

# Imitation, Absorptive Capacity and Innovation Capability

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## Session 2B

### Abstract

Previous literature on the relationship between imitation and innovation mainly focuses on the innovators who can capture the Schumpeterian rent by employing isolation mechanisms, such as patent and copyright protection. This paper focuses on imitators. However, it is still unclear whether imitation could enhance the innovation capability of the imitators. By establishing a framework, the paper attempts to investigate the influence of imitation on both absorptive capacity and innovation capability of imitators. Using datasets collected from 115 firms in mainland China, the empirical results show that imitation has a significant positive impact on absorptive capacity, while it has a significant negative impact on innovation capability. Absorptive capacity has a significant impact on innovation capability. Managerial implications are inferred from the results.

**Keywords:** imitation, innovation capability, absorptive capacity

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## Abstract

Previous literature on the relationship between imitation and innovation mainly focuses on the innovators who can capture the Schumpeterian rent by employing isolation mechanisms, such as patent and copyright protection. This paper focuses on imitators. However, it is still unclear whether imitation could enhance the innovation capability of the imitators. By establishing a framework, the paper attempts to investigate the influence of imitation on both absorptive capacity and innovation capability of imitators. Using datasets collected from 115 firms in mainland China, the empirical results show that imitation has a significant positive impact on absorptive capacity, while it has a significant negative impact on innovation capability. Absorptive capacity has a significant impact on innovation capability. Managerial implications are inferred from the results.

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## 1 Introduction

Innovative Firms can sustain their competitive advantage in the market. A firm that is first to introduce a new product theoretically realizes monopoly profits by being the only player in a particular niche of the marketplace (Lieberman and Montgomery, 1988; Porter, 1985). However, whether these first mover monopolistic advantages are temporary or more durable will be largely determined by the responses of rivals. By quickly imitating new product introductions, rivals can adversely affect the durability of the first mover advantages by sharing and/or reducing their potential profits (D'Aveni, 1994; Lieberman and Montgomery, 1988). Most Chinese firms are prone to imitate rather than innovate due to the high cost of R&D expenditure and longer product development cycles.

Previous studies on imitation and innovation mainly focus on two broad levels: the macro- and micro- level. On the macro-level, related literature examines issues such as whether more intense competition and imitation is good for innovation and growth (Aghion et al., 2001; Mondal & Gupta, 2006), how imitation activities affect the technology gap between developing and developed countries (Coe & Helpman, 1993; Currie et al., 1999; Tanaka, 2006). On the micro-level, interorganizational imitation of practices and structures plays a central role in several theories of organizational action.

Theories of organizational learning, for example, argue that organizations copy other organizations, letting others absorb the costs of experimentation or discovery (Dutton and Freedman 1985; Levitt and March 1988; Lant and Mezias 1990). Firms can also benefit from their imitative behavior by avoiding and reducing uncertainty (Cyert and March 1963; Thompson 1967). The imitation of past behavior can provide legitimation to a similar behavior (DiMaggio and Powell 1983), or past behavior can provide informational cues that narrow the range of uncertainty (Levitt and March 1988). Some researchers investigate issues such as imitation barriers (e.g. complex business strategy and causal ambiguity) on the sustainability of first-mover and early-mover advantages (Makadok, 1998; Rivkin, 2000; Strang and Still, 2006), uncertainty and imitation behaviors (Henisz and Delios, 2001), the balance of inertia, innovation and imitation in complex environments (Hodgson and Knudsen, 2006), inter-organizational imitation (Haunschild, 1993; Haunschild and Miner, 1997; Massa and Testa, 2004; Rhee, Kim and Han, 2006) .

A close examination of the literature finds two gaps that the current paper attempts to address: firstly, the area where the literature has been inadequate is the lack of empirical studies on the micro-level, especially where local firms in developing countries are concerned. In this paper, we attempt to examine the outcome-based imitation behaviors of Chinese firms and their effects on firms' innovation capabilities; secondly, a plethora of work has found evidence to support the notion that absorptive capacity plays an important role in the firms' ability to acquire knowledge and learn from various sources. This paper further examines the mediating role of absorptive capacity between imitation and innovation capability.

