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# 參加 2012 管理學術會議年會發表學術論文

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## 摘要

此行目的是發表有關資源承諾與資源彈性對公司創新績效影響之研究成果，並開拓國際視野，提升國際交流，而且希望獲得國際學者專業評論，以進行論文後續修改。此行的過程為，本人於 2012 年 7 月 29 日抵達加拿大溫哥華先參加另一場國際研討會—2012 年波特蘭工程與科技管理國際中心舉辦的國際研討會，然後於 2012 年 8 月 2 日抵達美國波士頓，全程參與 2012 年 8 月 3 日至 8 月 7 日 2012 管理學術會議年會，並於 2012 年 8 月 5 日發表論文，然後於 2012 年 8 月 8 日搭機離開美國。此行成果為，分別獲得碧格羅博士、葛瑞芬博士、奧卡木羅博士與曲切喬博士的修改建議，目前已依照修改建議進行論文修改，然後轉投國外知名期刊，此外亦結識數位國際學者，提升國際視野，增進國際合作機會。

# 目次

章	節	頁次
目的		1
過程		2
心得及建議		4
附錄		5

# 本文

## 目的

此行目的是發表有關資源承諾與資源彈性對公司創新績效影響之研究成果，並開拓國際視野，增進國際交流與國際合作的機會，而且希望國際級學者提出專業評論，以獲得論文後續修改建議。管理學術會議年會是管理領域最重要的年度學術研討會之一，每年有許多國際級管理大師參加管理學術會議年會，而且2012管理學術會議年會的主辦單位也邀請許多全球資深管理學者評審論文，並當場給予論文報告人許多寶貴建議。雖然投稿管理學術會議年會的接受率極低，但是只要被管理學術會議年會接受的論文，能依照論文評論者的建議加以修改的話，轉投國際知名期刊的接受率將會大幅提高。因此，管理學術會議年會是全球管理學者最期盼的年度學術研討會。參加本次研討會可以提升本人研究能力，增加國際視野，並提高國際期刊發表能力。本文已依照論文評論者的建議進行修改，然後轉投知名國際知名期刊。此外，本人亦結識碧格羅博士、葛瑞芬博士、奧卡木羅博士與曲切喬博士，開拓國際視野，並增進國際交流與國際合作的機會。

## 過程

2012 Academy of Management (AOM)年會於 2012 年 8 月 3-7 日舉行，主題為「非正式經濟 (The Informal Economy)」，舉辦地點為美國波士頓。本人在按照活動時程提報、繳交論文摘要與全文後，取得年會主辦單位的錄取通知信，接著著手規劃行程相關機票、食宿之安排，並向學校單位申請，取得博士班研究生參與國際會的經費補助（包含機票及會議註冊費）。在一切就緒後，起程前往參與會議。此會議為本人第二次參加 Academy of Management (AOM)年會，由於本次參與國際會議地點為美國波士頓，屬於北美先進國際化城市，因此上次累積的參與 Academy of Management (AOM)年會經驗，對本次與會相當有幫助。首先是行前的準備，應熟悉同一場次的其他論文，並適當準備演講稿件，以清晰明朗的投影片製作為首要方針。由於 Academy of Management (AOM)年會的與會者來自世界各國，口音相當多元，因此簡單扼要的報告將會使溝通更為順利。另外，相較於其他國際會議，Academy of Management (AOM)年會的確是一個相當國際化的研討會，總計有 80 多個來自全球不同國家、對企業管理相關領域學有專精的學者專家共同參與，我們可以看到不同國家在企業管理相關領域上所面臨的問題、抱持的觀點與研究的重點，有著極大的差異，但也就是因為這樣的差異，透過這個國際學術會議，大家彼此分享、交流，促進瞭解也開展了更寬闊的視野。

本人非常榮幸出席知名國際研討會 2012 Academy of Management (AOM) Annual Meeting，此行的過程為，本人於 2012 年 7 月 29 日抵達加拿大溫哥華先參加另一場國際研討會-2012 PICMET International Conference，然後於 2012 年 8 月 2 日抵達美國波士頓，2012 年 8 月 3 日註冊後，立即參加 Academy of Management (AOM) Annual Meeting 的 Professional Development Workshop Program (主持人：Dr. Paul S. Alder)，2012 年 8 月 4 日參加 AOM 的 Scholarly Program of papers and symposia (主持人：Dr. R. Duane Ireland)，2012 年 8 月 5 日參加 Nascent Entrepreneurship in China and Beyond、TIM-Theoretical Perspectives、Informal Networks and the Top Team 三個場次論文發表會，本人於 TIM- Theoretical Perspectives 場次發表論文（地點：Boston Park Plaza, Boston, MA,

USA, Room: Alcott Room, 場次: 518: TIM- Theoretical Perspectives)。此外, 本人於 2012 年 8 月 6 日參加 Organizational Errors, Reliability, and Safety Culture、Humanistic Management Caucus、Institutional Theory in International Business and Management、Innovation in Informal Economy Organizations 四個場次論文發表會, 並於 2012 年 8 月 7 日參加 Developmental Networks and the Informal Economy、Informal Economy Influences on the Sustainability Agenda、The Ethicist: The Informal Economy and Scholarship, Teaching and Professional Life Ethics 三個場次論文發表會, 並於 2012 年 8 月 8 日搭機離開美國。

