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INFORMATION SYSTEM DEVELOPMENT TEAM COLLABORATION ANTECEDENTS

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Abstract

Despite information system development companies have invested substantial resources to support the success of information system development (ISD) projects, the failure rate is still high. Extant studies indicated that the constant changes from socio-technical environments are the main causes of the low success rate. This study argues that team collaboration is a key factor to effectively cope with unexpected disruptions that would have negative effect on overall software product success. This study proposes a research model exploring factors that influence the development of team collaboration. These factors include the team commitment, transactive memory systems (TMS), and collective mind. In addition, the study suggests that the collective mind has an intermediate effect on the team commitment, TMS, and team collaboration. This study takes the information development teams of various companies in Taiwan as its subjects.

Keywords: Team commitment, Transactive memory systems, Collective mind, Team collaboration, Social cognitive theory

1   INTRODUCTION

A recent survey indicated that among all the information systems development (ISD) projects with budgets exceeding $2.5 million, failure rate is as high as 74% (Project Management Institute 2006). The extant research pointed out that the unexpected disruptions resulting from rapid changes in both business requirement and systems development technology are the main causes of the low success rate (Amabile et al. 2001; Anandhi 2000; Jarvenpaa & Leidner 1997; Jiang & Klein 2002). Requirement changes lead to software redesigns and project schedule disruptions, which in turn increase project uncertainties and affect team productivity (Zowghi & Nurmuliani 2002). Frequently changes in development technology force ISD teams to stay familiar with the newest trends in systems development (SD) technology and also to introduce new SD technologies in a timely manner in order to improve project efficiency. However, introducing new development technology is a major risk within the SD field that can lead to project failures if project teams lack the ability to apply these new development technologies (Schmidt et al. 2001) or to integrate them with those previously applied in older systems. For ISD teams to effectively cope with constantly changeable socio-technical environments, ISD team collaboration plays an essential role which enables the focal teams to be flexible through communication and teamwork among the team members. Team collaboration in this study refers to the relationship established among the members to achieve the target as they mutual engage in a coordinated effort to solve the problem together (Roschelle & Teasley 1995).

As such, one vital question concerning ISD companies is how to enhance ISD team collaboration. Based on social cognitive perspective, this study proposes that collaborative behaviors are motivated and influenced by individuals' cognitive perception regarding the atmosphere where they reside. Particularly, this study focuses on three salient social factors, namely team commitment, transactive memory systems, and collective mind.

Team commitment is defined as a psychological state wherein the members express their loyalty in recognizing the team, and express the desire and intent to maintain the relationship with the team to which they belong (Allen & Meyer 1990; Morgan & Hunt 1994). Team commitment is a key motivation that determines the behavior of its members and guides individual behavior (Allen & Meyer 1990). The higher commitment from the team members, the more they will recognize and satisfy the current work environment, and contribute to the team (Herrbach 2006; Morgan & Hunt 1994). Such behaviors assist in the establishment of system development activities.

TMS is an expertise index system similar to an expertise map that allows the members to understand the internal expertise distribution of the team (Moreland 1999; Wegner 1987). It serves as a knowledge map that provides the team with the information of who knows what and thus enables the team to retrieve needed knowledge from right person at the right time and right places.

Collective mind refers to the assignment of proper tasks to its members and, accordingly, effectively manages the professional expertise of the members (Weick & Roberts 1993). Past studies have evidenced that the lack of utilization of expertise in respect of system analysis and design is the key cause of failure of projects (Crowston & Kammerer 1998; Jackson & Klobas 2008). Particularly for large projects, the team needs to assign tasks to suitable members who display more accurate and valuable expertise in order to support the operation of the team project (Crowston & Kammerer 1998). An effective coordination system will reduce the occurrence of errors for the project.

Reviewing extant literature on collaboration suggested that team commitment plays an important role in contributing team collaboration in terms of motivating ISD team members to assist their teams in solving problems (Morgan & Hunt 1994; Steers 1977). However, these studies have not described the process of how team commitment leads to collaborative behaviors in team context. This study proposes that team commitment will support the development of TMS and collective mind which in turn result in collaboration. In addition, this study argues that the presence of TMS may not directly enhance team collaboration to solve the problems the teams encounter in the course of system development if team members do not have an overall picture of the problems and the overarching solution plan (Kanawattanachai & Yoo 2007; Yoo & Kanawattanachai 2001). Therefore, this study

contends that collective mind serves as a mediator that intervenes the impact of team commitment and TMS on team collaboration.