## **2 Variables and hypotheses**

### **2.1 Innovation capability**

Vorhies, Im&Morgan (2002) define the innovative capability of firms as a process in which firms obtain market knowledge and technical knowledge from both inside and outside of firms. Firms, then combine the knowledge to get creative ideas, finally produce valuable products by using the relevant resources. Penrose (1995:25) points out that "The services yielded by resources are a function of the way in which they are used--exactly the same resources when used for different purposes or in different ways and in combination with different types or amounts of other resources provides a different set of services." In essence, the process of innovation can be seen as the process of knowledge recombination. Firms often form alliances with customers, suppliers, complementors, and even competitors to jointly work on an innovation project or to exchange information and other resources in pursuit of innovation. In this paper, we will examine the role of imitation on innovation capabilities of firms.

### **2.2 Imitation**

Imitation occurs when one or more organizations' use a practice increases the likelihood of that practice being used by other organizations. Haunschild (1997) distinguishes three fundamental bases of imitation: frequency-based imitation, trait-based imitation, and outcome-based imitation. In the case of outcome-based imitation, organizations use the

outcomes that occur after other organizations use a practice or structure to determine whether they should adopt. Practices or structures that produced positive outcomes will be imitated. A similar concept in management with imitation is benchmarking. Camp (1989) defines it as “the search for industry best practices that will lead to superior performance.” Lucertini et al.(1995) propose that “[benchmarking is ] continuing search, measurement and comparison of products, processes, services, procedures, ways to operate, best practices that other companies have developed to obtain an output and global performance, with the aim of improving the company performance.” This paper will use benchmarking as a proxy for outcome-based imitation.

### 2.3 Absorptive capacity

Cohen&Levinthal (1990:128) argue that the ability to exploit external knowledge is a critical component of innovation capabilities. They argue that the ability to evaluate and utilize outside knowledge is largely a function of the level of prior related knowledge. Prior related knowledge confers an ability to recognize the value of new information, assimilate it, and apply it to commercial ends. These abilities collectively constitute what they call “absorptive capacity” of a firm.

Absorptive capacity consists of two important parts: prior knowledge and intensity of efforts. Firms’ absorptive capacity stems from the long process of internal investments and knowledge accumulation. Such process exhibits the path dependent characteristics. Therefore, firms’ prior knowledge serves as a platform for new knowledge accumulation in the future. Intensity of effort refers to the time and effort that have been spent by organizational members to enhance absorptive capacity. In all, the higher a firm’s absorptive capacity, the stronger ability the firm can deal with the external environment, i.e. the higher probability the firm can recombine existing knowledge to create new knowledge. Because imitators share a lot in common with their competitors, their knowledge bases are highly related. Therefore, we assume that outcome-based imitation contributes to the absorptive capacity of firms.

H1: Imitation has a positive impact on firms’ absorptive capacity

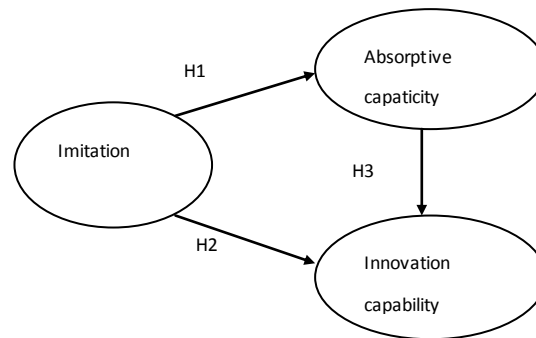
Although critics have often charged that firms are using external sources of innovation rather than investing in original research, empirical evidence suggests that external sources of information are more likely to be complements to rather than substitutes for in-house R&D (Schilling 2005).

Intensity of efforts relate to the inputs by organization members to utilize the knowledge. It is not enough to access the external knowledge without internalizing efforts. The higher the firms’ absorptive capacity is, the higher the probability of innovation will be for firms who can internalize and recombine the related knowledge. Therefore, we develop H2 and H3.