本人於 2012 年 8 月 5 日 TIM- Theoretical Perspectives 場次發表論文時, 共有四位發表人, 除了本人之外, 其他三位發表人分別為: Dr. Mark Greeven、Dr. Koichiro Okamura、Dr. Naohiro Shichijo。本人的論文係探討資源承諾與資源彈性對公司創新績效之影響, 並探討吸收能力之中介效果。研究結果發現資源承諾與資源彈性會透過吸收能力而對公司創新績效產生正向影響。Dr. Mark Greeven 所報告的文章則是探討制度與環境不確定性對於中國創新活動的影響, 並提出新的理論模型解釋中國的創新活動; Dr. Koichiro Okamura 所報告的文章則搜尋美國專利資料庫的機器人專利, 探討區域與全球網絡的研發活動對於複雜科技領域的影響狀況; Dr. Naohiro Shichijo 所報告的文章則比較不同類型科學家的研發行為與創新績效的不同。此外, 與會學者對於本人發表之研究也提出批評, 數人建議研究樣本除了臺灣製造業之外, 後續研究可挑選其他國家進行分析, 並進行跨國比較。此外, 本研討會的主持人 Dr. Lyda S. Bigelow 教授也對本論文提出許多寶貴建議, 尤其對於文章的管理意涵的不足之處提出具體批評, 而且建議後續應再補強專家訪談, 以支持本文之論點。參與本次研討會獲得許多寶貴的建議, 尤其本研討會的主持人 Dr. Lyda S. Bigelow 教授非常欣賞本文章, 並認為參考多位學者的評論與建議而加以修改與補強之後, 可以進一步投稿國外知名期刊。本次參加研討會, 分別獲得主持人 Dr. Lyda S. Bigelow 與來賓 Dr. Mark Greeven、Dr. Koichiro Okamura、Dr. Naohiro Shichijo 的寶貴專業評論, 目前已依照論文評論者的建議進行修改, 然後轉投知名 SSCI 期刊論文。此外, 本人亦與 Dr. Lyda S. Bigelow、Dr. Mark Greeven、Dr. Koichiro Okamura、Dr. Naohiro Shichijo 保持聯繫, 希望持續提升國際視野, 並增進國際交流與國際合作的機會。

## 心得及建議事項

參與本次國際研討會除了提高個人的國際視野之外，並能與世界各國管理領域的學者交換研究心得，獲得許多寶貴的研究經驗。此外，透過本次國際研討會也認識了不少國際知名的研究學者，回國後希望能繼續向這幾位國際知名研究學者請益，並期盼日後能有跨國共同研究的機會。本次參加研討會，分別獲得主持人 Dr. Lyda S. Bigelow 與來賓 Dr. Mark Greeven、Dr. Koichiro Okamura、Dr. Naohiro Shichijo 的寶貴建議，目前已依照論文評論者的建議進行修改，然後轉投知名 SSCI 期刊論文。參與本次國際研討會並發表文章實在是收獲非常多，而且非常感謝行政院國科會的補助，本人並希望明年再次爭取行政院國科會補助出席國際研討會。

參與此次會議以後，本人有一點建議，即為籌備大型國際研討會的必要性。Academy of Management (AOM) Annual Meeting 是一個大型且複雜的國際學術會議，從主辦組織、主辦學校到主辦城市，都是由不同地區的人或單位主辦，儘管在事先曾感受到主辦單位對於相關問題的回覆速度顯的有些緩慢，但在活動舉辦的五天中，卻是相當細心、順利且受到大家的讚揚的，而透過與會者的參與，也再度提升主辦城市波士頓的能見度，並成功的進行城市的包裝。而舉辦國際會議，也能藉由學者間的交流，為該主辦國帶入學術氛圍，並帶動航空、旅遊、出版等相關產業的發展。希望未來國內各單位能積極主辦國際知名研討會，以提升臺灣的國際學術知名度與能見度，並帶動國內航空、旅遊、出版等相關產業的發展。

## (附錄) 出席研討會照片



研討會註冊處



發表論文會場



研討會大會會場



研討會報到處



研討會索取資料



研討會聯絡處



## (附錄) 論文全文檔

### **The positive effect of resource on innovation performance: mediation role of absorptive capacity**

**Abstract.** This study utilized structural equation modeling (SEM) to find out that absorptive capacity plays a mediation role between resource commitment, resource flexibility and innovation performance. This study tests the hypotheses in a sample of 311 Taiwanese manufacturing companies, including 193 SMEs and 118 large enterprises. The findings in this study highlight the importance of the company's resources as determinants of its capability to achieve superior innovation performance. Although resource commitment and flexibility reflect different resource traits, this study asserts companies should invest in both of resource commitment and resource flexibility. Companies can not only rely on resource commitment, but also pay attention to resource flexibility to develop capabilities to actively absorb relevant knowledge. Moreover, this study finds that resource flexibility in established companies is significantly higher than those of new companies in Taiwan.

**Keywords:**

resource commitment, resource flexibility, absorptive capacity, innovation performance, innovation

# **The positive effect of resource on innovation performance: mediation role of absorptive capacity**

## **INTRODUCTION**

Current studies are not sufficiently clear on how different kinds of resources and capabilities contribute to innovation performance. This study seeks to improve understanding of the relationship between resource, capability and performance. According to resource-based view (RBV), competitive advantage results from the key resources and capabilities of companies (Barney, 1991; Orsato, 2006; Penrose, 1959). Sustained competitive advantage emerges from unique combinations of resources (Grant, 1996) that are valuable, rare, difficult to imitate and non-substitutable (Barney, 1991). A company's performance is based on its resources. Resources are inputs to production that an organization owns, controls, or has access to (Helfat & Peteraf, 2003). The ability of deploying resource can neutralize threats for companies (Barney, 1991). Companies obtain a competitive advantage not only by deploying key resources and through resource interaction, but also by developing capabilities through acquisition, and accumulation of organizational and intangible assets over time (Teece et al., 1997). Moreover, the key capability also leads to a sustained competitive advantage (Hart, 1995). This study proposes the research framework of resource-

capability-performance.

