

# 行政院國家科學委員會專題研究計畫 成果報告

## 新產品開發團隊之交互記憶系統與學習：寬裕資源與自主性之角色 研究成果報告(精簡版)

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行政院國家科學委員會補助專題研究計畫  成果報告  
 期中進度報告

新產品開發團隊之交互記憶系統與學習：寬裕資源與自主性之角色

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## Transactive Memory System and Learning in New Product Development Teams: The Role of Slack Resource and Autonomy

### 中文摘要

由於新產品發展在維持持久性競爭優勢的角色日益重要，先前的研究關注於新產品發展專案團隊的知識學習議題。本研究整合先前研究的觀點，透過文獻回顧發展出一研究架構來界定主要的決定因素，並檢視交互記憶系統、團隊學習、寬裕資源、自主性、與專案績效之間的關聯性。本研究的母體是以中華徵信所公布的 5000 大企業為主要調查對象，以分層隨機抽樣的方式，以每一千家公司為分層，各層隨機抽出 100 家公司，共 500 家公司為樣本。本研究以敘述性統計、因素分析、信度分析與多元迴歸分析來驗證所提出之假設。

本研究主要發現如下：首先，迴歸分析結果顯示交互記憶系統、團隊學習、寬裕資源、自主性、與專案績效之間有顯著的關係；第二，實證結果支持交互記憶系統與專案績效的關係是經由團隊學習的中介效果；第三，團隊學習與專案績效之間關係的強度會受到寬裕資源之干擾效果所影響；第四，自主性在團隊學習與專案績效之關係扮演干擾調節的角色。

**關鍵字：**交互記憶系統、團隊學習、寬裕資源、自主性、專案績效

### Abstract

Owing to the increasing important role of new product development for sustainable competitive advantage, previous research has paid attentions to knowledge learning in new product development project teams. Synthesizing insights from prior research, this study develops a framework through literature review to identify the key determinants and examine the interrelationships between transactive memory system, team learning, slack resource, autonomy, and project performance. The population for this study is the top 5000 Taiwanese firms listed in the China Credit Information Service Incorporation. A stratified random sampling method is used to select 100 firms in each of the five 1000 levels. The statistical analysis methods including descriptive statistic analysis, factor analysis, reliability analysis, and multiple regression analysis are used to test the hypotheses.

The major findings of this study include: firstly, the results of regression analyses show the significant relationships between transactive memory system, team learning, slack resource, autonomy, and project performance. Secondly, the empirical results support that the effect of transactive memory system on project performance is mediated by team learning. Thirdly, the strength of the relationship between team learning and project performance is moderated by slack resource. Fourthly, the relationship between team learning and project performance varies depending on the intensity of autonomy.

**Keywords:** Transactive Memory System, Team Learning, Slack Resource, Autonomy, Project Performance

## **1. Research Motivation and Objectives**

Organizational learning theory suggests that firms need to actively manage knowledge and expertise to develop innovative products through learning (Srinivasan, Haunschild, & Grewal, 2007). Team learning plays an important role in the contribution of new product success (Sarin & McDermott, 2003; Atuahene-Gima & Murray, 2007). Learning involves reciprocal exchange and joint effort between individual members (Blazevic & Lievens, 2004). Members need shared memory systems to assist them in learning and exchanging knowledge. When performing project tasks, team members share collective transactive memory to access others' knowledge and expertise. Transactive memory systems can generate the conditions that facilitate members to encode, store, and retrieve group knowledge from different domains (Wegner, 1987; Lewis, 2003; Brandon & Hollingshead, 2004). Through transactive memory systems, team members can learn and spread their learning effectively and thereby improve the project performance. Thus, this study aims to examine whether team learning plays the mediating role in transactive memory systems and project performance.

