

The impact of transactive memory systems on IS development teams' coordination, communication, and performance

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Abstract

The high complexity nature of current contemporary software makes team a popular work style in information system development (ISD) projects. ISD is a knowledge intensive process which requires members to exchange and coordinate knowledge resources effectively. However, it is reported that ISD projects often failed because of coordination breakdown and insufficient knowledge exchange resulting from ineffective communication among team members. This highlights the importance of understanding how to enhance those knowledge-oriented teamwork activities. Drawing on this issue, this study aims at exploring the critical role of transactive memory system (TMS) on teamwork processes and performance. Data collected from 236 IS personnel confirmed our hypotheses that having a mature TMS can effectively enhance performance directly, and indirectly through improving communication and coordination process. Lastly, discussions of the results and implications toward practitioners and academia are provided.

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1. Introduction

Teamwork style has been broadly adopted to counter potential risks resulting from the highly complex nature of contemporary information system development (ISD) projects. Projects can only meet their predefined goals within budget and on time when members of the team work in a high quality way (Hoegl and Gemuenden, 2001). However, managing a group of individuals from different functional backgrounds to work together to achieve a common goal within a period of time is a challenging task. To obtain high teamwork quality, members need to communicate and coordinate smoothly to accomplish the task and reduce potential risks and project uncertainty (Adenfelt and Lagerström, 2009; Krackhardt, 1992). However,

many projects are found delayed and or canceled because of communication and coordination breakdowns, which result in additional work or mistakes (Curtis et al., 1988).

Given that an ISD project is a knowledge intensive process, diversified knowledge, skills, and ability are required to accomplish the task. Team composition researchers have indicated that miscommunication and conflicts may erode performance when team members are highly diverse. As effective knowledge exchange or transfer is necessary, communication provides the basis for information exchange and processing. Through effective communication, effective solutions are found to project challenges. Peltoniemi et al. (2004) pointed out that communication is the second strongest factor impacting on project team performance among nine knowledge sectors indicated by PMBOK. A lack of effective or adequate communication increases the difficulty in knowledge processing and utilization (Laufer et al., 1996) necessary to deal with uncertainty and ambiguity (Daft and Lengel, 1986). As a result, the probability of a successful outcome for the project

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team is reduced, as is the chance of achieving predefined goals (Cohen and Bailey, 1997; Stasser and Taylor, 1991; Weick and Roberts, 1993).

At the same time, a project can also be viewed as a means of achieving predefined tasks through utilization of a collection of various resources, such as human labor, money, facilities, and expertise. Dependencies that are inherent in the structure of tasks or that result from assigning tasks to actors and resources can be found between tasks and the resources, or between the resources used (Crowston and Kammerer, 2010). The extent to which team members are able to coordinate with each other to manage the dependencies of resources, tasks, and actors plays a critical role in project execution (Faraj and Sproull, 2000; Walz et al., 1993). The consequences of inadequate coordination include undertaking unnecessary work and blurring the boundaries of role responsibility, which, in turn, increase the total project cost or delays the schedule. Empirical studies also show that administrative and expertise coordination are both directly and indirectly associated with project team performance (e.g. Akgün and Lynn, 2002; Faraj and Sproull, 2000; Hoegl and Gemuenden, 2001; Nidumolu, 1995; Nidumolu, 1996).

Therefore, in the contemporary ISD project context, it is critical for project teams to have high work quality, achieved by having effective communication and coordination of diverse resources. In this study, we adopt the transactive memory system (TMS) concept and attempt to explore its impact on communication and coordination in ISD projects. TMS theory indicates that effective information exchange requires team members to know who possesses what knowledge, to trust the knowledge that one possesses, and to be able to access the knowledge (Lewis, 2004). It is unfortunate that given the importance of TMS on team processing effectiveness, its impact on communication, coordination, and the final project outcomes have been overlooked in the extant literature. Based on the understanding that knowing who possesses what knowledge can effectively promote information exchange and facilitate the matching of task, resources, and people, the focus of this study is to examine the relationships among TMS and teamwork processes, communication and coordination in particular, and project team performance in the content of IS development teams (Austin, 2003; Brandon and Hollingshead, 2004; Liang et al., 1995; Wegner, 1987).

Therefore, since project performance and teamwork process are team level variables, a team-level survey was conducted to achieve the goals specified above. More specifically, we argue that TMSs can enhance project team performance through improved communication and coordination as a result of the team's awareness of the collective knowledge that is available, and where it resides within the team (Lewis, 2004). With TMS, teams can obtain higher levels of performance by matching tasks, knowledge, and people (Brandon and Hollingshead, 2004). Communication can be made more effective by knowing the location of required knowledge and being able to access it.

In the following sections, we first review related literature and build hypotheses on the basis of the review. Our methodological approach is outlined in the third section. The fourth section focuses on data analysis and discussion. Finally, conclusions and implications are provided.

2. Theoretical background

In this section, related literature and research were reviewed, following the outcome–process–input order. We first reviewed the literature of teamwork and highlighted potential barriers blocking ISD to perform well. We then defined and discussed the impact of these two critical teamwork processes on final performance individually. Lastly, transactive memory system literatures, including the definition and its relationship with teamwork performance were provided.

2.1. Project team performance

Teamwork style is popular in the contemporary business environment, with many businesses having been transformed into team-based structures or project-oriented organizations (Katzenbach and Smith, 1993). Team or project-based organizations are able to react quickly to environmental uncertainty and change. Both academia and practitioners have concluded that team-oriented interventions have the most salient effect on organization effectiveness (Macy and Izumi, 1993). Team research is broadly based on the Input-Process-Output (IPO) model. Researchers focus on identifying the difference between individual and group activities by ascertaining the strengths and weaknesses of individual and group work. This is achieved by measuring productivity or outcomes (Hackman and Morris, 1975; McGrath, 1984; Steiner, 1972). Studies to date have focused on the effect of various combinations of input on project team performance (Hackman, 1997; Kruglianskas and Thamhain, 2000; McGrath, 1984; Thamhain, 2004).

Information systems development (ISD) is considered to be a knowledge intensive process. The value of IT professionals is that they contribute their professional knowledge to work towards implementation of the final product (Schement, 1990). The large scale and complex nature of contemporary ISD suggests the need for more than one type of knowledge or expertise. Team members, individuals with different knowledge, cooperate and coordinate with each other to accomplish work that cannot be done by the individual alone (Cappelli and Rogovsky, 1994). For example, to develop a system to fulfill managerial requirements demands both technical and business domain knowledge (Rus and Lindvall, 2002). However, the high failure rates of many projects, where teams have been unable to attain the expected goal within the predefined schedule and cost, imply the existence of low quality teamwork (Hoegl and Gemuenden, 2001; Thamhain and Wilemon, 1987). To achieve predefined collective goals, members in one team act interdependently to convert inputs to outcomes through various activities directed toward organizing tasks (Marks et al., 2001). The organizing of tasks and interaction among members are two basic process elements which need to be improved to achieve higher levels of performance. They are especially important in the ISD context because of its non-structured nature with no clear and readily identifiable paths to the solution. Moreover, this context is difficult to overcome through the use of documents or formal specifications (Cooper, 2000). Therefore, the exchange of information among members to increase the availability of that information and to improve the

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