

The moderating role of environmental dynamism on the influence of innovation strategy and firm performance

Hsiang-Feng Ting, Hsien-Bin Wang, and Dja-Shin Wang

Abstract—Facing competitive business environment, organizations are required to develop innovation strategy in order to sustain competitive advantage. Innovation involves change and the high technology industry has been the most powerful tool for strengthening national competitiveness. Furthermore, business environments are very sensitive, which demand nimble changes in terms of innovation strategies. It is, thus, that in the high-tech industry the key of organization's success lies in good innovation strategies and high performance. There are many studies on strategy, environment and performance linkages. The impact of innovation strategies and environmental variables on firm performance in high-tech industries has been less attended. The purpose of this research is to understand the association between innovation strategy and firm performance. The environmental factor also discuss about as a moderate effect between innovation strategy and firm performance relationship. We will develop an empirical model that can be applied in other sectors to improve performance.

Index Terms—Business environment, innovation strategy, performance, high-tech industry.

I. INTRODUCTION

In strategic management and organizational theory, environment has long been considered one of the critical contingencies. Previous research has considered strategy can be under the control of managers. Prescott [1] pointed out the relationship between strategy and performance need considered environments as moderators of that relationship. The overall aim of this research is to develop a model explaining how business environments affect the development of a firm's innovation strategy, which, in turn, affects the performance of that firm in question. Despite the abundance of literature on strategy-performance at the general level, studies focusing specifically on the link between innovation strategy and performance in the context of the high technology industry are rare. Lin and Chen [2] resulted that innovation is unavoidable for firms that want to develop and maintain a competitive advantage and/or gain entry into new markets. A firm must set up and follow an innovation strategy that can encourage employees in their behavior. Here, we propose to examine the effects of innovation strategy on firm performance.

The relationship between innovation strategy and firm performance has been a subject of continuing debate in management field. Ward et al [3] and Bhaskaran [4] adopted the "manufacturing function" approach. In recent years, the

emphasis has moved to discussion of types and sources of the innovation strategy-performance relationship. Li and Atuagene-Gima [5] argued that empirical research on the performance implications of innovation has yielded varied results: some positive, some negative, and some have shown no relationship at all. Damanpour and Schneider [6] reported that association between innovation and firm performance depends on organizational characteristics and performance measurement. Zahra [7] and Prajogo [8] have also shown that external environment influences firms' innovation activities. Tan and Tan [9] pointed out "most previous studies have focused on one aspect of the environment, namely, uncertainty or rate of change. However, there are two other critical aspects of a firm's operating environment, namely complexity and munificence which have received relatively little attention". This study attempts to address this gap in past research by investigating: environmental dynamism as a moderator of the relationship between innovation strategy and firm performance.

II. LITERATURE REVIEW

Generally speaking, the environment is anything outside an organization that may affect an organization's activities. Duncan [10] defined environment from organizational decision making; he stated the relevant physical and social factors outside the boundary of an organization. There are two levels of business environment: internal and external. The internal business environment comprises organizational function areas such as marketing, human resources, finance and operation. All these components might be changeable. The external environment is normally divided into two categories. One is general environment and another is task environment. The task environment more directly interacts with the business operation and covers the forces relevant to an individual organization within an industry.

An organization's task environment is fundamental to management research from virtually all major perspectives. Boyd et al. [11] stated three important theories: population ecology theory, contingency theory and resource dependence theory. The population ecology theory contends that organizational growth and survival are determined by environmental factors. This theory focuses on the environment is a system of resources available and interconnected organizations. Contingency theory has shown that firms adopt various strategies appropriate different environmental conditions. No one strategy can be appropriate to all situations. Miller and Friesen [12] found an effective innovation strategy is dependent on specific environmental conditions. Dess and Beard [13] defined environmental dependence as the importance of a resource

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to the organization and the number of sources from which resources are available. It is only reasonable to project that environmental variables may play an important role in innovation strategy.

Organizational theory and strategic management have conceptualized environment as one of the key constructs for understanding performance. Lenz and Engledow [14] distinguished five approaches to modeling environments: the industry model, the cognitive model, the organizational field model, the population ecology and resource dependence model, and the era model. All of these approaches are based on assumptions concerning about environmental structure and described the causes and nature of environmental change, and how managers gain knowledge from their environments. Bourgeois [15] has developed three environmental perspectives. One perspective is a focus on the group external to the organization, including customers, suppliers, competitions and regulatory groups. The second perspective focuses on the attributes of external forces such as complexity, dynamism, and munificence. The third perspective consists of managerial perceptions concerning these environmental attributes such as dynamism, complexity, and hostility. Environmental dynamism indicates how frequently elements in the environment are changing. Dynamism can be considered as a concept similar to environmental turbulence or high velocity environment. Aldrich [16] stated that a high degree of turbulence in the environment will stimulate innovation by making an organization more aware of 'cues' to innovate.

Innovation has been conceptualized in many ways and studied within different disciplines. Most studies focus on a pair of types of innovation: administrative and technical, product and process, and radical and incremental. An important distinction is administrative and technical because this relates to a more general distinction between social structure and technology. From an organization's view, it adopts innovations in order to enhance its performance. Damanpour [17] pointed out that innovations cannot influence performance until they have been correctly used and explained innovation as part of the overall business strategy of an organization.