Successful innovation becomes an important determinant for a company, as well as an important profit source in its future (Chen et al., 2006). While resource investments have direct effects on innovation performance (Sirmon & Hitt, 2009), company's capability is likely to mediate the resource investment and performance relationship. The organizational capability is to utilize a company's resources and direct efforts toward achieving business objectives (Saraf et al., 2007). Successful innovation emerges from unique combinations of resources (Grant, 1996). Different strategies in deploying these resources are likely to have a direct effect on the process of product development (Aral & Weill, 2007; Kleinschmidt et al., 2007). Hence, the main purpose of this study is to explore the positive effect of company's resource on innovation in the Taiwanese manufacturing industry via the mediator: capability.

In the framework of this study, capability is the mediator between resource and performance. Absorptive capacity is the ability to enable companies to effectively acquire and utilize external knowledge as well as internal one which positively affects innovations (Chen et al., 2009; Daghfous, 2004; Jiménez-Barrionuevon et al., 2011). However, research which deals with the antecedent of organization's absorptive capacity is scant in professional literature. This study examines resources as an antecedent of absorptive capacity, thereby providing insight into absorptive capacity which plays a mediating role between resources and innovation in Taiwanese manufacturing industry. Companies can not only rely solely on

commitments of resource, but have to enhance resource flexibility to develop successful innovations (Henard & Szymanski, 2001). However, resource commitment and flexibility lie on opposite sides of a company's investment spectrum. When companies have to manage uncertain and develop innovations, both resource commitment and resource flexibility are required (Olausson & Berggren, 2010).

A company can build a competitive position through strong resource commitment leads to superior performance (Isobe et al., 2000). Resource commitment is sticky. Companies are to some degree stuck with what they have (Teece et al., 1997). On the other hand, flexible resources may give the company a better chance of responding to a larger range of future changes. Resource flexibility is a critically important property which helps companies to adjust their resources and organizational structure to face uncertainty (Fredericks, 2005).

There was no prior study exploring the influences of the resource commitment and resource flexibility upon innovation performance. This research selects the two antecedents are resource commitment and resource flexibility, and the consequent is innovation performance, while the mediator is absorptive capacity. The structure of this study is as follows. A literature review is discussed in section 2, and five hypotheses are also proposed in this section. In section 3, this study describes the methodology, the sample and data collection, and the measurements of the constructs. In section 4, the descriptive statistics, reliability of the measurement, factor analysis, correlation coefficients between constructs, and the results

of measurement and structural model are shown. In section 5, this study mentions the discussions about the findings and implications, and possible directions for future studies.

## **LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT**

### **The Positive Effect of Resource Commitment on Absorptive Capacity**

Companies can achieve their competitive advantage through resources and capabilities investments (Barney, 1991; Teece et al., 1997). To obtain competitive advantage, companies can combine the different types of resources and generate new applications (Barney, 1991; Teece et al., 1997). Resources are crucial to the company's future development. Resources can be divided into two types: property-based and knowledge-based resources (Chen & Li, 2008). Property-based resources are financial resources and physical assets. Such resources are specific and well-defined assets. Knowledge-based resources are intangible resources, such as managerial systems, organizational culture, which are not easily imitable and transferable because of their tacit. According to the two different types of resources, this study asserts that resource commitment can be defined as financial investment, research and development (R&D) expenditure and managerial resource investment (Luo, 2004; Richey et al., 2005; Neelankavila & Alaganarb, 2003). Resource commitment can be developed over time and incubate the company's absorptive capacity (Vega-Jurado et al., 2008; Chen, 2004).

Absorptive capacity is defined as a set of organizational capability which companies can

acquire, assimilate, transform, and exploit knowledge to produce the organizational capacity (Zahra & George, 2002). Acquisition of knowledge is the ability to recognize and acquire external knowledge that is critical to a company's operations (Lane & Lubatkin, 1998). Assimilation of knowledge means a company's routines that allow it to understand, analyze, and interpret knowledge from outside sources. Transformation of knowledge means the company's ability to develop routines that facilitate combining existing knowledge with newly acquired and assimilated knowledge (Zahra & George, 2002). Exploitation of knowledge is a company's ability to apply new external knowledge commercially to achieve organizational objectives (Lane & Lubatkin, 1998). Companies develop their absorptive capabilities to obtain knowledge actively (Matthyssens et al., 2005) and transfer knowledge to build leadership in their own area (Isobe et al., 2000). Absorptive capacity can value knowledge through past experience and investment (Cohen & Levinthal, 1990).

Sufficient resources commitment such as financial investment, R&D expenditure and managerial resource investment can facilitate a company's capability. Companies build up their capabilities through the establishment and development of property-based and knowledge-based resources. Previous studies asserted that when the companies invest in physical resources and R&D activities, the capability of exploiting knowledge can be improved (Bharadwaj, 2000; Brynjolfsson & Hitt, 1996; Spithoven et al., 2011). Absorptive capacity embedded in a company's routines (Zahra & George, 2002) which can value

knowledge through past experience and investment. Moreover, the prior investment in managerial resource can determine the quality of the company's capability to integrate, build and reconfigure the company's internal and external resources (Kleinschmidt et al., 2007).

While the company investment in managerial process and routines, it will help to integrate the information from diverse resources and facilitate the efficiency in company's operation (Saraf et al., 2007). Companies can control the resources which they invest in pervious time, the resources will influence the capability that lead the company's future development.