H2: Imitation has a positive impact on firms’ innovation capability.

H3: The absorptive capacity of firms has a positive impact on their innovation capability.

The above hypotheses can be illustrated with the Figure 1.



**Figure 1 Conceptual model**

## 3 Methodology

### 3.1 Data collection

This study used a two-stage questionnaire to collect data. In the first stage, a series of observed indicators corresponding to the latent variables in the hypotheses were designed. In developing items used to measure the indicators, we first searched for relevant empirical studies. Based on multiple-item designing principle, the paper made the best use of existing scales or added new items by exploring the definition of variables. In order to ensure the questionnaire is properly developed, we asked two professors and one Ph. D. student to revise the content, arrangement and wording of questions.

Before sending out final questionnaire, we conducted a pretest by randomly selecting 40 respondents to fill in the questionnaire and encouraging them to provide any questions for ambiguous wording. After that, we made some appropriate deletions and additions of the items. In the second stage, we sent out revised questionnaire and tested the reliability again by the collected samples.

The questionnaires were mainly sent out in the MBA or EMBA class, or by e-mail, with a covering letter introducing the study as well as the strict confidential commitment. The respondents are alumni of University of International Business and Economics. Almost all respondents are middle or top management staff who are quite familiar with their own firms and the related industry.

### 3.2 Measures

All the items in the study are measured by 5-point Likert scale. Respondents were asked to indicate their agreement to these statements on 5-point Likert-type scales with anchors ranging from “1=disagree strongly” to “5=strongly agree”.

#### 3.2.1 Imitation

The imitation questionnaire includes the following items: “Our company adopts the management tools or practices used by competitors”(Q1); “Our company pays great attention on the moves of competitors”(Q2); “Human resources from competitors are highly valued by our company”(Q3); “Our company is keen to acquire the information on products(services) of competitors”(Q4). The internal consistency reliability of this measure is 0.724.

### **3.2.2 Absorptive capacity**

Absorptive capacity measures the ability of a firm that can successfully exploit knowledge from both inside and outside. We used 4 items to measure this latent construct, such as “Our company actively seek the relevant information and knowledge from outside(Q5)”, “Our company encourage knowledge sharing among employees (Q6)”, “Our company spends a lot of time and effort to train employees in orde to acquire new knowledge (Q7)”, “Our company has accumulated ample knowledge and rich experience in industry (Q8)”, The internal consistency reliability of this measure is 0.766.

### **3.2.3 Innovative capability**

The study adopts a pair-wise comparison method to operationalize the latent construct of innovative capability. Based on the original definition of innovation by Schumpeter, we measured the construct by 5 items, such as “Our company can develop new products (services) more quickly than our competitors”, “Our company can exploit new markets more quickly than our competitors”, “Compared with competitors, our company can preempt the new markets”, “Compared with competitors, our company can control the new supply sources of raw materials or semi-finished products ”, “Compared with our competitors, our company pay more attention to research and development than our competitors”. The internal consistency reliability of this measure is 0.811.

## **4 Data analysis and results**

Linear structural equation modeling (LISREL) was used to explore the relationship between imitation, absorptive capacity and innovative capability. LISREL procedure provides a vigorous method for testing causal models, as it is capable of simultaneously evaluating both measurement and causal components of complex models. Standardized coefficients and t-values of the causal relationship between constructs were used to test the hypothesis stated in the above section.

### **4.1 Descriptive statistics**

A total of 123 respondents returned the questionnaire, resulting in an average response rate of 61.5%. Eight questionnaires were dropped because of missing data and problematic response patterns, yielding a final sample of 115. In the non-repeated 115 sample firms, 85.2% firms' headquarters are located in mainland China. Sample firms' headquarters which are located in USA, Europe, Japan and Korea are 7%, 4.3% and 3.5% respectively, of which less than 1% firms are exclusively controlled by foreigners. Most respondents were from the traditional manufacturing sector (40.7%), information technology, telecommunication, pharmacy, biological pharmacy (31.9%), finance and other intermediate services (17.4%).

