit in an organizational/department context. Example items for the subcategory specialization are: "Each member in this organization/department has specialized knowledge of some aspect about to the work we do" and "I have knowledge about an aspect of the work we do that no

other member in this organization/department has.” Example items for the subcategory credibility are: “I am comfortable accepting procedural suggestions from other members in this organization/department” and “I trust that knowledge of other members in this organization/department about our work is credible.” Example items for the subcategory coordination are: “Members in this organization/department work together in a well-coordinated fashion” and “Members in this organization/department have very few misunderstandings about what to do.”

Colleague familiarity (employment duration and different colleagues collaborated with).

Since colleague familiarity was studied through employment duration and the number of colleagues collaborated with, it was measured with two questions. First, data on employment duration was collected by asking the participants “Indicate, in years, how long you have been employed in this organization/department.” Second, data about how many colleagues employees collaborated with, was collected with the following question: “Indicate with how many different members in this organization/department you have collaborated in the last month.” This question resulted in a number that represented the number of colleagues. It was decided to only collect data on the collaborations of the last month, because TMSs are dynamic and subject to changes in membership (Lewis & Herndon, 2011)

Trust. Trust was measured through an adapted version of the scales used Kanawattanachai and Yoo (2002), which were also used by Akgün et al. (2005) and (Tang, 2015). The scale measured trust as a combination of cognitive- and affective based trust. The choice for this questionnaire was made as it was previously used in TMS literature and since it focused on trust in teammates (or co-workers), which was the focus of the current study. The eight items on the scale were rated on a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). Reliability analysis revealed an acceptable Cronbach’s α of .76, indicating that the scale was reliable (Field, 2009). Since all items were originally formulated for a team context, the items in this questionnaire were adapted to fit an organizational/department context. Example items for the cognitive based trust questions are: “Most of the members in this organization/department approach their job with professionalism and dedication” and “I can rely on other members in this organization/department to not make my job more difficult by careless work.” Examples for the affective based trust questions are: “I can talk freely to members in this organization/department about difficulties I am having at work and know that they will want to listen” and “If I shared my problems with members in this organization/department, I know they would respond constructively and caringly.”

Psychological safety. In order to measure psychological safety, an adaption of Edmondson’s (1999) scale was used. This measure contained seven items and used a 7-point Likert scale ranging from *very inaccurate* (1) to *very accurate* (7). Reliability analysis revealed a good Cronbach’s α of .80, meaning the scale had a good reliability (Field, 2009). It has been widely used and shown to display internal consistency reliability and discriminant validity (Edmondson, 2004). Again, items were adjusted so that the scale fits an organizational/department context. Example items are: “If you

make a mistake in this organization/department, it is often held against you” and “It is difficult to ask other members of this organization/department for help.”

Group identification. The scale used to measure group identification was the scale used by Mael and Ashforth (1992). It consisted of six items and used a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). Cronbach’s α was acceptable with .71, meaning that the scale was reliable (Field, 2009). The choice for an unidimensional scale was made since this study did not aim to research the different dimensions of group identification. Additionally, multi-dimensional scales consist of more items, challenging the motivation of respondents and thus hindering good reliability. Example items of this scale are: “When someone criticizes this organization/department, it feels like a personal insult” and “When I talk about this organization/department, I usually say ‘we’ rather than ‘they’.”

Knowledge exchange norms. Knowledge exchange norms were measured through an adapted version of the scale developed by Fisher et al. (1997). The statements were adapted to measure knowledge exchange instead of information sharing, to focus on organizational/department norms, and to be better understandable. The scale contained five statements and used a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). Reliability analysis revealed a questionable Cronbach’s α of .69, meaning that the reliability of the scale can be questioned (Field, 2009). Respondents needed to indicate to what extent they believed this statement was applicable for their organization or department. Example items are: “In this organization/department everyone believes that exchanging knowledge (e.g. information, advice, or help) is important,” “Knowledge sharing and seeking (e.g. information, advice, or help) is strongly encouraged in this organization/department,” and “People in this organization/department are expected to share and seek knowledge (e.g. information, advice, or help) with others.”

Factor Analysis

To see how well the Likert-items in this study corresponded to the scale they belonged to, a principal components factor analysis was conducted on all the Likert-items of this study. Since it is not unlikely that some of the different constructs in this study are correlated, the choice for oblique rotation was made (Ford, MacCallum, & Tait, 1986). An initial analysis extracted 12 factors based on eigenvalues greater than 1. The scree plot indicated three points of inflection. The first after two components, the second after five components and the third after 10 components (see Figure 3). However, after the second point of inflection, the graph decreases significantly less. Since this study indeed researched five different constructs and because the general rule of thumb states that only factors above the “scree” (where the graph tapers off very gradually) should be considered, the choice was made to extract five factors (Costello & Osborne, 2005; Field, 2009). The resulting pattern matrix is presented in Table 1.

