行政院國家科學委員會專題研究計畫 成果報告

創新能力與新產品績效前因之研究
研究成果報告(精簡版)

計 畫 類 別 ：個別型
計 畫 編 號 ：NSC 98-2410-H-153-014-
執 行 期 間 ：98 年 08 月 01 日至 99 年 07 月 31 日
執 行 單 位 ：國立屏東教育大學教育行政研究所

計 畫 主 持 人：黃靖文
共 同 主 持 人：李勇輝
計畫參與人員：碩士班研究生-兼任助理人員：方翌
博士班研究生-兼任助理人員：呂書屏

報 告 附 件 ：出席國際會議研究心得報告及發表論文

處 理 方 式 ：本計畫涉及專利或其他智慧財產權，2 年後可公開查詢

中 華 民 國 99 年 09 月 27 日

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

創新能力與新產品績效前因之研究

計畫類別：■ 個別型計畫　　□ 整合型計畫

計畫編號：NSC 98-2410-H-153 -014

執行期間：98 年 8 月 1 日至 99 年 7 月 31 日

計畫主持人：黃靖文
共同主持人：李勇輝
計畫參與人員：呂書屏、方翌

成果報告類型(依經費核定清單規定繳交)：■精簡報告　□完整報告

本成果報告包括以下應繳交之附件：
□赴國外出差或研習心得報告一份
□赴大陸地區出差或研習心得報告一份
■出席國際學術會議心得報告及發表之論文各一份
□國際合作研究計畫國外研究報告書一份

處理方式：除產學合作研究計畫、提升產業技術及人才培育研究計畫、列管計畫及下列情形者外，得立即公開查詢
□涉及專利或其他智慧財產權，□一年□二年後可公開查詢

執行單位：國立屏東教育大學教育行政研究所

中　華　民　國　99　年　9　月　20　日

創新能力與新產品績效前因之研究

A Study of Antecedents of Innovation Capability and New Product Performance

中文摘要

新產品發展為提升公司能力以適應環境紛擾與維持創新的重要機制之一，先前的研究關注於新產品發展專案團隊的創新與學習的議題。本研究透過文獻回顧發展出研究架構來檢視學習導向、產品開發熟練度、創新能力、與新產品績效之間的關聯性。本研究的研究對象為中華徵信所公布的 5000 大企業，採分層隨機抽樣的方式，共抽取出 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：第一，迴歸分析結果顯示學習導向、產品開發熟練度、創新能力、與新產品績效之間有顯著的關係；第二，實證結果支持學習導向與新產品績效的關係是經由創新能力的中介效果；第三，產品開發熟練度與新產品績效之間的關係會受到創新能力之中介效果所影響；最後，本研究之發現將可使學者與管理者更加了解在探究新產品開發團隊之新產品績效時，學習導向、產品開發熟練度、與創新能力之重要性。

關鍵字: 學習導向、產品開發熟練度、創新能力、新產品績效

Abstract

New product development is considered as a critical mechanism to enhance the ability of the firm to adapt to environment turbulence and maintain innovation. Previous research has paid attentions to the issues of innovation and learning in new product development project teams. Synthesizing insights from prior research, this study develops a framework to examine the interrelationships between learning orientation, product development proficiency, innovation capability, and new product 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 500 firms. 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 learning orientation, product development proficiency, innovation capability, and new product performance. Secondly, the empirical results support that the effect of learning orientation on new product performance is mediated by innovation capability. Thirdly, the relationship between product development proficiency and new product performance is also mediated by innovation capability. Finally, the findings in this study enable scholars and managers to better understand the importance of learning orientation, product development proficiency, and innovation capability in the study of new product development performance.