This study also identifies two important intervening factors, including slack resource and autonomy, and examines the relevant theoretical rationales and empirical work. Slack resource is recognized as a critical facilitator of risk taking, innovation, and performance (Damanpour, 1991; Nohria & Gulati, 1996; Keegan & Turner, 2002; Tan & Peng, 2003; George, 2005). The existence of slack resources enables the firm to experiment with new strategies such as introducing new products and entering new markets (Tan & Peng, 2003; Geiger & Makri, 2006). Thus, organizational slack may play a contingent role to trigger innovation and support the exploitation and exploration of knowledge for the favorable project outcomes. Autonomy reflects the freedom and discretion of group members to determine how to do their work (Kirkman & Rosen, 1999). Greater autonomy facilitates a positive attitude among team members and enhances their willingness to cooperate collectively and try novel approaches to the innovation activities (Kirkman & Rosen, 1999; McGrath, 2001). In this respect, autonomy may facilitate the conversion of knowledge learning into desired project results.

According to the above, this study purposely selects the transactive memory system, team learning, slack resource, autonomy, and project performance as the main constructs to find out their interrelationships in new product development teams. The primary purpose of this study is to examine the mediating effect of team learning on transactive memory systems and project performance, and the moderating effects of slack resource and autonomy on the association of team learning and project performance.

## **2. Literature Review**

### **2.1 Transactive Memory System**

Transactive memory describes the beliefs about the knowledge possessed by others and about the accessibility of that knowledge (Wegner, 1987; Lewis, 2003). Research has indicated that transactive memory systems help organizational teams to fully utilize members' expertise and provide benefits to improve team performance and project outcomes (Austin, 2003; Lewis, 2004; Lewis et al., 2005; Akgün et al., 2006). Transactive memory systems provide a knowledge network among individuals to interchange, store, and retrieve information and to complete their work. Members in a project team use transactive memories to cultivate specialized expertise in their knowledge domains and maintain access to diverse knowledge embedded in other members (Akgün, Byrne, Keskin, Lynn, & Imamoglu, 2005; Hollingshead, 2000). Access and exposure to others' knowledge and expertise can reduce repetition of effort and ensure a greater amount of task-specific knowledge to assemble and apply to project tasks (Hollingshead, 2000; Austin, 2003; Lewis et al., 2005).

Accordingly, transactive memory systems are critical for team members to recognize the available knowledge and expertise of different domains. Transactive memory systems can have a positive contribution to team learning in new product development process. Thus, the following hypothesis is proposed.

***Hypothesis 1: Transactive memory system is positively associated with team learning.***

### **2.2 Team Learning**

Team learning reflects information processing activities and reciprocal exchanges between individual members (Blazevic & Lievens, 2004). Learning in a team or group promotes adaptive behaviors that help to facilitate group decision making, collaborative problem solving, and intragroup coordination (Edmondson, 1999; Bunderson & Sutcliffe, 2003; Blazevic & Lievens, 2004). For example, Bunderson and Sutcliffe (2003) suggested that the emphasis on team learning has positive consequences for team effectiveness.

The resource-based view suggests that valuable knowledge and expertise provide the basis for value creation (Grant, 1996). New product development and innovation require the application and combination of specialized knowledge. Team members are likely to avoid repeating mistakes by combining existing knowledge and applying lessons derived from past experiences (Sarin & McDermott, 2003; Atuahene-Gima & Murray, 2007). Team members are stimulated to increase creative thinking and idea sharing during new product development stage (Blazevic & Lievens, 2004). Project team might be able to create more innovative products through the development of new insight (Sarin & McDermott, 2003)

As stated in the above, team learning enhance the ability of team members to adapt to environment and operate effectively. Thus, team learning can lead to improved project performance. Accordingly, the following hypothesis is proposed.

***Hypothesis 2: Team learning is positively associated with project performance.***

### **2.3 The Mediation Effect of Team Learning**

As noted previously, Hypothesis 1 links transactive memory system with team learning, and Hypothesis 2 links team learning with project performance. Implicitly, the discussion suggests that transactive memory system affects project performance through the effect on team learning. Thus, we argued that team learning plays a mediating role in the relationship between transactive memory system and project performance. Accordingly, the following hypothesis is developed.