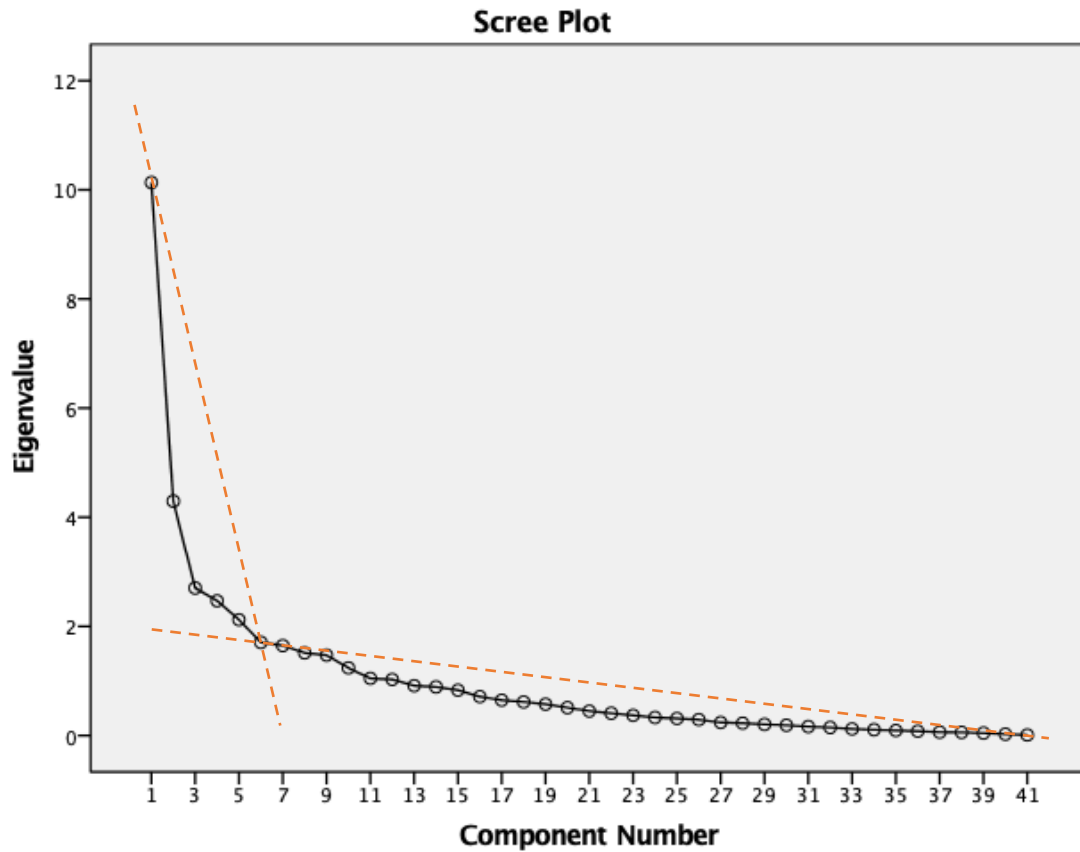


Figure 3. Scree Plot for the Factor Analysis

Table 1

Pattern Matrix of the Factor Analysis With Oblique Rotation of TMS, Trust, Psychological Safety, Group-identification, and Knowledge Exchange Norms Scales

Items	Components				
	1	2	3	4	5
TMS proxy					
Specialization 1	.49	.15	.04	-.03	-.54
Specialization 2	-.10	-.07	.17	-.14	-.57
Specialization 3	.15	-.21	-.08	.38	-.61
Specialization 4	-.06	.10	-.11	-.01	-.74
Specialization 5	.15	-.09	.36	.10	-.38
Credibility 6	-.15	-.02	.23	.65	.02
Credibility 7	.90	.09	.06	-.17	-.07
Credibility 8	.77	-.02	.13	-.05	-.13
Credibility 9	.72	-.26	-.02	-.07	.28
Credibility 10	.76	-.06	-.12	.03	.02

Coordination 11	.25	.44	.18	.34	.07
Coordination 12	.27	.15	.11	.03	-.44
Coordination 13	.57	-.10	-.04	.38	.30
Coordination 14	.50	.16	.13	.20	-.18
Coordination 15	.57	-.15	-.11	.29	.01
Trust					
Item 1	.39	.29	.19	.12	-.07
Item 2	.75	.17	.22	-.07	-.11
Item 3	.60	.20	.03	.12	-.05
Item 4	.62	.27	-.01	.08	-.30
Item 5	.04	.37	.35	.42	.16
Item 6	-.01	.56	.32	-.23	-.01
Item 7	-.01	-.06	.19	.64	.10
Item 8	-.03	.54	.30	.02	-.05
Psychological safety					
Item 1	.29	-.07	-.17	.55	-.32
Item 2	.05	.34	-.09	.65	-.07
Item 3	.16	.03	-.27	.58	-.31
Item 4	.18	.04	.00	.60	.01
Item 5	.19	.45	-.07	.24	-.08
Item 6	.24	.11	-.23	.37	.23
Item 7	-.03	.24	-.11	.65	-.26
Group identification					
Item 1	.01	.11	.55	-.14	.12
Item 2	-.41	.43	.35	.18	-.18
Item 3	.03	.12	.64	.28	-.02
Item 4	.11	-.02	.64	.22	-.05
Item 5	.06	-.20	.71	.35	-.16
Item 6	.03	-.06	.60	-.36	-.12
Knowledge exchange norms					
Item 1	-.15	.65	-.10	.03	-.19
Item 2	.20	.46	-.21	-.08	-.26
Item 3	.15	.78	-.14	-.10	.17
Item 4	-.09	.77	.00	.17	.11
Item 5	.02	.50	.01	.02	.02

Note. Factor loadings > .40 are in boldface. The items for each questionnaire are presented in Appendix I.