Keywords: Learning orientation, Product development proficiency, Innovation capability, New product performance

1. Research Motivation and Objectives

1.1 Research Motivation

New product development and innovation require the exploitation and exploration of specialized knowledge inputs from many different functional areas (Yalcinkaya, Calantone, & Griffith, 2007). Both exploitation and exploration capabilities allow project team members to avoid repeating mistakes by using lessons derived from past experiences and to explore new knowledge to develop new products (Lubatkin, Simsek, Ling, & Veiga, 2006; Yalcinkaya et al.,2007). Project teams with greater exploitation and exploration capabilities will be more successful in new product development that leads to achieve better performance (Tushman & O'Reilly, 1996; Katila & Ahuja, 2002; He & Wong, 2004; Yalcinkaya et al., 2007).

Organizational learning theory emphasizes on the use of existing knowledge and the acquisition of new knowledge by actors to direct future actions (Miller, 1996). When performing project tasks, team members can develop learning orientation to increase knowledge flow, collaborative problem solving, and intragroup coordination (Edmondson, 1999; Calantone et al., 2002; Bunderson & Sutcliffe, 2003).

In addition to learning orientation, previous research has shown that the development proficiency such as marketing and technical proficiency of the firm can play a critical role in effectively managing new product development (Song & Parry, 1999; Song & Montoya-Weiss, 2001; Ozer, 2004). Marketing and technical proficiency gives the firm potential for the development of more innovative, technologically superior products compared to those offered by competitors (Kim et al., 2005; Jeong et al., 2006).

According to the above, the present study attempts to identify learning orientation and product development proficiency as antecedents of innovation capability and investigate whether learning orientation and product development proficiency will directly affect new product performance or it will play the indirect role in affecting new product performance through the intermediate variable of innovation capability.

1.2 Research Objectives

(1) To propose and investigate the relationships between learning orientation, product development proficiency, innovation capability, and new product performance;

(2) To examine whether innovation capability plays the mediating role in affecting the relationship between learning orientation and new product performance;

(3) To explore the mediating effect of innovation capability on the relationship between product development proficiency and new product performance.

2. Literature Review

2.1 Learning Orientation and Innovation Capability

Learning orientation reflects a firm's values and beliefs that can influence its behavior and propensity to create, share, and apply knowledge (Slater & Narver, 1995; Sinkula et al., 1997; Hurley & Hult, 1998). Learning in a firm or a team has been regarded as a collective capability based on experiential and cognitive processes (Aragón-Correa et al., 2007). Learning orientation enhances the potential of an organization to exploit and explore knowledge for developing innovation (Hurley & Hult, 1998; Calantone et al., 2002; Hult et al., 2004; Aragón-Correa et al., 2007).

Creative idea and knowledge can be generated by nurturing open-mindedness and shared vision in an organization for further improvement (Sinkula et al., 1997; Baker & Sinkula, 1999). When developing new products team members are more likely to increase their capability to leverage learning-oriented activities into new product programs and generate cumulative technical advances (Baker & Sinkula, 2007). Thus, the following hypothesis is proposed.

Hypothesis 1*: Learning orientation is positively related to innovation capability.*

2.2 Learning Orientation and New Product Performance

Organizational learning theory suggests that learning orientation encourages adaptive behaviors that help to facilitate group decision making, collaborative problem solving, and intragroup coordination (Edmondson, 1999; Calantone et al., 2002; Bunderson & Sutcliffe, 2003).

Learning is especially critical for the firm to take suitable actions to respond to the rapid change and the complex environment (Baker & Sinkula, 1999; Wang, 2008). When dealing with new product development, project members from different functional areas need to develop team learning orientation to increase information flow, coordinate actions with other functions, and overcome the difficulties in new product development (Lynn et al., 2000; Bunderson & Sutcliffe, 2003; Tucker et al., 2007). Thus, the following hypothesis is proposed.

Hypothesis 2*: Learning orientation is positively related to new product performance.*

2.3 Product Development Proficiency and Innovation Capability

Product development proficiency refers to the abilities, skills, knowledge, and efficacy of a new product team in carrying out innovation activities (Nakata et al., 2006). Product development

proficiency includes marketing and technical proficiency (e.g. Song & Parry, 1999; Song & Montoya-Weiss, 2001; Ozer, 2004). Team member with marketing proficiency can better identify consumer needs and potential target segments, communicate with target consumers, and implement marketing tasks (Song & Parry, 1999). Technical proficiency leads to greater efficiencies in the development of prototype and testing, production startup, and necessary technology acquisition (Song & Parry, 1999; Jeong et al., 2006).