***Hypothesis 3: Team learning mediates the relationship between transactive memory system and project performance.***

### **2.4 Slack Resource**

Slack refers to a buffer or cushion of actual or potential resources that can be diverted or redeployed for the achievement of organizational goals (George, 2005). When team members learn new knowledge and skill, they may need appropriate slack to adapt to internal pressures for adjustment or to buffer technical core form environment turbulence (Tan & Peng, 2003; Geiger & Makri, 2006) and then utilize the knowledge to develop new products.

The presence of adequate or excess slack would provide the necessary flexibility for consistently allocating resources to innovative projects (Nohria & Gulati, 1996; George, 2005). Team members are less likely to worry about the risk of failure because slack resources are available to buffer the losses from such failures (Damanpour, 1991). Additionally, slack resources relax managerial control and ease capital restrictions which allow firms to pursue projects with uncertain outcomes and explore new ideas in advance of actual need (Nohria & Gulati, 1996; George, 2005; Geiger & Makri, 2006). Slack also gives creative individuals the space, time, and necessary resources to actively apply what they learn to the project activities (Nohria & Gulati, 1996; Haas, 2006). Thus, project teams with larger slack resources can bear the cost of new product development, and team members are more likely to engage in learning initiatives for the desired project results.

According to the above, this study argues that slack resources may moderate the relationship between team learning and project performance. Thus, the following hypothesis is developed.

***Hypothesis 4: Team learning is more positively associated with project performance when the***

*team has more slack resources.*

## **2.5 Autonomy**

Autonomy refers to the extent of the freedom, independence, and discretion to determine what actions are required and how best to execute them (Kirkman & Rosen, 1999). Project team needs to have latitude and ability to take action on problems and implement potential improvements (Gibson & Vermeulen, 2003). The perception of autonomy and discretion will stimulate the motivation of team member to learn collectively (Sarin & McDermott, 2003; Gibson & Vermeulen, 2003; Blazevic & Lievens, 2004). Team members are more likely to devote greater effort toward learning and diffusing existing and new knowledge, and feel responsible for the accomplishment of project completion (Gibson & Vermeulen, 2003; Blazevic & Lievens, 2004). Greater autonomy may assist in the iterative process of team learning by enabling team members to translate new or existing knowledge into favorable project results. Thus, the following hypothesis is proposed.

***Hypothesis 5:** Team learning is more positively associated with project performance when the team has more autonomy.*

## **3. Research Design and Methodology**

The first issue is to examine the relationships between transactive memory system, team learning, and project performance. The second issue is to explore the mediating effect of team learning on the relationship between transactive memory system and project performance. The third issue is to investigate whether slack resource will play the moderating role in the relationship between team learning and project performance. The fourth issue is to examine whether the effect of team learning on project performance will be moderated by autonomy.

For the purposes of this study, four major constructs including transactive memory system, team learning, slack resource, autonomy, and project performance, are operationalized in this study. To enhance reliability, multiple-item scales are designed to measure the multifaceted nature of each of the above constructs except for the basic characteristics of the respondent and the firm. Seven-point Likert scales are developed to measure the opinions of respondents.

The population in this study is the top 5,000 Taiwanese firms listed in the China Credit Information Service Incorporation. A random stratified sampling method was used to select 100 firms in each of the five 1,000 levels. A questionnaire then mailed to the 500 companies, along with a cover page that explained the nature of the study. Follow-up letters and phone calls were done two weeks later to appeal for participation.

To achieve the research purposes and test the hypotheses, this empirical study applies the software of SPSS to analyze the collected data. This study conducts the following data analysis: descriptive statistic analysis, factor analysis, reliability analysis, and multiple regression analysis.