The pattern matrix and the structure matrix of the factor analysis were quite similar where by some factor loadings above the .4 threshold in the structure matrix were absent in the pattern matrix. Further analysis of the pattern matrix (Costello & Osborne, 2005) overall indicated that psychological safety was presented by Component 4, group identification was presented by Component 3, and knowledge exchange norms was presented by Component 2. The TMS proxy was mainly presented by Components 1 and 5, however two of the items loaded onto Components 2 and 4. Finally, the trust items did not seem to clearly load onto one component, but instead were spread out over Components 1, 2, and 4 with a preference for Component 1. The items that loaded onto Component 1 were the items that measured the perceptions about other's competence and the items that loaded onto Components 2 and 4 were the items that measured the perceptions about other's intentions. Exploration of additional factors to be extracted (in total 6, 8 and 10) did not result in any improvements in the factor loadings.

The results of the factor analysis indicate that the items of trust, TMS, and one item of both psychological safety and group-identification did not clearly represent their own construct, suggesting that continuing with the scales as they are, increases construct validity issues (Thompson & Daniel, 1996). However, the sample of this study was quite small ($n = 59$) and the Kaiser-Meyer-Olkin measure demonstrated that this sample is not adequate for factor analysis with not exceeding the .5 threshold; $KMO = .46$ (Field, 2009). Moreover, with very small sample sizes ($N < 100$) the risk emerges that the found solutions of factor analysis are not proper and generalizable (Costello & Osborne, 2005; MacCallum, Widaman, Zhang, & Hong, 1999). Additionally, the used instruments in this study have already been used and validated in previous studies. Consequently, the choice was made to continue with the questionnaires as they were intended.

Procedure

The first step in this study was to request approval of the ethics committee of the University of Twente. Subsequently five different departments and small organizations were contacted by email to request for their participation in this study. They received general information about this study, including the goals and information about data collection. After receiving consent to distribute the survey within the organizations, all participants received an email containing information and a link through which they could fill in the questionnaire. Participation to this study was anonymous and voluntary. Before filling in the questionnaire, participants had to provide individual consent. After receiving the first email, participants received two additional reminders with an interval of a week, resulting in a three week period in which they could fill in the questionnaire. In total, data collection happened over a period of a month after which the data was analysed.

Data Analysis

In order to answer the first research question, regression analysis was used to examine the effect of the predictors colleague familiarity (through employment duration and colleagues

collaborated with), trust, psychological safety, and group identification on the TMS proxy variable. Since this study included several predictors, multiple regression analysis was used (Field, 2009). To answer the second research question, a moderator analysis was performed through a hierarchical multiple regression analysis with the centralized variables of group identification and knowledge exchange norms, and the interaction term “centralized group identification*centralized knowledge exchange norms” as predictor variables and the TMS proxy variable as outcome variable (Fairchild & MacKinnon, 2009; Hall & Sammons, 2013).

Assumptions Testing

Before and during the analysis, several assumptions were tested. First, the assumption of normality for the TMS proxy variable distribution was assessed. The histogram demonstrated a bell-shaped distribution that was slightly skewed to the right. Further inspection revealed kurtosis and skewness values of respectively $-.08$ ($SE = .61$) and $-.54$ ($SE = .31$). Both the Kolmogorov-Smirnov test, $D(59) = .10$, $p = .200$, and the Shapiro-Wilk test, $W(59) = .97$, $p = .139$, were not significant. Considering the above, normality of the dependent variable was assumed.

For the regression analysis which was used to answer the first research question, assumptions were tested. Multicollinearity was not found to be a problem for the produced models since the independent variables did not correlate very strongly (above $.80$; Field, 2009), none of the VIF values were greater than 10, and the tolerance values were well above 0.2. Further, no strong violations for the homoscedasticity assumption were found. Next, besides the relationship between employment duration and the TMS proxy variable, the relationships between the independent variables with the TMS proxy variable seemed linear. Finally, evaluation of the residuals of the produced model, showed a leptokurtic distribution. As such, the assumption of normally distributed errors may have been violated, indicating that the findings of this study may not be suitable to be generalized beyond the current sample. For the moderator analysis, the same assumptions as for the regression analysis were tested and no violations were found.

Results

The goal of this study was to investigate to what extent colleague familiarity (through employment duration and colleagues collaborated with), trust, psychological safety, and group identification predict the TMS proxy variable in departments and small organizations. Furthermore, the extent to which knowledge exchange norms moderates the relationship between group identification and the TMS proxy variable was investigated. The current chapter presents the descriptive statistics, followed by the outcomes of the regression- and moderator analysis.

Preliminary Analyses

Means, standard deviations, minima, and maxima for the TMS proxy variable, colleague familiarity (employment duration and different colleagues collaborated with), trust, psychological safety, group identification, and knowledge exchange norms are presented in Table 2. The average employment duration was 5.29 ($SD = 8.38$) years with a minimum of 0 years and a maximum of 33. The average of different number of colleagues employees worked with in the last month was 12.31 ($SD = 6.74$) with a minimum of 3 colleagues and a maximum of 30. The distributions for employment duration and knowledge exchange were quite skewed with skewness values of respectively 2.32 ($SD = .31$) and $-.64$ ($SD = .31$). Correlational analysis revealed significant, strong correlations between trust and the TMS proxy variable, $r = .67, p < .01$ and between psychological safety and the TMS proxy variable, $r = .66, p < .01$. Correlations between the other predictor variables and the TMS proxy variable were not significant (see Table 2). Correlations between the predictor variables themselves are presented in Table 2 as well.