Accordingly, this study implies the following hypothesis:

*Hypothesis 1: Resource commitment is positively associated with absorptive capacity.*

### **The Positive Effect of Resource Flexibility on Absorptive Capacity**

In rapidly changing environment, a company devotes to developing the ability to sense the need to reconfigure the company's resource structure. (Amit & Schoemaker, 1993). Resource flexibility enables a company to resist fluctuations in its market, changes in products or manufacturing processes (Saraf et al., 2007). Flexibility can be defined as the ease with the company's structure and process can be changed (Huber & McDaniel, 1986). The flexible resources have more than one use and can be switched from one use to another quickly and inexpensively (Sanchez & Heene, 1997). Flexible resources can be applied to alternative uses

may give the company a better chance of responding to a larger range of future changes.

Resource flexibility is a critically important property which helps companies to adjust their resources and organizational structure to face uncertainty (Fredericks, 2005).

Companies gain competitive advantage not only by deploying key resource but also by utilizing capabilities (Kleinschmidt et al., 2007). Previous studies have largely emphasized the value of resource flexibility (Evans, 1991; Sanchez & Heene, 1997; Saraf et al., 2007). The ideally flexible infrastructure of a company is designed support the business processes (Saraf et al., 2007). As the environment shifts, resource advantages can become disadvantages if there is no attempt to refresh the resource stock. Hence, companies reconfigure their resources and modify their current capabilities which can acquire and utilize external knowledge. To improve a company's absorptive capacity, companies are motivated to engage in using shorter time or spending lower cost to switching their resources. Resources and equipments of a company can be extended for new use (Ambrosini et al., 2009). Flexible organizational structure facilitates the company to acquire, assimilate, transform, and exploit knowledge. Companies should display a clear understanding of its status, and do some reaction to customers' shifting needs. Through coordination, integration, exploitation of a company's resources, companies can enhance absorptive capacity to generate new applications and meet changing market demands. Thus, this study implies the following hypothesis:



*Hypothesis 2: Resource flexibility is positively associated with absorptive capacity.*

### **The Positive Effect of Absorptive Capacity on Innovation Performance**

Knowledge acquisition does not ensure successful knowledge application. Hence, many companies have to establish mechanisms to recognize external knowledge sources (Cohen & Levinthal, 1990). If the environment is rapidly changing, companies need to utilize external knowledge through the sequential processes to acquire, assimilate, transform, and exploit knowledge. Absorptive capacity is the ability to enable companies to acquire and apply external knowledge as well as internal one which have a positive effect on innovations (Daghfous, 2004; Fichman, 2004). Companies need to have approaches and mechanisms to learn and to exploit knowledge which can lead to innovations (Daghfous, 2004; Fichman, 2004).

Companies require the ability to produce creative and innovative ideas (Chen & Huang, 2009). Absorptive capacity of a company is critical to its innovative capabilities (Cohen & Levinthal, 1990). Companies commercialize internal and external knowledge using outside and inside pathways to develop innovations (Kleinschmidt et al., 2007; Schiele, 2010). An organization's absorptive capacity involves change in investment of R&D resources, interaction mechanisms and managerial process (García-Morales et al., 2007). Obtaining companies sustainable development needs the integration of external knowledge and

technologies with internal capabilities (Grant, 1996). Successful innovation requires knowledge input from a variety of internal and external sources to determine how to be designed into the new products (Calantone et al., 2004; Chiesa, 1996). Moreover, the well-integrated knowledge combine with external information and internal capability which provide important clues about successful innovation (Knight & Cavusgil, 2004). Therefore, this study proposes the following hypothesis:

*Hypothesis 3: Absorptive capacity is positively associated with innovation performance.*

### **The Positive Effect of Resource Commitment on Innovation Performance**

Previous studies assert that a company can build a competitive position through strong resource commitment leads to superior performance (Isobe et al., 2000). Innovation can create “isolation mechanisms” which protect profit margins and allow benefits to be gained for companies (Lavie, 2006). Successful innovation can make external imitation more difficult and allow companies to sustain their advantages better (García-Morales et al., 2007). From a long-term point of view, the investment of financial investment, R&D expenditure and well-defined managerial processes are positively associated with a company’s innovation performance (Stewart, 1994).

This study focuses on innovation performance. Successful innovation not only need the

process capabilities, but also need the effective deployment of key organizational resources (Kleinschmidt et al., 2007). Specific related resources and commitment have also been noted to play a significant role in innovation (Henard & Szymanski, 2001). Low investment relative to competitors can lead to negative outcomes. Older facilities often limit the development of the companies' products. The involvement of financial investment can improve productivity which results in better innovation performance. Therefore, there is a dominant factor associated with innovation performance is the commitment of sufficient resources. Based on the statements above, this study implies the following hypotheses:

*Hypothesis 4: Resource commitment is positively associated with innovation performance.*

### **The Positive Effect of Resource Flexibility on Innovation Performance**

From the contingency theory view, fit or not is the central concern (Sirmon & Hitt, 2009). To utilize resource effectively, managers have to make decisions regarding how to best deploy the investments under the different conditions (Helfat & Peteraf, 2003). Thus, while resource investments play an essential role in innovation, the fit of resource deployment decision is also important. Resource flexibility helps companies to adapt both incremental and revolutionary changes in the organization with minimal effort and cost. Companies with flexible resources means that their organizations' structures and processes can be changed

easier (Saraf et al., 2007). The organizational structure must provide enough flexibility to accommodate these changes. Companies can switch and combine resources in new ways. The renewing resources would be the introduction of new product lines, or the extension into a innovative application (Ambrosini et al., 2009). With the increase of resource flexibility, existing resources can be used more easily for new purposes and help companies to quickly commercialize the new product. Moreover, renewed resources lead to innovations. Through the flexible resources, companies can develop new types of products. Therefore, this study proposes the following hypothesis:

*Hypothesis 5: Resource flexibility is positively associated with innovation performance.*

This study summarizes the literature of resource and capability into a new managerial framework. This study seeks to improve understanding of the relationship between resource, capability and performance. The main purpose of this study is to explore the positive effect of resource commitment and resource flexibility on innovation performance in the Taiwanese manufacturing industry via the mediator: absorptive capacity. This study also wants to explore whether absorptive capacity plays a mediation role between resource commitment, resource flexibility and innovation performance. This study shows the research framework in Figure 1.