#### **4. Discussion and Conclusions**

The aim of this study is to advance our understanding of team learning in new product development team. Firstly, the results of regression analyses show the significant relationships between transactive memory system, team learning, slack resource, autonomy, and project performance. Secondly, the empirical results support that the effect of transactive memory system on project performance is mediated by team learning. Thirdly, the strength of the relationship between team learning and project performance is moderated by slack resource. Fourthly, the relationship between team learning and project performance varies depending on the intensity of autonomy.

This study has some limitations. The first limitation is the use of a cross-sectional research design. The second limitation concerns the response rate. Thirdly, the study is based on self-report data incurring the possibility of common method bias. Fourthly, this study was done by empirically investigating Taiwanese firms. Potential cultural limitation should be noted.

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## 出席國際學術會議心得報告

計畫編號	NSC-97-2410-H-041-004
計畫名稱	新產品開發團隊之交互記憶系統與學習：寬裕資源與自主性之角色
出國人員姓名 服務機關及職稱	黃靖文 嘉南藥理科技大學資訊管理系助理教授
會議時間地點	98年5月27-29日 日本東京
會議名稱	(中文) 創新、管理與科技2009年國際會議 (英文) 2009 International Conference on Innovation, Management and Technology (ICIMT)
發表論文題目	(中文) 應用認知風險理論與科技接受模式於線上購物管道 (英文) Applying Theory of Perceived Risk and Technology Acceptance Model in the Online Shopping Channel

### 一、參加會議經過

World Academy of Science, Engineering and Technology (WASET) 為科技管理領域極具聲望的學術組織，今年2009年的年度會議的主題是Innovation, Management, and Technology。

本人於98年5月27日下午由桃園國際機場起飛，經過三個多小時的飛行，抵達日本東京成田國際機場。研討會期間為98年5月27日至29日，本人除了自身有一篇論文發表之外，亦積極參與ICIMT所舉辦的其他各場次論文發表，收集相關資料，聽取相關領域學者之研究方向與新近之研究趨勢。

本人的研究論文發表時間為2009年5月28日上午11點15到11點30分，發表地點在國際會議中心，本篇論文主題為「Applying Theory of Perceived Risk and Technology Acceptance Model in the Online Shopping Channel」。由本人進行論文的張貼，並與其他學者進行互動式的討論。

### 二、與會心得

本人此次參與由「科學、工程與科技世界學會」所舉辦的2009年年度會議的過程，

在個人研究主題、未來學術研究以及國際觀等方面獲益良多。本人論文經由張貼發表與互動討論之後，不僅讓外國學者能進一步瞭解本論文所探討之議題，與會的其他學者亦提出了一些建議與想法，有助於強化本論文之內容，並獲得許多的啟發。觀摩同一場次其他學者的文章，使本人在相關研究範疇上有更多的了解。

另一方面，藉由聆聽不同的主題，使本人能夠吸收新近的研究趨勢，延伸研究的觸角。在參與研討會的期間，與其他來自世界各國學者交流，亦開拓了個人的國際視野及人脈，這些是在往後研究中所不可或缺的。

### 三、建議

本人十分感謝國科會對於本次參與國際會議費用的補助，亦感謝學校相關單位之大力協助，才使這次的論文發表順利而圓滿。多參與國際學術會議有助於提昇國內學術研究之水準，而且個人在參與研討會的過程中，從聽取其他學者的研究，能使個人獲得相當多的經驗及資訊。因此，本人非常肯定及感謝國科會對於國內學者出國參與會議的補助，此項補助可讓國內之研究學者能夠更快速掌握國際學術之動向，更有助於鼓勵臺灣學者參與國際會議與提升學術研究水準。

### 四、攜回資料名稱及內容

1. 會議大會手冊：內容包括會議各項須知、各場次的時間地點與主題，及與會者的身份索引
2. 會議論文集光碟片：內容為各論文之摘要