Proficiency in marketing and technical activities can enhance the capability of team members to engage in exploratory innovation or exploitative innovation. Accordingly, the following hypothesis is proposed.

Hypothesis 3*: Development proficiency is positively related to innovation capability.*

2.4 Product Development Proficiency and New Product Performance

The proficiency of marketing activities enables firms to be more adept at assessing potential market opportunities and formulating clear new product strategies (Song & Parry, 1997; Kim et al., 2005). The proficiency of technical activities places emphasis on product redesign, technical analysis, and product testing to achieve effective product proliferation (Kim et al., 2005; Ozer, 2006).

Previous studies have identified both marketing and technical proficiency in executing new product development activities as keys to new product performance and success (Ozer, 2004; Kim et al., 2005; Jeong et al., 2006; Millson & Wilemon, 2006).

Increases in development proficiency can enhance new product performance relative to competitive alternatives. Thus, we propose the following hypothesis.

Hypothesis 4*: Development proficiency is positively related to new product performance.*

2.5 Innovation Capability and New Product Performance

Exploitative innovation capability enables a project team to recognize new customer needs and reduce repetitive disturbances in products and technologies (Yalcinkaya et al., 2007). Improved and refined existing knowledge likely reduces the time required to accomplish project tasks and introduce new products (March, 1991).

Firms with better exploration capability can shape the rules of the competitive game in ways that rivals will have difficulty imitating and expand their customer base into new or emerging markets (Lubatkin et al., 2006). Exploration capability allows project team members

to increase creative thinking and idea sharing, thereby facilitating the potential for new innovative outcomes (Blazevic & Lievens, 2004; Yalcinkaya et al., 2007). Thus, the following hypothesis is formulated.

Hypothesis 5*: Innovation capability is positively related to new product performance.*

2.6 The Mediation Effects

As noted previously, Hypothesis 1 and Hypothesis 3 link learning orientation and development proficiency with innovation capability, and Hypothesis 5 links innovation capability with new product performance. We argued that innovation capability plays a mediating role in the relationship between independent variables of learning orientation and development proficiency and dependent variable of new product performance. Accordingly, the following hypothesis is developed.

Hypothesis 6*: Innovation capability mediates the relationship between learning orientation and new product performance.*

Hypothesis 7*: Innovation capability mediates the relationship between development proficiency and new product performance.*

3. Research Design and Methodology

The first issue is to examine the relationships between learning orientation, product development proficiency, innovation capability, and new product performance. The second issue is to explore the mediating effect of innovation capability on the relationship between learning orientation and new product performance. The third issue is to investigate whether innovation capability will play the mediating role in the relationship between product development proficiency and new product performance.

The questionnaire includes measures of variables to be studied including learning orientation, product development proficiency, innovation capability, new product performance, and some background information. Variables are measured with multi-items. Respondents are asked to indicate the level of agreement for their firms on each of the items using five-point Likert-type scales ranging from “strongly disagreement” to “strongly agreement”. 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 is used to select 500 companies. Follow-up letters and phone calls are 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 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 learning orientation, product development proficiency, and innovation capability in new product development teams. The major findings of this study include: firstly, the results of regression analyses show the significant relationships between learning orientation, product development proficiency, innovation capability, and new product performance. Secondly, the empirical results support that the effect of learning orientation on new product performance is mediated by innovation capability. Thirdly, the relationship between product development proficiency and new product performance is also mediated by innovation capability. Finally, the findings in this study enable scholars and managers to better understand the importance of learning orientation, product development proficiency, and innovation capability in the study of new product development performance.

This study has several 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.

5. References

Aragón-Correa, J. A., García-Morales, V. J., & Cordón-Pozo, E. 2007. Leadership and organizational learning's role on innovation and performance: Lessons from Spain. Industrial Marketing Management, 36(3): 349-359.