Table 2

Summary of Intercorrelations, Means, Standard Deviations, Minima, and Maxima

Variable	1	2 a	2 b	3	4	5	6
1. Transactive memory system	-						
2. Colleague familiarity							
a. Employment duration	.18	-					
b. Different colleagues collaborated with	.00	.04	-				
3. Trust	.67*	-.01	.03	-			
4. Psychological safety	.66*	.11	-.11	.60*	-		

5. Group-identification	.20	-.02	.02	.41*	.05	-	
6. Knowledge exchange norms	.23	-.12	-.04	.53*	.38*	.17	-
<i>M</i>	3.79	5.29	12.31	3.92	5.49	3.81	4.26
<i>SD</i>	.49	8.38	6.74	.51	.93	.53	.59
Minimum	2.47	0	3	2.75	3.00	2.33	2.60
Maximum	4.80	33	30	5.00	6.86	5.00	5.00

* $p < .01$.

Relations Between the Predictors and the TMS Proxy Variable

Multiple regression analysis was used to test H_{1A} , H_{1B} , H_2 , H_3 , and H_4 . In order to find the best-fitting model, the backwards method was used. To retain control, variables were excluded manually based on insignificant p -values; the highest p -values were excluded first. All the produced models are presented in Table 3. The first parameter to be deleted was group-identification ($b = .00$, $SE = .10$, $\beta = .00$, $t(53) = .03$, $p = .973$). The second parameter to be deleted was collaboration with different colleagues ($b = .00$, $SE = .01$, $\beta = .02$, $t(54) = .27$, $p = .788$). Finally, the third parameter to be deleted was employment duration ($b = .01$, $SE = .01$, $\beta = .14$, $t(55) = 1.55$, $p = .126$). For all three parameters mentioned above, the main effects were very low and non-significant. As such, hypotheses H_{1A} , H_{1B} , and H_4 were not supported by the findings of this study. The final model included the variables trust and psychological safety. This model was significant with $R^2 = .55$, $F(2, 56) = 34.40$, $p < .001$ meaning that, in the current sample, the final set of parameters explained 55% of the variance of the TMS proxy variable in this sample. Further observation of the parameters showed that both trust ($b = .41$, $SE = .11$, $\beta = .43$, $t(56) = 3.85$, $p = .000$) and psychological safety ($b = .21$, $SE = .06$, $\beta = .40$, $t(56) = 3.56$, $p = .001$) had significant positive and quite similar effects on the TMS proxy variable, providing support for H_2 and H_3 . The part correlations of trust and the TMS proxy variable and psychological safety and the TMS proxy variable were respectively $r_{\text{tms}(t,ps)} = .34$ and $r_{\text{tms}(ps,t)} = .32$.¹ As such, trust contributes of 11% to the total variance of the TMS proxy variable that cannot be explained by psychological safety and psychological safety contributes 10% to the total variance of the TMS proxy that is cannot be explained by trust.

¹ tms = TMS proxy variable, t = trust, ps = psychological safety

Table 3

Regression Models of the TMS Proxy Variable Predictors

Model 1						Model 2				
Variable	<i>b</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	b	<i>SE</i>	β	<i>t</i>	<i>p</i>
Constant	.97	.42		2.29	.026	.98	.35		2.76	.008
Colleague familiarity										
a. Employment duration	.01	.01	.14	1.50	.139	.01	.01	.14	1.52	.135
b. Different colleagues collaborated with	.00	.01	.03	.27	.790	.00	.01	.02	.27	.788
Trust	.42	.12	.44	3.40	.001	.42	.11	.44	3.92	.000
Psychological safety	.20	.06	.38	3.17	.003	.20	.06	.38	3.31	.002
Group-identification	.00	.10	.00	.03	.973					
Model <i>R</i> ²			.57			.57				

Model 3						Model 4				
Variable	<i>b</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	b	<i>SE</i>	β	<i>t</i>	<i>p</i>
Constant	1.00	.34		2.92	.005	1.03	.35		2.98	.004
Colleague familiarity										
a. Employment duration	.01	.01	.14	1.55	.126					
b. Different colleagues collaborated with										
Trust	.43	.11	.45	4.02	.000	.41	.11	.43	3.85	.000
Psychological safety	.20	.06	.37	3.34	.002	.21	.06	.40	3.56	.001
Group-identification										
Model <i>R</i> ²			.57			.55				

Note. Regression method: backwards

Moderation of Knowledge Exchange Norms on the Relationship Between Group Identification and the TMS Proxy Variable

The final hypothesis (H₅) was tested through moderator analysis. After centralization of the variables group identification and knowledge exchange norms, the interaction of these two variables was calculated. Correlations between the variables are presented in Table 4. Next, hierarchical regression analysis was performed. In the hierarchical regression analysis the first block included the variables “centralized group identification” and “centralized knowledge exchange norms”. The second block included the interaction effect between these two variables. The results are presented in Tables 5 and 6. The resulting models were not significant (see Table 5). Further investigation showed that the first model explained 8% of the variance and the second model (including the interaction term) explained 10% of the variance. Meaning that the interaction term contributed an extra 2% of the total variance. This change in variance was very low and not significant ($R^2_{\text{change}} = .02$ $F_{\text{change}}(1,55) = .96$, $p_{\text{change}} = .331$). Further analysis of the regression models showed that in both models the main effects were positive but not significant. Additionally, the interaction parameter ($b = .21$, $SE = .22$, $\beta = .13$, $t(58) = .98$, $p = .331$) showed that the interaction had a positive but not a significant effect on the TMS proxy variable, meaning that, in this sample, there was no significant moderation effect of knowledge exchange norms on the relationship between group identification and the TMS proxy variable in the current sample. Concluding, H₅ was not supported by the findings of this study.