It is worth noting that structural equation modeling technique requires every single variable to be normally distributed, and all the variables to be multi-variate normally distributed (Hou et al., 2004). Although all the 14 variables in this study skewed left or right to some extent, and all variables are flatykurtic distributions, many researchers (eg. Hu, Bentler&Kano 1992) suggested that maximum likelihood (ML) method can be used to estimate parameters because of its robustness. Therefore, we adopt ML method in

parameter estimation to deal with the non-normal distribution of data.

#### 4.2 Exploratory factor analysis

Table 1 summarizes the measurement performance of the variables. Reliability and unidimensionality were evaluated separately for each construct (Gerbing and Anderson 1988). Cronbach's alpha was used as a measure of reliability because it provides a lower bound to the reliability of a scale and is the most widely used measure. All scales had an alpha greater than 0.70, providing an adequate level of reliability for predictor tests and hypothesized measure of construct (Nunnally 1978).

Unidimensionality has been defined as the existence of one latent trait of construct underlying a set of measures. Gerbing&Anderson (1988) pointed out that two conditions may be satisfied when investigating the items' unidimensionality: (1) each items must be significantly related to the underlying construct, and (2) each item must be only related to one latent variable. Unidimensionality was constructed through Exploratory Factor Analysis (EFA). The larger the factor loadings, the stronger the evidence that the measured items represent the underlying constructs. The factor loadings are all over 0.5, which means all the items are well loaded upon their respective construct.

**Table 1 Exploratory factor analysis on imitation, absorptive capacity and innovative capability**

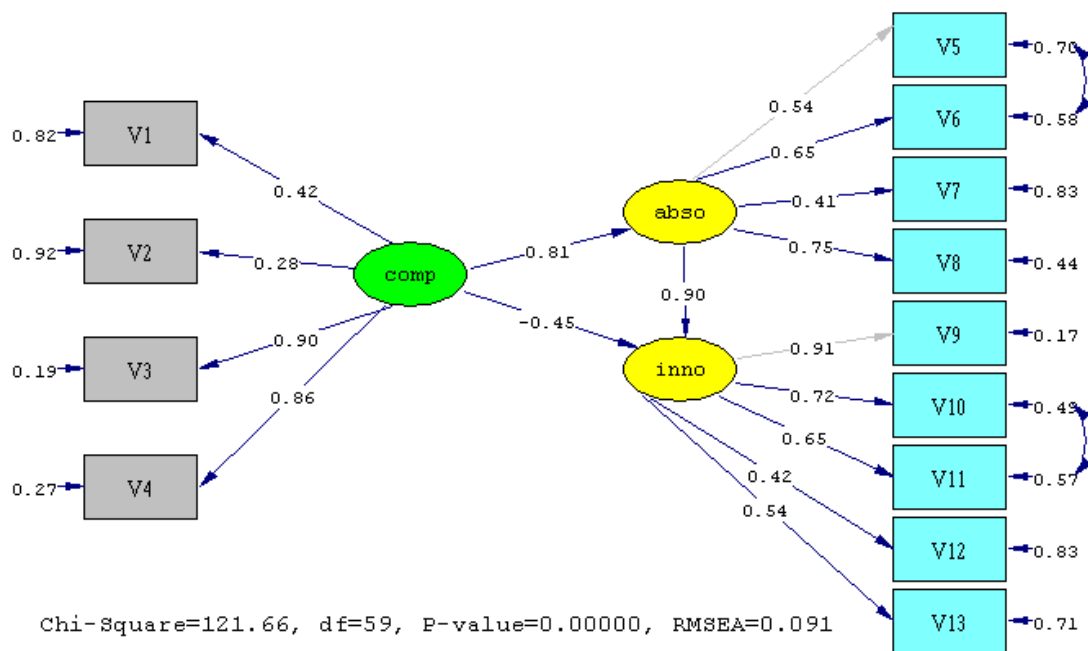
Items	Imitation (comp)	Absorptive capacity (Abso)	Innovative capability (Inno)	Variance explained	Cronbach's $\alpha$
Q4	.869			0.536	0.724
Q2	.860				
Q3	.588				
Q1	.552				
Q6		0.832		0.538	0.766
Q5		0.777			
Q8		0.765			
Q7		0.516			
Q10			0.863	0.577	0.811
Q9			0.826		
Q11			0.824		
Q13			0.654		
Q12			0.587		