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## **METHODOLOGY AND MEASUREMENT**

### **Data Collection and the Sample**

The unit of analysis in this study is the business level and focused on the manufacturing industry in Taiwan. In addition, the sample is randomly selected from the “2009 Business Directory of Taiwan.” Respondents are top managers, CEOs, managers of manufacturing, R&D, purchasing, marketing, human resource management, or finance departments. To increase the survey response rate, each company is called and confirmed the names and job titles of the respondents. Then, explained the objectives of this study prior to mailing of the questionnaire. The respondents are asked to return the completed questionnaires within two weeks after mailing.

Moreover, to avoid common method variance (CMV), different respondents answer the different constructs in the questionnaire. The respondents of “resource commitment” are CEOs, managers of finance or R&D departments; those of “resource flexibility” are CEOs, managers of manufacturing, purchasing, or human resources management departments; those

of “absorptive capacity” are CEOs, managers of R&D or human resources departments; those of “innovation performance” are CEOs, managers of marketing or R&D departments in Taiwanese manufacturing companies. This study sent 1000 questionnaires to the respondents. There are 311 valid questionnaires, and the effective response rate is 31.1%.

### **Measurements of Variables**

The measurement of the questionnaire items in this study is by use of “five-point Likert scale from 1 to 5” rating from strongly disagreement to strongly agreement. The measurements of the constructs in this study as follow:

***Resource commitment.*** The three measurements are the major portion of a company’s resource commitment, such as financial investment, R&D expenditure and managerial resource investment. The measurement of resource commitment includes three items: (1) whether the financial investment in the company is more than those of its major competitors; (2) whether the R&D expenditure in the company is more than those of its major competitors; (3) whether the managerial resource investment is more than those of its major competitors (Luo, 2004; Richey et al., 2005; Neelankavila & Alaganarb, 2003).

***Resource flexibility.*** Resource flexibility means the resources enable an organization to withstand uncertain environment. The measurement of resource flexibility includes four items: (1) whether the company can switch the resources from one use to another in a changing

environment; (2) whether the company can adjust the manufacturing facilities in a changing environment; (3) whether the company can adjust the organizational structure in a changing environment; (4) whether the time of switching resources from one use to another is shorter than those of its major competitors (Sanchez & Heene, 1997; Saraf et al., 2007).

***Absorptive capacity.*** Absorptive capacity is what enables the companies to effectively acquire and utilize external as well as internal knowledge which affects the company's ability to innovate and to adopt to its changing environment (Daghfous, 2004). This study defines absorptive capacity as the ability to acquire, to assimilate, to transform, and to exploit knowledge (Daghfous, 2004; Cohen & Levinthal, 1990). The measurement of absorptive capacity includes five items: (1) whether the organizational structure of the company has the ability to understand, analyze and interpret information from external knowledge; (2) whether the company can communicate technological knowledge across the units of the firm; (3) whether the company has the ability to combine existing knowledge with the newly acquired and assimilated knowledge; (4) whether the corporation has the ability to recognize, value, and acquire external knowledge that is critical to a company's operation; (5) whether the company has the ability to apply new external knowledge commercially and invent new product (Daghfous, 2004; Cohen & Levinthal, 1990; Lichtenthaler, 2009; Jiménez-Barrionuevon et al., 2011).

***Innovation performance.*** This study referred to pervious empirical studies about the

measurements of innovation performance and developed the following five items: (1) whether the company can develop new technology to improve products; (2) whether the company purchase new instrument or equipment to accelerate productivity; (3) whether the company can address method to modify the manufacturing process or working procedure; (4) whether the process design speed of the company is faster than those of the major competitors; (5) whether the company can enhance profitability by innovation (Utterback, 1975;Cordero, 1990).

## **EMPIRICAL RESULTS**

This study utilized Structural Equation Modeling (SEM) to verify the research framework and hypotheses, and applied Amos 17.0 to obtain the empirical results. SEM is a statistical technique for testing and estimating causal relationships in a more powerful way which takes into account the modeling of interactions, nonlinearities, correlated independents, measurement error, correlated error terms, multiple latent independents each measured by multiple indicators, and one or more latent dependents also each with multiple indicators. The antecedents of the research framework are resource commitment and resource flexibility, and the consequent is innovation performance, while absorptive capacity is the mediator. SEM of this study included two levels of analysis - the measurement model and the structural model.



## **Results of the Measurement Model**

This study demonstrates the means and standard deviations of the constructs and the correlations among them in Table 1. There are positive correlations among the four constructs: resource commitment, resource flexibility, absorptive capacity, and innovation performance. This study shows the result of factor analysis in Table 2. Every construct in this study can be classified into only one factor. This study applies confirmatory factor analysis (CFA) to verify the validity and reliability in the measurement model. The results of the CFA indicate that the measurement model exhibits the acceptable levels of the model fit (GFI=0.939, CFI=0.979, AGFI=0.909, RMSEA=0.048).