Baker, W. E. & Sinkula, J. M. 1999. The synergistic effect of market orientation and learning orientation on organizational performance. Journal of the Academy of Marketing Science, 27: 411-427.

Baker, W. E. & Sinkula, J. M. 2007. Does market orientation facilitate balanced innovation programs? An organizational learning perspective. Journal of Product Innovation Management, 24(4): 316-334.

Blazevic, V. & Lievens, A. 2004. Learning during the new financial service innovation process: Antecedents and performance effects. Journal of Business Research, 57: 374-391.

Bunderson, J. S. & Sutcliffe, K. M. 2003. Management team learning orientation and business unit performance. Journal of Applied Psychology, 88(3): 552-560.

Calantone, R. J., Cavusgil, S. T., & Zhao, Y. 2002. Learning orientation, firm innovation, and firm performance. Industrial Marketing Management, 31(6): 515-524.

Edmondson, A. 1999. Psychological safety and learning behavior in work teams. Administrative Science Quarterly, 44: 350-383.

He, Z. L. & Wong, P. K. 2004. Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. Organization Science, 15(4): 481-494.

Hult, G. T., Hurley, R. F., & Knight, G. A. 2004. Innovativeness: Its antecedents and impact on business performance. Industrial Marketing Management, 33(5): 429-438.

Hurley, R. F. & Hult, G. T. 1998. Innovation, market orientation, and organizational learning: An integration and empirical examination. Journal of Marketing, 62(3): 42-54.

Jeong, I., Pae, J. H., & Zhou, D. 2006.Antecedents and consequences of the strategic orientations in new product development: The case of Chinese manufacturers. Industrial Marketing Management, 35(3): 348-358.

Katila, R. & Ahuja, G. 2002. Something old, something new: A longitudinal study of search behavior and new product introduction. Academy of Management Journal, 45: 1183-1194.

Kim, J. Y., Wong, V., & Eng, T. Y. 2005. Product variety strategy for improving new product development proficiencies. Technovation, 25: 1001-1015.

Lubatkin, M. H., Simsek, Z., Ling, Y., & Veiga, J. F. 2006. Ambidexterity and performance in small- to medium-sized firms: The pivotal role of top management team behavioral integration. Journal of Management, 32(5): 646-672.

Lynn, G. S., Reilly, R. R., & Akgün, A. E. 2000. Knowledge management in new product teams:

Practices and outcomes. IEEE Transactions on Engineering Management, 47(2): 221-231.

March, J. G. 1991. Exploration and exploitation in organizational learning. Organization Science, 2(1): 71-87.

Miller, D. 1996. A preliminary typology of organizational learning: Synthesizing the literature. Journal of Management, 22: 485-505.

Millson, M. R. & Wilemon, D. 2006. Driving new product success in the electrical equipment manufacturing industry. Technovation, 26: 1268-1286.

Nakata, C., Im, S., Park, H., & Ha, Y. 2006. Antecedents and consequence of Korean and Japanese new product advantage. Journal of Business Research, 59: 28-36.

Ozer, M. 2004. The role of the Internet in new product performance: A conceptual investigation. Industrial Marketing Management, 33(5), 355-369.

Ozer, M. 2006. New product development in Asia: An introduction to the special issue. Industrial Marketing Management, 35(3): 252-261.

Sinkula, J., Baker, W., & Noordewier, T. 1997. A framework for market-based organizational learning: Linking values, knowledge, and behavior. Journal of the Academy of Marketing Science, 25(4): 305-318.

Slater, S. & Narver, J. 1995. Market orientation and the learning organization. Journal of Marketing, 59: 63-74.

Song, M. & Montoya-Weiss, M. M. 2001. The effect of perceived technological uncertainty on Japanese new product development. Academy of Management, 44(1): 61-80.

Song, X. M. & Parry, M. E. 1999. Challenges of managing the development of breakthrough products in Japan. Journal of Operations Management, 17: 665-688.