2 RESEARCH MODEL AND HYPOTHESES

Figure 1 presents the research model and hypotheses. Particularly we argue that team commitment, TMS, and collective mind will affect the team collaboration. Additionally, this study proposes that TMS will be affected by team commitment. Lastly, this research model shows that collective mind has a mediating effect on the relationship between team commitment, TMS, and team collaboration. The following paragraphs describe the relationships between the various concepts of the model.
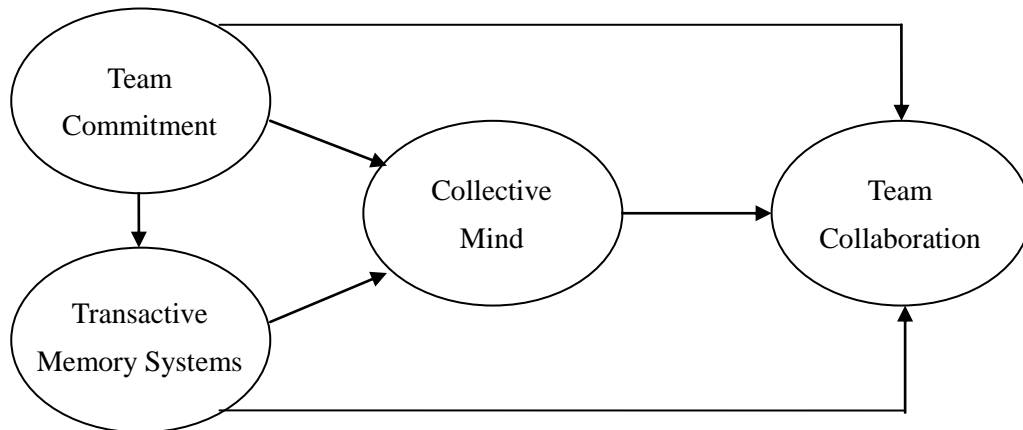

Figure 1.   Research Model

2.1   Team Commitment and Team Collaboration

Team commitment enables team members to desire to maintain a valued relationship with the team, and increases interactive actions among the members to achieve their targets with positive attitude (Morgan & Hunt 1994; Steers 1977). The members highly recognize the team and are willing to participate in the group work as they exchange opinions, collaboration, and assist the team in solving problems (Morgan & Hunt 1994; Herrbach 2006). Highly committed members will try to contribute to the team and more willingly work with the other team members to complete a task (Hoegl et al. 2004). Accordingly, this study hypothesizes the following:

H1: Team commitment is positively associated with team collaboration.

2.2   TMS and Team Collaboration

TMS is a knowledge map, the members can quickly identify the expertise sources through their interaction and communication (Jackson & Klobas 2008; Wegner 1987). Whenever the team confronts difficulties, the members will contribute their expertise to assist the team in solving the problems. Well-developed TMS not only allows the members to understand the location of the internal expertise of the team, but also allows them to work together to achieve the target of the project through expertise sharing and effective communication (Brandon & Hollingshead 2004). Based on the aforementioned argument, we hypothesize the following:

H2: TMS is positively associated with team collaboration.

2.3   Team Commitment and TMS

Highly committed members are willing to actively take part in team tasks and help to facilitate communication and interaction among the team members (Morgan & Hunt 1994). Frequently communication between the members is a crucial factor for creating TMS, which help them learn

from one another, understand the expertise of the team members, and better understand the technologies and professional expertise they possess (Hollingshead 1998; Lewis 2004). Accordingly, we hypothesize the following:

H3: Team commitment is positively associated with TMS.

2.4 Team Commitment and Collective Mind

High commitment increases the willingness of the members to communicate. Sharing information allows them to understand the skills and characteristics of the members and how the team coordinates the tasks for the members through social interaction (Morgan & Hunt 1994; Weick & Roberts 1993). In addition, highly committed members are willing to contribute to the team and accept tasks from the team, potentially improving the ability of the team in coordinating expertise and tasks (Kanawattanachai & Yoo 2007; Morgan & Hunt 1994). Thus, the following hypothesis is offered:

H4: Team commitment is positively associated with collective mind.