There are several measures to confirm the reliability and validity of the measurement. One measure of reliability is to examine the loadings of each of the constructs' individual items. With respect to the quality of the measurement model, the loadings ( $\lambda$ ) of items of the constructs listed in Table 3 are all significant. Table 3 lists the Cronbach's  $\alpha$  coefficients for the measure of reliability. In general, the minimum requirement of the Cronbach's  $\alpha$  coefficient is 0.7 (Hair et al., 1998). Because the Cronbach's  $\alpha$  coefficients of the four constructs are more than 0.7, the measurement of this study is acceptable in reliability. In addition, it is also important to verify whether the validity of the measurement is acceptable. There are three ways to verify the validity of the measurement. First, the study refers to previous studies to design questionnaire items. Prior to mailing to the respondents, seven

experts and scholars modified the questionnaire in the first pretest. Subsequently, the authors distributed the questionnaires to twelve CEOs or the managers of manufacturing, marketing, human resource, purchasing, finance, or R&D departments in different Taiwanese manufacturing companies. They fill in the questionnaires and to identify ambiguities in terms, meanings, and issues in the second pretest. The questionnaire of this study has high level of content validity. Second, this study applies Fornell and Larcker's measure of average variance extracted (AVE) to assess the discriminative validity of the measurement (Fornell & Larcker, 1981). The AVE measures the amount of variance captured by a construct through its items relative to the amount of variance due to the measurement error. To satisfy the requirement of the discriminative validity, the square root of a construct's AVE must be greater than the correlations between the construct and other constructs in the model. For example, the square roots of the AVEs for the two constructs, resource commitment and resource flexibility, are 0.810 and 0.744 in Table 3 which are more than the correlation, 0.580, between them in Table 1. This demonstrates there is adequate discriminative validity between resource commitment and resource flexibility. The square roots of all constructs' AVEs in Table 3 of this study are all more than the correlations among all constructs in Table 1. Therefore, the discriminative validity of the measurement in this study is acceptable. Third, the AVEs of the four constructs are more than 0.5 in Table 3. It means that the convergent validity of the four constructs is acceptable. In sum, there are adequate reliability and validity in the measurement of this study

according to the above analysis.

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Insert Table 1 about here

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Insert Table 2 about here

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Insert Table 3 about here

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**The Results of the Structural Model**

This study verifies the empirical results of the hypotheses in this section. The results of the structural model are presented in Table 4 and Figure 2. The measures of overall fit indicate the fit of the structural model is acceptable (GFI= 0.939, CFI=0.979, AGFI=0.952, RMSEA=0.048). Adding or deleting any paths in this research framework would not significantly improve the fit. The residuals of the covariance are also small and centered near 0. All of the five paths are in Table 4. The results of the full model are shown in Figure 2.

According to in Table 4 and Figure 2, the results indicate broad support for most of the hypothesized effects in the research model except H5. Therefore, this study verifies that absorptive capacity is a mediator in this model. This study finds out absorptive capacity mediates the positive relationship between resource commitment and innovation.

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Insert Figure 2 about here

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Insert Table 4 about here

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### **Difference Analysis of Resource Commitment and Resource Flexibility among Different Groups**

Subsequently, the study applied the t test to analyze whether there are differences between resource commitment and resource flexibility in manufacturing companies in Taiwan.

According to the ‘standards for identifying small and medium-sized enterprises’ stipulated by Ministry of Economic Affairs of Taiwan, this study defined a medium and small enterprise (SME) as that where the number of regular employees of a company does not exceed 200

persons. Large enterprise was defined as the number of regular employees exceeds 200 persons. The total number of samples in the study was 311 samples, including 193 SMEs and 118 large enterprises. This study compares resource commitment and resource flexibility of Taiwan's large enterprises with those of Taiwan's small and medium enterprises (SMEs). Table 5 shows that resource commitment and resource flexibility in Taiwan's SMEs was significantly less than those of large enterprises in Taiwan. It is imperative for SMEs in Taiwan to develop their resource commitment and resource flexibility to strengthen their absorptive capacity and innovation performance.

According to the survey of Council of Labor Affairs Executive Yuan in Taiwan, the average established years of companies is 13 years. As shown in Table 6, this study classifies the manufacturing companies in Taiwan into two groups which are "more established companies" and "younger companies" according to the established years. This study defines a company as an established company when its established year is more than the mean value 13 years. Table 6 shows that resource flexibility in established companies is significantly more than those of younger companies in Taiwan. However, there is no difference between established companies and younger companies in resource commitment in Taiwanese manufacturing industry. It is imperative for younger companies in Taiwan to develop their resource flexibility to strengthen their absorptive capacity to raise innovation performance.

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Insert Table 5 about here  
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Insert Table 6 about here  
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## **CONCLUSION AND IMPLICATIONS**

This study utilizes structural equation modeling (SEM) to explore the positive effect of resource commitment and resource flexibility on innovation in the Taiwanese manufacturing industry via the mediator: absorptive capacity. The findings in this study highlight the importance of the company's resources as determinants of its capability to achieve superior innovation performance. Although many previous studies explored the issues of absorptive capacity and innovation, few researches explored the antecedents of absorptive capacity. Moreover, this study also verifies the relationship between resource commitment, resource flexibility and innovation performance and discussed the mediation role of absorptive capacity.

This study examines relationships among the four constructs that have often been asserted, but seldom tested, across a large sample of companies. The detailed analysis not only clarifies the potential contribution of resources and capabilities to performance outcomes, but also allows tracing a clearer trail of logic from the resources and capabilities deployed to innovation outcomes.