Table 4

Descriptive Statistics and Correlations for the Moderator Analysis

Variable	<i>M</i>	<i>SD</i>	Correlations			
			1.	2.	3.	4.
1. Transactive memory system	3.79	.49	-			
2. Centralized group-identification	.00	.53	.20	-		
3. Centralized knowledge exchange norms	.00	.59	.23	.17	-	
4. Interaction of centralized group-identification and centralized knowledge exchange norms	.00	.30	.11	.11	-.17	-

Table 5

Model Summary

Model	<i>R</i>	<i>R</i> ²	<i>F</i>	<i>p</i>	<i>R</i> ² change	<i>F</i> change	<i>p</i> change
1	.29 ^a	.08	2.48	.093	.08	2.48	.093
2	.31 ^b	.10	1.98	.128	.02	.96	.331

Note. Model 1 includes the predictors centralized group-identification and centralized knowledge exchange norms; Model 2 includes the predictors centralized group-identification, centralized knowledge exchange norms, and the interaction term.

Table 6

Regression Model for the Moderator Analysis

Variable	Model 1					Model 2				
	<i>b</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	<i>b</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
Constant	3.79	.06		60.97	.000	3.78	.06		59.86	.000
Centralized group-identification	.16	.12	.17	1.31	.196	.14	.12	.15	1.15	.254
Centralized knowledge exchange norms	.17	.11	.20	1.57	.123	.19	.11	.23	1.72	.091
Interaction of centralized group-identification and centralized knowledge exchange norms						.21	.22	.13	.98	.331

Discussion

This study aimed to investigate to what extent colleague familiarity, trust, psychological safety, and group identification predict TMSs in the context of departments and small organizations. The predictors on which this study focused were colleague familiarity (through employment duration and the number of different colleagues collaborated with), trust, psychological safety, and group identification. The choice for this set of predictors was made because they have been found to be of importance in the team TMS literature (Akgün, Byrne, Keskin, Lynn, & Imamoglu, 2005; Liao, O'Brien, Jimmieson, & Restubog, 2015; Ren & Argote, 2011) and embody social constructs. The latter is relevant since TMSs are embedded in social interactions (Argote & Ren, 2012; Liao et al., 2012). Additionally, the moderator effect of knowledge exchange norms on the relationship between group identification and TMSs was studied. Due to the differences between organizational/department and team contexts, the assumption was made that individual perspectives on TMS existence, as indicated by the TMS proxy variable, would provide a sufficient first indication of TMS existence in departments and small organizations. Consequently it was also assumed that this would provide a sufficient first idea when studying TMS predictors in departments and small organizations. The findings indicated that only trust and psychological safety were significant predictors of TMS existence in departments and small organizations. In the following section the findings of this study are discussed followed by the limitations and future research. Finally, the theoretical and practical implications are presented.

Colleague Familiarity

The first hypothesis consisted of two parts and proposed that colleague familiarity predicts the TMS proxy variable. The first part (H_{1A}) hypothesized that employment duration predicts the TMS proxy variable in departments and small organizations. However, no significant relationship was found between employment duration and the TMS proxy variable. The second part of the first hypothesis (H_{1B}) hypothesized that the number of different colleagues employees collaborate with predicts the TMS proxy variable in departments and small organizations. However, the findings of this study did not support this. Altogether, the first hypothesis was not supported, which is partially contradicting with previous findings on the effect of team familiarity on TMS existence in teams (Ren & Argote, 2011).

Several reasons can be presented for the fact that there was no significant relation between colleague familiarity and the TMS proxy variable. First, in response to the divergent findings regarding the relationship between familiarity and TMSs, Ren and Argote (2011) argued that familiarity may help to gain a basic understanding of each other's expertise, but does not necessarily lead to transactive knowledge exchanges. For example, familiarity has been pointed out to result in a range of beliefs about others and their expertise (Akgün et al., 2005). So far, this has been assumed to

imply a positive relationship between familiarity and TMSs. However, it could also be the case that prior experiences and interactions are perceived negatively, and thus may result in restraint to engage in the behaviours necessary for TMSs. Second, Gruenfeld et al. (1996) argued that people generally choose to interact with people they like. Thus, even if members of a TMS are familiar with more different colleagues and their expertise, they might choose to approach people with whom they feel comfortable or have a good relationship, hindering TMSs. This reasoning can also explain the divergent findings of this study compared to findings in team TMS literature where colleague familiarity was found to be significantly related to the TMS proxy variable (Akgün et al., 2005; Zheng, 2012). The dependency on each other in teams for finishing shared tasks and projects may be higher, leaving team members with less freedom to address the people they like compared to members in organizations and departments. Third, previous research that found a significant relationship between familiarity and the TMS proxy variable focused on newly formed small groups (Akgün et al., 2005; M. Jackson & Moreland, 2009; Zheng, 2012), whereas this study focused on departments and small organizations that already existed for a longer period. This difference may imply that familiarity is especially important for TMSs in groups or situations when they are newly formed and less for groups that have been existing for a longer period. Moreover, in these previous studies colleague familiarity was assessed through asking participants if they knew or worked with members of their group before, but not via assessing the duration of membership in their group (Akgün et al., 2005; M. Jackson & Moreland, 2009; Zheng, 2012). Even though it was expected that longer employment duration would provide more opportunities to get acquainted with colleagues, it could be that at some point familiarity with colleagues reaches a maximum and further duration of employment does not necessarily contribute to stronger familiarity among colleagues. This may be an explanation for the insignificant and not found linear relationship between employment duration and the TMS proxy variable. Fourth, departments and organizations are subject to more changes (e.g., role changes, new colleagues joining, and old colleagues leaving) and it is also possible that employees are more physically separated. Physical separation and all potential changes in organizations make it more difficult to create and maintain accurate perceptions about expertise locations (P. Jackson & Klobas, 2008; Liao et al., 2012; Palazzolo, 2005). As such, even if employees are employed for a longer period and are familiar with their colleagues, it could be that over time their perceptions about each other's expertise may become less accurate which is not helpful for TMS existence. Finally, in organizations and departments not every employee has unique knowledge or a different role compared to other colleagues in the same organization/department, resulting in expertise overlap. Lewis (2004) argued that initial expertise overlap among members of a group can delay TMS emergence. This could imply that colleague familiarity may be less valuable for TMSs in organizations and departments than in teams, due to the likely existing expertise overlap.