Tucker, A. L., Nembhard, I. M., & Edmondson, A. C. 2007. Implementing new practices: An empirical study of organizational learning in hospital intensive care units. Management Science, 53(6): 894-907.

Tushman, M. L. & O'Reilly, C. 1996. Ambidextrous organizations: Managing evolutionary and revolutionary change. California Management Review, 38: 8-30.

Wang, C. L. 2008. Entrepreneurial orientation, learning orientation, and firm performance. Entrepreneurship Theory and Practice, 635-657.

Yalcinkaya, G., Calantone, R. J., & Griffith, D. A. 2007. An examination of exploration and exploitation capabilities: Implications for product innovation and market performance. Journal of International Marketing, 15(4): 63-93.

出席國際學術會議心得報告

計畫編號	NSC 98-2410-H-153 -014
計畫名稱	創新能力與新產品績效前因之研究
出國人員姓名 服務機關及職稱	黃靖文 國立屏東教育大學教育行政研究所助理教授
會議時間地點	99 年 7 月 5-7 日 日本北九州
會議名稱	(中文) 2010 年商業與資訊國際研討會 (英文) 2010 International Conference on Business and Information (BAI2010)

一、參加會議經過

International Conference on Business and Information (BAI)國際研討會是一年一度為世界各地學者舉辦的盛會。每年會議中都會邀集與國際商管和資訊學界相關的學者與學術文章。2010 年度會議於 7 月 5-7 日在日本北九州市 Rihga Royal Hotel Kokura 舉行，由國際商業學術財團 International Business Academics Consortium (IBAC)與台灣資訊系統研究學會 Academy of Taiwan Information Systems Research (ATISR)主辦，國立台北大學、早稻田大學與實踐大學共同承辦。

本人於99年7月4日下午由桃園國際機場起飛，經過三個多小時的飛行，抵達日本福岡國際機場。本人在研討會期間積極參與BAI所舉辦的各場次論文發表，收集相關資料，並與來自台灣與不同國家地區之其他學者進行互動式的討論，聽取相關領域學者之研究方向與新近之研究趨勢。

二、與會心得

本人此次參與由國立台北大學、早稻田大學與實踐大學所承辦的2010年商業與資訊國際研討會的過程，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。藉由聆聽不同的主題與觀摩不同場次其他學者的文章，使本人能夠吸收新近的研究趨勢，延伸研究的觸角，並使本人在相關研究範疇上有更多的了解。另一方面，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，才使這次的出席國際會議順利而圓滿。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

EXPLOITATIVE AND EXPLORATORY LEARNING IN NEW PRODUCT DEVELOPMENT TEAM

Jing-Wen Huang, National Pingtung University of Education, Taiwan
Yong-Hui Li, National Pingtung Institute of Commerce, Taiwan

ABSTRACT

The purpose of this study is to examine the effect of slack resource on the relationship between team learning and project performance. Regression analysis was used to test the hypotheses in a sample of Taiwanese firms. The findings suggest that team learning is positively associated with project performance. In addition, slack resource plays a moderating role in the relationship between team learning and project performance. Empirical results provide general support for our predictions. Managerial implications and future research directions are discussed.

Keywords: *team learning, slack resource, project performance*

1. INTRODUCTION

When dealing with new product development, team members in a new product development team can engage in exploitative and exploratory learning for knowledge exchange (March, 1991). Both exploitative learning and exploratory learning can broaden and improve the knowledge base of project teams (Blazevic & Lievens, 2004). Through team learning regarding exploitation and exploration, project teams can increase the ability to respond to market, solve problems, and enhance performance outcomes (Auh & Menguc, 2005). Thus, team learning plays an important role in new product success and project perforamnce (Sarin & McDermott, 2003; Atuahene-Gima & Murray, 2007).