Most of the hypotheses are supported in this study except H5. This study suggests that companies should focus on resource commitment and resource flexibility which can enhance absorptive capacity because it is positively associated with innovation performance. If companies want to develop their absorptive capacity and innovation, they should raise their resource commitment and resource flexibility. However, research which deals with the antecedent of organization's absorptive capacity is scant in professional literature. Previous research focused on either resource commitment or resource flexibility on absorptive capacity or innovation performance, but there was no research taking into the effects of both. Companies can not only rely on resource commitment, but also pay attention to resource flexibility to develop capabilities to actively absorb relevant knowledge. This study summarized the literature on the resource commitment and resource flexibility into a new managerial framework. The results show both of the two antecedents of absorptive capacity fit the model exactly from the result of SEM.

This study also found that resource flexibility in established companies is significantly

higher than those of younger companies in Taiwan. The established companies already learned how to adapt changes minimal effort and cost. They can sense the need to reconfigure the company's resource structure. To utilize resource more effectively, the established companies have to make decisions regarding how to best deploy the resources under the different conditions. It is imperative for the younger Taiwanese manufacturing companies to provide enough flexibility to accommodate these changes to strengthen their absorptive capacity and innovation performance. Therefore, this result can contribute to Taiwanese manufacturing companies as reference.

Abundant research opportunities exist in the framework of resource- capability and performance. The research object of this study is the manufacturing industry of Taiwan, so the future studies can focus on other industries or areas and compare with this study. This study is conducted in the Taiwanese context. It is an interesting issue to test whether the hypotheses are supported in other countries. In order to verify whether the hypotheses can be generalized to the rest of the world, future studies can select other countries as the research object and compare with this study. This study verifies hypotheses by use of questionnaire survey, only providing cross-sectional data, so that this study can not observe the dynamic changes of resource commitment and resource flexibility in the different stages of the development of the Taiwanese industry through longitudinal data. Therefore, future studies can set forth toward the longitudinal study to find out the different stages of the development in the manufacturing



industry of Taiwan. Finally, this study hopes the research results are beneficial to managers, researchers, or policy makers in the manufacturing industry of Taiwan, and contribute to relevant studies and future researches as reference.

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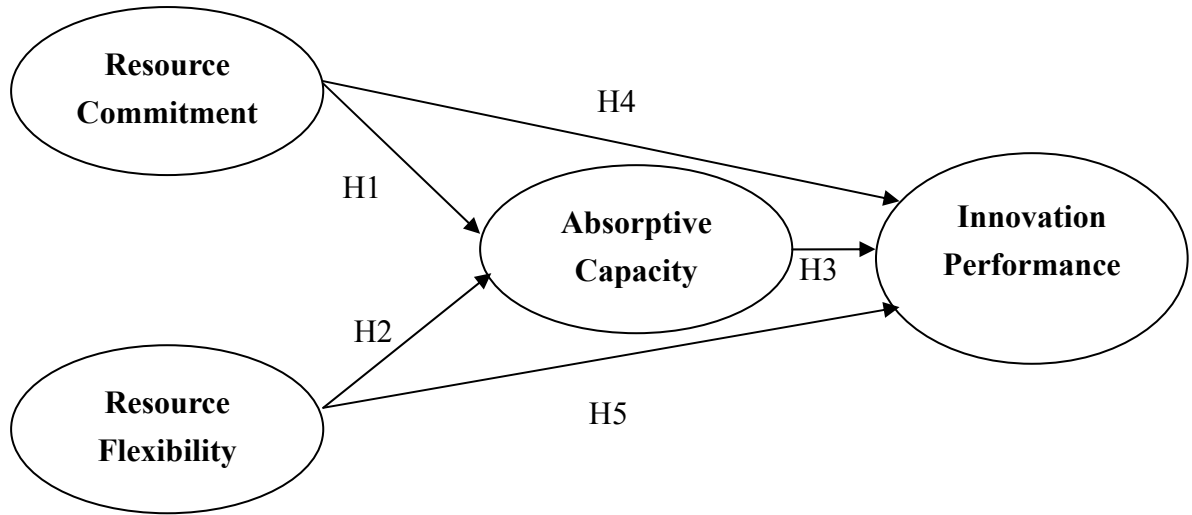
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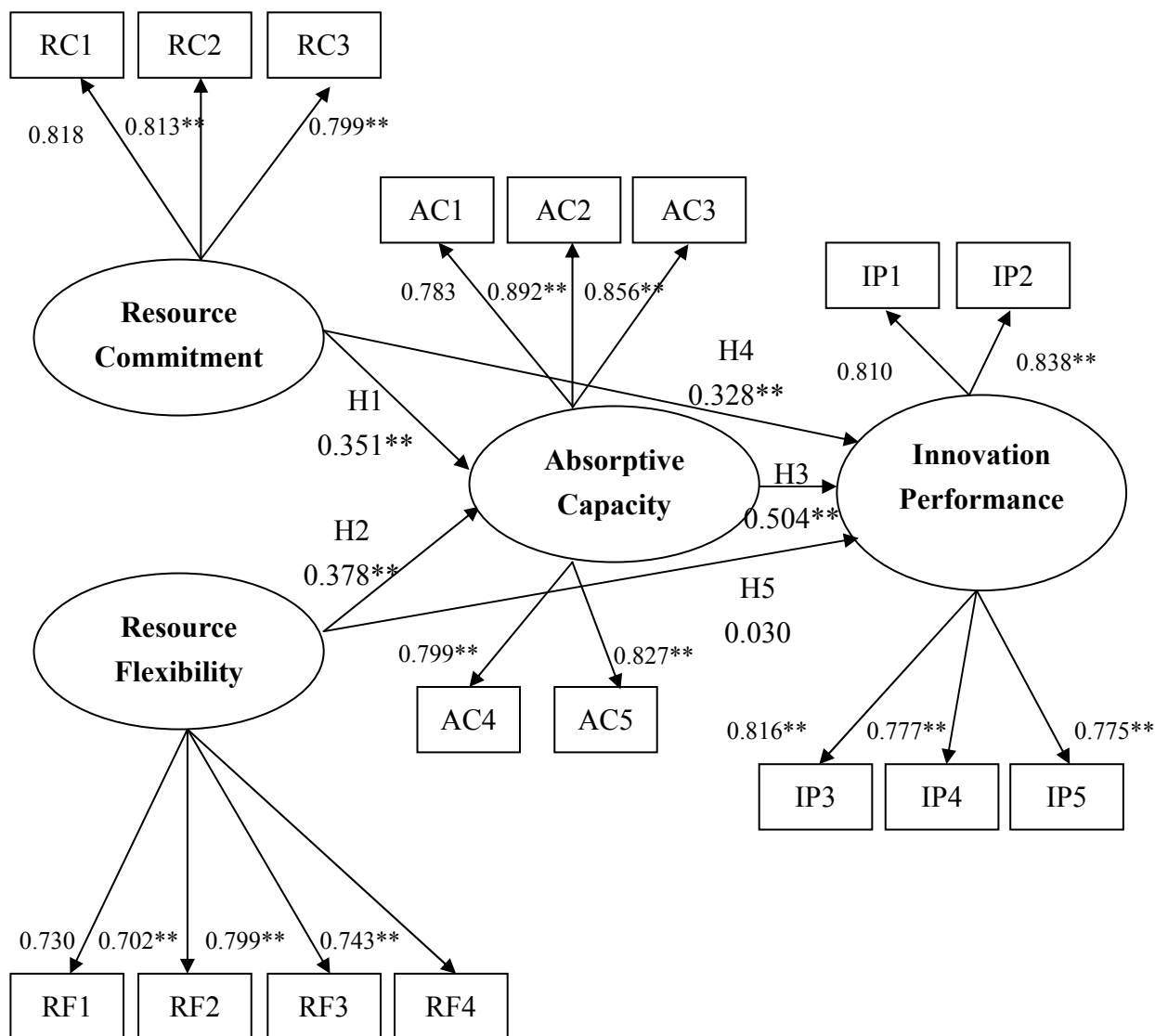
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**Figure 1**  
**Research Framework**