Trust and Psychological Safety

The second hypothesis proposed that trust positively predicts the TMS proxy variable in departments and small organizations. The findings of this study indeed demonstrated a significant strong positive relation between trust and the TMS proxy variable. This finding indicates that trust could be important in facilitating TMSs in departments and small organizations and seems to be in line with previous research (Akgün et al., 2005; Tang, 2015). It should be noted, however, that previous research which focused on the effect of trust on the TMS proxy variable studied the two dimensions of trust (cognitive- and affective based) separately. As such, even though this study seems to confirm that trust is important for TMSs in departments and organizations, it does not provide information about the influence of the separate dimensions of trust on the TMS proxy variable.

The third hypothesis proposed that psychological safety positively predicts the TMS proxy variable in departments or small organizations. This study indeed demonstrated a significant strong positive relation between psychological safety and the TMS proxy variable, which is in line with a previous study of Hood et al. (2016). The findings indicate that if people feel psychologically safe in their organization or department, this contributes to the TMS proxy variable through, for example, increasing the perceived safety for approaching colleagues for help and taking risks (Edmondson, 1999; Frazier et al., 2017; Hood et al., 2016). Altogether this study implicates that psychological safety could also be important in facilitating TMSs in departments and small organizations.

Group Identification

The fourth hypothesis stated that group identification predicts the TMS proxy variable in departments or small organizations. However, in this study group identification was not a significant predictor of the TMS proxy variable. This finding seems to be in contradiction with the findings of Liao et al. (2015) who found a positive relation between team identification and the TMS proxy variable in teams when studying the mediation effect of team identification on the relationship between communication quality and quantity.

A reason why the effect of group identification on the TMS proxy variable was not found could be related to the organizational context in which this study took place. Liao et al. (2012) argued that a shared common identity encourages members of a team to learn about each other's expertise through having shared goals and interests. However, in organizational settings, as was the setting in which this research was conducted, it is possible that employees belong to multiple (nested) groups which may result in multiple forms of group identification for employees (Ashforth & Mael, 1989). Considering this, any possible effect that group identification on an organizational level (which was the focus in this study) could have on the TMS proxy variable may be overshadowed by other types of identification (i.e. role identification or identification with a subgroup within the department or organization). As such, the motivation to contribute to shared organizational goals may be overshadowed by the motivation to contribute to goals that may seem of higher interest to employees,

for example personal or shared goals that emerge from working on tasks and projects (Ashforth & Mael, 1989). Another reason could be that the characteristic of group identification to stimulate behaviour of members towards the norm of the group can result in behaviours that are focused on maintaining cohesion in the organization (Liao et al., 2012). Especially, the absence of shared (cognitive) goals and tasks could result in overemphasis on social norms and values which may inhibit learning processes (i.e. through conflict or discussion) that contribute to learning who knows what and exchanging knowledge (Liao et al., 2012).

Knowledge exchange norms.

The final hypothesis stated that knowledge exchange norms moderate the relationship between group identification and the TMS proxy variable. However, the data in this study did not provide evidence for this relationship. Therefore, the final hypothesis was not supported, indicating that knowledge exchange norms do not contribute to the relationship between group identification and the TMS proxy variable in departments and small organizations. The absence of a significant relationship between group identification and the TMS proxy variable may be an explanation for the not found moderator effect of knowledge exchange norms. Naturally, if a relationship does not exist, the presence or absence of a third variable cannot influence that relationship.

Additionally, the insignificant results could be explained by the reasoning that this study only focused on departments and organizations in which the performed tasks required expertise from different areas. In these organizations, knowledge exchange may be a requirement instead of a choice, leading to generally high levels of knowledge exchange norms. In the sample of this study, the mean for knowledge exchange norms was indeed very high. Moreover, because the knowledge exchange norms distribution in this study was very skewed towards the right and did not include any low values, the data in this study cannot exclude the possibility that the absence of knowledge exchange norms can cause group identification to have a negative effect on the TMS proxy variable.

Finally, this study did not take into account any other group norms that could have an effect on the relationship between group identification and the TMS proxy variable. As explained in the previous section, if norms concerning the cohesion of the group are very prominent, the characteristic of group identification to stimulate behaviour of members towards the norm of the group can result in socially accepted behaviours aimed to maintain cohesion in the organization (Liao et al., 2012), instead of the critical behaviours necessary for TMSs. Thus, even if knowledge exchange norms are very high, other norms may promote different behaviours that do not contribute to TMSs and may mitigate the possible influence that knowledge exchange norms can have on the relationship between group identification and the TMS proxy variable.