Slack resource acts as a buffer which insulates the technical core from environmental pressures and challenges (Bourgeois, 1981). The availability 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). The firm can afford to risk and capital restriction associated with knowledge exploration and new product development (Nohria & Gulati, 1996; George, 2005; Voss, Sirdeshmukh, & Voss, 2008). Thus, organizational slack resources may play a contingent role to support the exploitation and exploration of knowledge for the favorable project outcomes. According to the above, the main purpose of this study is to examine the effect of team learning on project performance and whether slack resource plays the moderating role in affecting the association of team learning and project performance.

2. RESEARCH BACKGROUND AND HYPOTHESES

2.1 Team Learning

New product development teams can engage in exploitative and exploratory learning (Atuahene-Gima & Murray, 2007) to share, combine, and utilize knowledge. Exploitative learning refers to the refinement and extension of existing knowledge, skills, and technologies (March, 1991). Learning form previous experience and well-defined solution will provide team members deeper knowledge in particular technology and product-market area (Atuahene-Gima & Murray, 2007). Based on

exploitation, project team can better recognize new customer needs and reduce repetitive disturbances in product technology. Moreover, improved and refined existing knowledge likely reduces the time required to accomplish tasks and introduce new products (March, 1991; Sarin & McDermott, 2003; Atuahene-Gima & Murray, 2007). Exploratory learning refers to the experimentation with new alternatives and acquisition of new knowledge, skills, and technologies (March, 1991). The newly acquired knowledge interacting with the existing knowledge can broaden the diversity of knowledge base (Blazevic & Lievens, 2004) and provide new insights into product design and allows for greater experimentation and innovation (Blazevic & Lievens, 2004; Atuahene-Gima & Murray, 2007). Project team might be able to create more innovative products through the development of new insight (Sarin & McDermott, 2003).

As stated in the above, exploitative and exploratory learning between team members enhance the ability to adapt to environment and operate effectively. Team learning can lead to desired project performance. Thus, the following hypothesis is proposed.

Hypothesis 1*: Team learning is positively associated with project performance.*

2.2 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 (Cyert & March, 1963; Bourgeois, 1981; George, 2005). The properties of slack resources vary in the extent to which they are absorbed in ongoing activities (Tan & Peng, 2003; Voss et al., 2008). Absorbed slack resources are already committed to a specific use and tied to current operations. Unabsorbed slack focuses on uncommitted resources that can be deployed in a discretionary manner (Tan & Peng, 2003; Voss et al., 2008). Some absorbed slack, such as excess capacity and underused facility, gives individuals sufficient resources to involve in creative thinking and learning (Greve, 2003; Haas, 2006). With absorbed slack resources, team members can more actively apply what they learn to the project activities (Nohria & Gulati, 1996; Greve, 2003; Haas, 2006). Firms can maintain coalitions of team members to ensure their aspirations and commitments to exploitative and exploratory learning (Cyert & March, 1963; Tan & Peng, 2003; George, 2005; Voss et al., 2008).

Some unabsorbed slack, such as financial resources, may facilitate product exploration entailing unpredictable investments and uncertain returns (Greve, 2003; Voss et al., 2008). Unabsorbed slack can ease capital restrictions and give firms greater leverage to pursue projects with uncertain outcomes and explore new knowledge in advance of actual need (Nohria & Gulati, 1996; George, 2005; Geiger & Makri, 2006; Voss et al., 2008). Thus, the unabsorbed nature of slack resources can protect firms from potential depletion and risk associated with experimentation (Nohria & Gulati, 1996; Tan & Peng, 2003; Voss et al., 2008). According to the above, slack resources may play a moderating role in facilitating team members to attain project performance. Hence, we propose the following hypotheses.

Hypothesis 2a*: Absorbed slack resource positively moderates the relationship between team learning and project performance.*

Hypothesis 2b*: Unabsorbed slack resource positively moderates the relationship between team learning and project performance.*

3. RESEARCH METHODOLOGY

3.1 Data Collection and Sample

We employed a questionnaire survey approach to collect data for testing the validity of the model and research hypotheses. All independent and dependent variables were assessed via seven-point Likert scales. The population for the study is the top 5000 Taiwanese firms listed in the yearbook published by the China Credit Information Service Incorporation. A stratified random sampling method was used to select 120 firms in each of the five 1000 levels. 600 questionnaires were distributed, along with a cover page that explained the nature of the study. Of the 181 returned questionnaires, 8 were incomplete. The remaining 173 valid and complete questionnaires were used for the following analysis. It represents a useable response rate of 28.8%.