**Figure 2**  
**Path Coefficients**



Note: † p<0.1, \* p<0.05, \*\* p<0.01.

**Table 1**  
**Means, Standard Deviations and Correlations of the Constructs**

Constructs	Mean	Standard deviation	A	B	C
A. Resource Commitment	3.414	0.735			
B. Resource Flexibility	3.617	0.668	0.580(**)		
C. Absorptive Capacity	3.668	0.690	0.542(**)	0.545(**)	
D. Innovation Performance	3.491	0.764	0.562(**)	0.456(**)	0.664(**)

Note: † p<0.1, \* p<0.05, \*\* p<0.01.

**Table 2**  
**Factor Analysis of This Study**

Constructs	Number of items	Number of factors	Accumulation percentage of explained variance
A. Resource Commitment	3	1	77.013%
B. Resource Flexibility	4	1	66.748%
C. Absorptive Capacity	5	1	76.074%
D. Innovation Performance	5	1	71.553%

**Table 3**  
**The Items' Loadings ( $\lambda$ ) and the Constructs' Cronbach's  $\alpha$  Coefficients and AVEs**

Constructs	Items	$\lambda$	Cronbach's $\alpha$	AVE	The square root of AVE
A. Resource Commitment	RC1	0.818	0.851	0.656	0.810
	RC2	0.813**			
	RC3	0.799**			
B. Resource Flexibility	RF1	0.730	0.834	0.554	0.744
	RF2	0.702**			
	RF3	0.799**			
	RF4	0.743**			
C. Absorptive Capacity	AC1	0.783	0.920	0.692	0.832
	AC2	0.892**			
	AC3	0.856**			
	AC4	0.799**			
	AC5	0.827**			
D. Innovation Performance	IP1	0.810	0.900	0.646	0.804
	IP2	0.838**			
	IP3	0.816**			
	IP4	0.777**			
	IP5	0.775**			

Note: † p<0.1, \* p<0.05, \*\* p<0.01.

**Table 4**  
**The Results of the Structural Model**

Hypothesis	Proposed effect	Path coefficient	Results
H1	+	0.351*	H1 is supported
H2	+	0.378**	H2 is supported
H3	+	0.504**	H3 is supported
H4	+	0.328**	H4 is supported
H5	+	0.030	H5 is not supported

Note: † p<0.1, \* p<0.05, \*\* p<0.01.

**Table 5**  
**Difference Analysis between Large Enterprises and SMEs**

Construct	Mean of large enterprises(A)	Mean of SMEs(B)	A-B	Results
Resource commitment	3.602	3.300	0.303** (3.592)	A>B
Resource flexibility	3.708	3.561	0.147 † (1.887)	A>B

Note: † p<0.1, \* p<0.05, \*\* p<0.01. The number in the bracket is the t value.

**Table 6**  
**Difference Analysis between More Established and Younger Companies**

Construct	Mean of more established companies (C)	Mean of younger companies (D)	C-D	Results
Resource commitment	3.425	3.396	0.029 (0.338)	No significant difference
Resource flexibility	3.675	3.527	0.148† (1.915)	C>D

Note: † p<0.1, \* p<0.05, \*\* p<0.01. The number in the bracket is the t value.