Limitations

The current research also had some limitations. First, the current research aimed to study TMS predictors in departments and organizations. However, this study did not measure TMS directly but instead used the scale developed by Lewis (2003) to indicate TMS existence. Even though this scale has been validated and widely used in previous studies (Ren & Argote, 2011), it only represents TMS through a proxy variable. The development of this scale is based on the assumption that the three TMS indicators - specialization, credibility, and coordination - are observed together because a TMS is operating (Lewis & Herndon, 2011). However, research into the exact nature of the relationship between TMS and these three indicators is limited. As such, even though it is likely that the findings of this study indicate the existence of TMS in departments and small organizations, this evidence is not irrefutable. Notwithstanding this limitation, using this scale allows for the collection of data in field settings and for the collection of more data in different organizations. In this way, general statements about TMS can be made. Moreover, by using the scale that has been widely used in previous studies, this study contributes to the existing body of literature.

A second limitation that comes with studying TMSs through the TMS proxy variable is related to the relationship between TMSs and trust. The TMS proxy measurement includes a credibility dimension that is closely related to the cognitive dimension of trust. As such, it is reasonable to expect that the TMS proxy scale and the trust scale overlap to some extent. The factor analysis indeed indicated that the cognitive based trust items loaded onto the same component as some of the credibility items of the TMS proxy scale. Consequently, part of the found effect between trust and the TMS proxy variable may be explained by this overlap. However, the TMS proxy and trust variables were not only represented by their credibility and cognitive dimensions.

Finally, in this study, only individual perceptions of the measured constructs were interpreted while using a scale that was originally developed for team contexts. Even though it has been suggested that this scale can be used in small organizations (Peltokorpi, 2008), previous research on TMSs generally constructed team scores through combining individual perspectives (e.g., Akgün et al., 2005; Liao et al., 2015; Zheng, 2012). As such, when using and interpreting the results of this study, it should be taken into consideration that they represent individual perceptions and any conclusions about the complete organizational TMSs should be exercised with caution. Despite this, evaluating individual perceptions of TMSs allowed us to study TMSs in organizational contexts. In these contexts it is, for example, likely that the organizational TMS is structured in connected clusters or subgroups which is likely to result in differences within the organization regarding TMS existence (Anand et al., 1998). For example, in some parts the TMS may be very well developed and operational and in other parts this could be less.

Suggestions for Future Research

In order to address the complicated relationship between TMSs and the TMS proxy variable, future research could focus on clarifying this relationship or focus on developing direct measures of TMS that are suitable in field and organizational settings as well. Using direct measurements allows researchers to investigate if constructs influence the TMS structure and processes differently. For example, (Peltokorpi, 2004) did not find a significant effect of psychological safety on employees knowledge about who knows what, which may be an indication that psychological safety is more important for the process component of TMS than for the structural component.

Because a TMS consists of individuals who are connected through knowing who knows what (structure) and based on this information, the knowledge exchanges between those individuals (processes), several authors have noted the value of network approaches to conceptualize and measure TMS (Jarvenpaa & Majchrzak, 2008; Lee, Bachrach, & Lewis, 2014; Lewis & Herndon, 2011; e.g. Nevo & Wand, 2005; Peltokorpi, 2012). Exploring TMSs through social network analysis allows researchers to map both the structure and the processes of TMS, which is in line with the original definition of Wegner et al. (1985). For example, Lewis and Herndon (2011) noted that with social networks the communication between members concerning knowledge exchanges can be examined. Additionally, social network analysis can provide further information about the influence of relational factors on TMS (e.g. the type of relationships people have with each other) which may provide more insight into the relationship between familiarity and TMSs in organizational contexts as well.

Another way through which TMSs in field studies can be studied is through diary approaches in which individuals log the reasons for exchanging knowledge with others. Diary approaches allow for the collection of detailed data regarding why, when, about what, how, and with whom employees exchange knowledge. This can provide information about when TMSs are valuable (e.g. for what types of knowledge do people use a TMS or what are the reasons they approach certain individuals) and about when knowledge exchanges are actually based on information about who knows. This type of data could provide further insights into how to facilitate TMSs and when it is valuable.

Finally, future research should continue to investigate factors that can contribute to or stimulate TMSs in organizations and departments as well as in teams. The current study focused on a subset of factors that have been found to be important in the TMS literature. Future research could investigate more thoroughly if and how they relate to TMSs. For example, studying the relationship between different levels of identification of individuals within an organization (e.g. organizational-, role-, and team identification) and TMSs may clarify when and how identification is valuable for TMSs. Other research has also suggested constructs, such as member stability (Ren & Argote, 2011) an communication quality and quantity (e.g., Akgün et al., 2005; Tang, 2015), that are important for TMS existence. Especially in organizations, in which members do not always work closely together,

or are physically separated (P. Jackson & Klobas, 2008), these constructs seem to be promising for future research.

Theoretical and Practical Implications

The current research has contributed to the existing TMS literature with new insights. First, by providing empirical data on TMS in organizational contexts, this research contributes to the scarce body of literature that has studied TMSs in organizations so far. Considering the potential benefits of TMS in organizations (Argote & Ren, 2012; Moreland et al., 2010; Nevo & Wand, 2005; Peltokorpi, 2008), this is a promising direction for research. Next, the findings of this study hint that, as already found in TMS in teams, trust and psychological safety are important variables for organizational TMS as well. This provides new information that can be used in the development of models of organizational TMSs. Knowledge about TMS antecedents help to explain why TMSs are observed and to identify when other constructs could be of importance as well. Additionally, combining the findings of this study with findings of existing studies (e.g., Akgün et al., 2005; M. Jackson & Moreland, 2009; Liao et al., 2015; Zheng, 2012) hint that the relationships between familiarity and TMSs and identification and TMSs are more complex and could be depending on context. For example, in teams identification has been found to be a significant predictor of TMS (Liao et al., 2015), whereas in this study it was not.