2.5 TMS and Collective Mind

TMS is geared at integrating the mind system of the members into an expertise map (Jackson & Klobas 2008; Wegner 1987). Many studies have shown that before an expertise-based project team starts implementing an effective coordination system, it should first understand the expertise of the team members and its location, it can effectively manage and utilize them through expertise coordination (Faraj & Sproull 2000; Yoo & Kanawattanachai 2001). Previous studies have indicated that the understanding of the internal expertise location of the team is a necessary condition to create task-expertise coordination (Kanawattanachai & Yoo 2007). Therefore, we offer the following hypothesis:

H5: TMS have a positive on collective mind.

2.6 Collective Mind and Team Collaboration

Collective mind assigns suitable tasks to the members according to their respective expertise in order for them to solve problems of the project together (Weick & Roberts 1993). The collective mind effectively manages and coordinates the expertise of the team members through task assignment and collaboration in order to prevent errors. The complete collective mind is established through the interaction and good relationship of the team members. This effectively coordinates the expertise of the team members and assists the project team in upgrading its ability for solving problems (Faraj & Sproull 2000; Weick & Roberts 1993). Hence, we offer the following hypothesis:

H6: Collective mind have a positive on team collaboration.

2.7 Collective Mind as a Mediator

Team commitment stimulates the motivation of the members for communication and collaboration (Morgan & Hunt 1994). If the system comes across a problem, the team will not be able to support and help to assign suitable tasks to its members according to their expertise and ability. TMS allows members to understand the internal distribution of expertise of the team; however, it cannot directly assist the team in solving problems. Team collaboration requires judgment of the expertise of the team in perception as it can only exhibit its value through expertise coordination (Faraj & Sproull 2000; Kanawattanachai & Yoo 2007).

Team commitment and TMS will help in the establishment of the collective mind in the team and the motivation of the members for sharing and exhibiting their effectiveness, and will foster the members to work as a team. In other words, the lack of expertise coordination system limits the ability of the team for achieving reliable expertise. Team commitment and TMS allow the members to gain correct and useful expertise through the operation of collective mind, and assist the project in solving problems. The following hypothesis is thus offered:

H7(a): The effect of team commitment on team collaboration is mediated by collective mind.

H7(b): The effect of TMS on team collaboration is mediated by collective mind.

3   RESEARCH METHODOLOGY

This study uses system development teams as the unit of analysis. The literature reviewed and the related constructs are derived from the same level of analysis. This study will systematically follow steps first to develop the construct validity and reliability of the key concepts included in the research model, and then to test nomological relationships. Pertinent scales will be reviewed for their coverage of content and psychometric properties. Existing measures that have a demonstrated reliability and validity will be used. The instrument will be a pilot tested on a representative sample of the target population using conditions similar to those anticipated during actual data collection. Reliability and validity tests will be performed to ensure that all areas of the domain of interest are covered and that the items truly measure what they are supposed to. Respondents will also be asked to report problems encountered while filling out the questionnaire. Feedback is thus obtained from participants in the pilot test regarding items selected, sentence structure, and interpretation of constructs. The instrument will be modified accordingly.

Due to the fact that this study uses the team as the unit of analysis, members of ISD teams in the top ten SD companies in Taiwan will be targeted as the main respondents. Cronbach's Alpha and confirmative factor analysis will be applied again to assess construct reliability and validity for the measurement model. Partial Least Square analysis will be used for path analysis among the exogenous variables and endogenous variables.

4   EXPECTED CONTRIBUTIONS

This proposal is expected to have the following contributions. First, the result of this study will help project managers understand the importance of team collaboration. It suggests that a project manager need to pay attention to the development of team commitment, TMS, and collective mind in system development to foster team collaboration. Secondly, this proposal outlines the relevant factors that can affect team collaboration, which include team commitment, TMS, and collective mind. In addition, it also proposes that collective mind plays an important role in that it may serve as a mediator that intervenes the relationship of team commitment and TMS with team collaboration. Thirdly, this study distinguishes the difference between TMS and the collective mind. Previous research has mostly merged the two concepts together. Their relationships has rarely described separately. Besides, TMS and collective mind had become emerging research agenda in recent years, this proposal explores how they affect team collaboration.

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