#### 4.3 Structural equation model

Structural equation modeling (SEM) is particularly effective when testing models that: (1) are path analytic with mediating variables; and (2) contain latent constructs that are being measured with multiple indicators. As our conceptual model contains several latent variables, structural equation modeling was deemed appropriate (Bentler&Chou 1987). All estimates were generated through maximum likelihood technique. Based on the above analyses, we use LISREL8.70 procedure to estimate the coefficients of SEM, which involves 13 observed variables and 3 latent variables. The overall value  $\chi^2/df$  is less than 3, The root mean square error of approximation (RMSEA) is 0.091. The CFI,

NNFI, SRMR values are 0.90, 0.91 and 0.79 respectively. Given the medium size of the sample, we assessed multiple fit indices to check the overall model fit. All these indices together suggest that the data fit the hypothesized model reasonably. Figure 2 shows the structural path diagram with standardized coefficients.

Hypothesis 1 suggests that imitation has a positive impact on firms' absorptive capacity. Figure 2 confirms this relationship (path coefficient 0.81, t value 4.51,  $P < 0.01$ ). From Figure 2, we can see that absorptive capacity of firms has a positive effect on the innovation capability of firms (path coefficient 0.90, t value 2.25,  $P < 0.05$ ). Therefore, H3 is also supported. H2 is not supported in our model because the path coefficient of imitation and innovation capability is -0.45, with t value of 3.89 ( $P < 0.05$ ). It is interesting that imitation actually does harm to innovation capability of firms, which we will discuss about later.



**Figure 2 Path coefficients of imitation, absorptive capacity, and innovation capability**

## 5 Discussions

This study evaluates the innovation capability of firms by considering the role of imitation and absorptive capacity. The empirical results show that (1) absorptive capacity has a significantly positive influence on innovation capabilities, (2) imitation has a significantly positive influence on absorptive capacity, (3) imitation has a significantly negative influence on innovation capability.

A plethora of work has found evidence to support the notion that absorptive capacity plays an important role in the firm's ability to acquire knowledge and learn from various sources (Zahra and George, 2002). Such acquired knowledge, once integrated with previous internal knowledge of the firm, create new knowledge that may give rise to improvements and innovations (Massa & Testa, 2004). Our results confirm the relationship between absorptive capacity and innovation capability. Successful exploitation of knowledge from outside requires firms to absorb knowledge in the first place, which means it is better for firms to accumulate related knowledge by investing



in R&D activities.

The empirical results confirm that imitation has a significantly positive influence on absorptive capacity. In our study, we examine the outcome-based imitation, through which firms look outside the boundaries and perform the best practice of other firms, enabling the process of acquiring knowledge from outside.

As for the influence of imitation on innovation capability, we argue the imitation behavior of Chinese firms can only improve the production possibility frontier, which means the operation efficiency is improved (Porter, 1990). This may be illustrated by the practice of Chinese firms' technology development phase. The imitation strategy once led Chinese firms to make significant progress in early technology development phase, but it also traps the Chinese firms into a vicious cycle. Firms imitate, lag behind, imitate again, and lag behind again. According to Teece et al.(1997), learning to create new knowledge which allows the focal firm to reconfigure, reintegrate, and transform its resources into new competences and competitive advantages. Therefore, it is imperative for Chinese firms to enhance dynamic capabilities.

## 6. Limitations

Previous literature pays little attention on empirical research on the influence of imitation on both absorptive capacity and innovation capabilities. The study presented here is clearly exploratory. Future researchers may focus on (1) the influence of other modes of imitation (i.e. frequency-based and trait-based imitation); (2) panel data instead of cross-section data should be used when investigating the long-term relationship between imitation and innovation capability; (3) cross-culture comparison of the effect of imitation.

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