3.2 Measures

Project performance. We measured project performance with six items that included the ability to meet project goals, adherence to schedule, adherence to budget, expected amount of work completed, high quality of work completed, and efficient task operations (Jones & Harrison, 1996) (α=0.866).

Team learning. The team learning construct was adapted from the work of Atuahene-Gima and Murray (2007). Exploitative learning consisted of five items regarding the refinement of common methods and ideas, the searched for generally proven methods and solutions, the acquisition of information to ensure productivity and update the firm's current project and market experiences, and the emphasis on the use of knowledge related to existing project experience (α=0.899). Exploratory learning included five items focusing on learning activities that involved experimentation and high market risks, the search for knowledge that led the firm enter into new markets and technological areas, and the acquisition of novel information that went beyond current market and technological experiences (α=0.963).

Slack resource. We adopted two types of slack resources including absorbed slack and unabsorbed slack (Tan & Peng, 2003). The absorbed slack was reflected by three items tapping the extent to which the project was developed under available capacity, under available human resource, and under available time for development activities among members (α=0.916). The unabsorbed slack was measured by asking the informants three questions about whether the retained earnings, financial resources, and debt financing with banks could be supplied sufficiently whenever the project team needed them (α=0.918).

Control variables. We entered four control variables in our analysis. The number of employees was calculated by taking the logarithm of each firm's total number of employees. Firm age was measured as the number of years from the founding date. R&D intensity was calculated as the ratio of R&D expenditure to a firm's total annual sales. To assess the industry type, one dummy variables was included to indicate whether a firm belonged to manufacturing sector or high-tech sector.

4. ANALYSIS AND RESULTS

This study attempts to understand the effects of team learning on project performance in different types of slack resource possessed by the team. The results of the regression analyses indicate that the direct effect of team learning on project performance is significant at the $p<0.001$ level. Thus, Hypothesis 1, which states that team learning is positively related to project performance, is supported. Next, we examined the contingent role of slack resource between team learning and project performance. The model of absorbed slack factor and the interaction term with team learning is significant at the $p<0.001$ level. The result indicates that team learning would promote project performance when the team has more absorbed slack resource. Thus, Hypothesis 2a is supported. The model of the moderating effects of unabsorbed slack is significant at the $p<0.001$ level. The coefficient of the interaction term between team learning and unabsorbed slack is positive and statistically significant ($p<0.001$). The findings support Hypothesis 2b and indicate that team learning is more positively related to project performance if the team has more unabsorbed slack resource.

5. DISCUSSION AND CONCLUSIONS

In this study, we sought to investigate the project performance implications of team learning and organizational slack. Consistent with our hypothesis, the positive effect of team learning on project performance is stronger under conditions of a higher level of absorbed slack resource and unabsorbed slack resource. The findings contribute to the theoretical development for explaining the relationships between team learning, slack resource, and project performance. We empirically demonstrate the moderating effect of slack resource on the relationship between team learning and project performance. The results join other researches in pointing that the strategic importance of slack resource within the organization (George, 2005; Geiger & Makri, 2006; Voss et al., 2008).

The practical implication of our results is that project managers need to actively manage and augment exploitative and exploratory learning activities in their project teams. Furthermore, when project teams involve in learning to promote new product development, the role of slack resource becomes more evident and critical. Project managers need to cultivate a better level of slack resource to encourage team members to commit their time and effort in the exploration and expoitatin activities of transforming knowledge into innovations.

REFERENCES

Atuahene-Gima, K. and Murray, J. Y., "Exploratory and Exploitative Learning in New Product Development: A Social Capital Perspective on New Technology Ventures in China", *Journal of International Marketing*, Vol. 15(2), 2007, 1-29.