For practice, the findings of the current study implicate that when managers desire to cultivate an environment suitable for TMS existence, they should invest in fostering feelings of trust (especially cognitive based trust) and to create a psychologically safe environment (Hood et al., 2016). A psychological safe environment can help to decrease emotional boundaries to engage in knowledge exchanges which helps with the retrieval and allocation of knowledge (Edmondson, 1999; Frazier et al., 2017; Hood et al., 2016). Managers can, for example, foster trust among members of teams by focussing on leadership behaviours that focus on fostering good relations, such as willing to help, stimulate openness, and improving emotional accessibility (Costa et al., 2018). Setting a good example for these behaviours is important (Costa et al., 2018). Communication of clear expectation and goals by leaders, in turn, can foster perceived psychological safety Frazier et al. (2017). Additionally, managers can foster a psychological safe environment through focussing on reducing hostility, fear, and guilt (Hood et al., 2016). Finally, Frazier et al. (2017) argued that, because proactive employees are likely to feel more psychological safe, focusing on investing in employees with that personally trait is fruitful.

Altogether, the current study is a stepping stone for future research into organizational TMS and provides new insights for organizations and departments that may help stimulate TMS and benefit from its advantages.

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Appendix I : Measurement Instruments

Transactive Memory System scale items

Specialization

1. Each member in this organization/department has specialized knowledge of some aspect about to the work we do.
2. I have knowledge about an aspect of the work we do that no other member in this organization/department has.
3. Different members in this organization/department are responsible for expertise in different areas.
4. The specialized knowledge of several different members in this organization/department is needed to complete the work we do.
5. I know which members in this organization/department have expertise in specific areas.

Credibility

6. I am comfortable accepting procedural suggestions from other members in this organization/department.
7. I trust that knowledge of other members in this organization/department about our work is credible.
8. I am confident relying on the information that other members in this organization/department bring to the discussion.
9. When other members in this organization/department give information, I want to double-check it for myself. (reversed)
10. I do not have much faith in the "expertise" of other members in this organization/department. (reversed)

Coordination

11. Members in this organization/department work together in a well-coordinated fashion.
12. Members in this organization/department have very few misunderstandings about what to do.
13. Members in this organization/department need to backtrack and start over a lot. (reversed)
14. In this organization/department we accomplish tasks smoothly and efficiently.
15. There usually exists much confusion about how we will accomplish tasks. (reversed)

Note. All items used a 5-point scale in which 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, and 5 = *strongly agree*

Trust scale items
Cognitive based trust
1. Most of the members in this organization/department approach their job with professionalism and dedication.
2. I see no reason to doubt the competence and preparation for the job of members in this organization/department.
3. I can rely on other members in this organization/department to not make my job more difficult by careless work.
4. Most of the members in this organization/department can be relied upon to do as they say they will do.
Affective based trust
5. I can talk freely to members in this organization/department about difficulties I am having at work and know that they will want to listen.
6. I would feel a sense of loss if one of us was transferred and we could no longer work together.
7. If I shared my problems with members in this organization/department, I know they would respond constructively and caringly.
8. I would have to say that we (me and my colleagues) have made considerable emotional investments in our working relationship.
<i>Note. All items used a 5-point scale in which 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree</i>

Psychological safety scale items
1. If you make a mistake in this organization/department, it is often held against you. (reversed)
2. Members in this organization/department are able to bring up problems and tough issues.
3. People in this organization/department sometimes reject others for being different. (reversed)
4. It is safe to take a risk in this organization/department.
5. It is difficult to ask other members of this organization/department for help. (reversed)
6. No one in this organization/department would deliberately act in a way that undermines my efforts.
7. Working with members of this organization/department, my unique skills and talents are valued and utilized.
<i>Note. All items used a 7-point scale in which 1 = very inaccurate, 2 = inaccurate, 3 = somewhat inaccurate, 4 = neither accurate nor inaccurate, 5 = somewhat accurate, 6 = accurate, and 7 = very accurate</i>

Group identification scale items

1. When someone criticizes this organization/department, it feels like a personal insult.
2. I am very interested in what others think about this organization/department.
3. When I talk about this organization/department, I usually say 'we' rather than 'they.'
4. This organization/department's successes are my successes.
5. When someone praises this organization/department, it feels like a personal compliment.
6. If a story in the media criticized this organization/department, I would feel embarrassed.

Note. All items used a 5-point scale in which 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, and 5 = *strongly agree*

Knowledge exchange norms scale items

1. In this organization/department everyone believes that exchanging knowledge (e.g. information, advice, or help) is important.
2. In this organization/department it is normal to communicate with people who have different functions.
3. Knowledge sharing and seeking (e.g. information, advice, or help) is strongly encouraged in this organization/department.
4. People in this organization/department are expected to share and seek knowledge (e.g. information, advice, or help) with others.
5. In this organization/department no one seems to care about sharing or seeking knowledge (e.g. information, help, or advice) with others. (reversed)

Note. All items used a 5-point scale in which 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, and 5 = *strongly agree*