Auh, S. and Menguc, B., "Balancing Exploration and Exploitation: The Moderating Role of Competitive Intensity", *Journal of Business Research*, Vol. 58(12), 2005, 1652-1661.

Blazevic, V. and Lievens, A., "Learning During the New Financial Service Innovation Process: Antecedents and Performance Effects", *Journal of Business Research*, Vol. 57, 2004, 374-391.

Bourgeois, L. J., “On the Measurement of Organizational Slack”, *Academy of Management Review*, Vol. 6, 1981, 29-39.

Cyert, R. and March, J., A Behavioral Theory of the Firm, Prentice-Hall: Englewood Cliffs, NJ, 1963.

Geiger, S. W. and Makri, M., “Exploration and Exploitation Innovation Processes: The Role of Organizational Slack in R&D Intensive Firms”, *Journal of High Technology Management Research*, Vol. 17, 2006, 97-108.

George, G., “Slack Resources and the Performance of Privately Held Firms”, *Academy of Management Journal*, Vol. 48(4), 2005, 661-676.

Greve, H. R., “A Behavioral Theory of R&D Expenditures and Innovations: Evidence from Shipbuilding”, *Academy of Management Journal*, Vol. 46(6), 2003, 685-702.

Haas, M. R., “Knowledge Gathering, Team Capabilities, and Project Performance in Challenging Work Environments”, *Management Science*, Vol. 52(8), 2006, 1170-1184.

Jones, M. and Harrison, A., “IS Project Performance: An Empirical Assessment”, *Information & Management*, Vol. 31(2), 1996, 57-65.

March, J. G., “Exploration and Exploitation in Organizational Learning”, *Organization Science*, Vol. 2(1), 1991, 71-87.

Nohria, N. and Gulati, R., “Is Slack Good or Bad for Innovation?, *Academy of Management Journal*, Vol. 39(5), 1996, 1245-1264.

Sarin, S. and McDermott, C., “The Effect of Team Leader Characteristics on Learning, Knowledge Application, and Performance of Cross-functional New Product Development Teams”, *Decision Sciences*, Vol. 34(4), 2003, 707-739.

Tan, J. and Peng, M. W., “Organizational Slack and Firm Performance During Economic Transitions: Two Studies From an Emerging Economy”, *Strategic Management Journal*, Vol. 24, 2003, 1249-1263.

Voss, G. B. Sirdeshmukh, D., and Voss, Z. G., “The Effects of Slack Resources and Environmental Threat on Product Exploration and Exploitation”, *Academy of Management Journal*, Vol. 51(1), 2008, 147-164.

Dr. Jing-Wen Huang is an assistant professor in National Pingtung University of Education, Taiwan. She has published papers in Journal of Business Research, International Journal of Information Management, Industrial Marketing Management, and other journals.

Dr. Yong-Hui Li is an assistant professor in National Pingtung Institute of Commerce, Taiwan. He has published papers in Journal of Business Research, Industrial Marketing Management, Chiao Da Management Review, and other journals.

無研發成果推廣資料

98 年度專題研究計畫研究成果彙整表

計畫主持人：黃靖文	計畫編號：98-2410-H-153-014-
計畫名稱：創新能力與新產品績效前因之研究	

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		

其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)	將國科會研究報告投稿國際期刊, 尚在初審階段

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

■達成目標

□未達成目標（請說明，以 100 字為限）

□實驗失敗

□因故實驗中斷

□其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文：□已發表 ■未發表之文稿 □撰寫中 □無

專利：□已獲得 □申請中 ■無

技轉：□已技轉 □洽談中 ■無

其他：（以 100 字為限）

將國科會研究報告投稿國際期刊, 尚在初審階段

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）（以 500 字為限）

本研究之發現將可使學者與管理者更加了解在探究新產品開發團隊之新產品績效時，學習導向、產品開發熟練度、與創新能力之重要性。作者進一步將此研究報告之論點投稿國際期刊，以增進學術價值。