Innovation strategy is one of the major strategies by which an enterprise can sustain competitive advantage. Zahra and Das [18] summarized the four most commonly used typologies of innovation strategy. There are many different potential links between those innovation dimensions; the fit between the dimensions is important. Innovation strategy is fundamental to the success of innovation in manufacturing firms. Chen and Yuan [19] stated that innovation strategy is generally described as an organization's innovation posture with regard to its competitors in terms of its new product and process development plan. Morgan and Berthon [20] adopted explorative and exploitative innovation strategy in manufacturing firms and recorded the positive impact of innovation strategy on firm performance. A firm must understand what type of innovation strategy fits it best in order to improve its performance.

A. The Relationship Between Innovation Strategy And Firm Performance

Many scholars have employed different perspectives to explore innovation strategy. Boyd et al [21] has focused on a firm's innovation strategy as a way of achieving superior performance. The environment conditions affect a firm's innovation strategy and its performance. The association between certain innovation strategies and firm performance may be indirect. Thus, the environment is a moderator of the innovation strategy-firm performance link. The managers' choice of the types (product and process) and sources (internal and external) of innovation determine the level of investments. Clercq et al [22] claimed that innovation is an important correlate of a firm's financial performance and suggested that different types and sources of innovation are associated with performance. Firm investment in innovation is expected to have a positive effect on performance. According to Oke et al. [23], a high research and develop expenditure is associated with a higher firm performance. Leadership orientation also has a direct influence on financial performance. The following hypothesis for this study:

H1: There is a positive relationship between innovation strategy and firm performance.

B. The Moderating Effect of Environmental Dynamism

Allred and Swan [24] studies suggested that environment moderates innovation strategy-firm performance. They have acknowledged that external environmental factors can moderate market orientation's effect on firm performance. Freel [25] proposed that dynamism involves continuous change in technology, market demand and competitors and is an environmental condition underlying uncertainty and more risk. Another kind of environmental dynamism refers to the extent of unpredictable change in an organization's environment. Pioneering can lead to first-mover advantage and it is profitable in dynamic and growth environments. Product innovation is positively associated with performance in the dynamic growth environment. Priem et al. [26] found that environmental dynamism can moderate the strategic decision process and firm performance. Firms in environmental hostility reduce their innovation. Rasheed and Precott [27] also found that environmental dynamism moderating effect outsourcing and firm performance. So, the following hypothesis is formulated:

H2: Environmental dynamism moderates the relationship between innovation strategy and firm performance.

C. Research Model

In light of the aforementioned research background, the main aim of this research is to develop a model of environmental factor as a moderating role between the innovation strategy-performance links. From the critical review of the literature, this study proposes several research questions:

- 1) What are the key business environmental variables for managers in high technology industries?
- 2) What are the main appropriate innovation strategies to select in high technology industries?

- 3) How do the business environment variables affect selection of innovation strategies and how do these, in turn, affect business performance?

The research model also shows below:

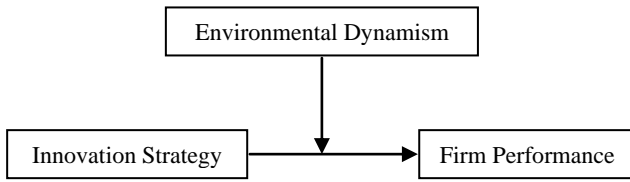


Fig. 1. Research model

III. RESEACH METHOD

The data used are from a survey of Taiwan manufactures which collected data on environment, innovation strategy, and performance. The context of this study is high technology industries in Hsinchu Science Park (HSP), one of the best developed high technology industry zones in Taiwan. The population was developed from industry lists compiled by the HSP office at the end of 2009 and consists of 426 firms. .

A. Data Collection and Construct Measurement.

The study identifies the sample that meets the following criteria: (a) the firm locates in Science Park; (b) the firm is stock exchange traded the firm stock; (c) the firm spends a minimum of 3% of sales on research and develops expenditure in fiscal 2010. The sample for this study was drawn from TWSE database.

We adopt Keat and Hill [28]; McArthur and Nystrom [29] to measure environmental variables. Environmental dynamism included measures of instability in growth rates over 9 (2002-2010) years. The value of shipments instability (VSI) refers to the value of shipments expressed as the standard deviation of the regression slope divided by the mean value for the period 2002-2010. The number of employee's instability (NEI) refers to the employees expressed as the standard deviation of the regression slope divided by the mean total employees for the period 2002-2010. Most research measured innovation strategy by using two indirect indicators: (research and develop) and patent data. Other direct indicators are innovation count and firm based survey. We measured the dimensions of innovation strategy using the firm over past three year's data. We use financial criteria to measure firm financial performance: return on investment (ROI) and return on assets (ROA). There are two control variables: firm size as measured by sales: Firm size has been found to be important in studies that involve innovation. Another is firm age. Firm size and age may be the antecedents of firm performance.

In order to understand of each construct, descriptive statistic analysis is utilized to describe the characteristic of each variable such as frequency analysis and mean scores. Another inferential statistics were the quantitative data analysis techniques used in this research. The statistical analysis of variance is used in assessing the relationship (correlation) between two variables. This method is

extremely helpful for uncovering the 'main effect' and 'interaction effects' of categorical independent variables on the interval dependent variable. A main effect is the direct outcome of an independent variable on a dependent variable. This statistical tool is used to assess the means of the groups formed by values of the independent variables, or combinations of values for multiple independent variables occurring by chance. It is important to show the significance in every test.

The future finding of this research is that environmental concerns appear to have a substantial impact on innovation strategy and performance. It will continue to carry out the primary research, including the analysis of the quantitative data obtained from the high technology companies which should be completed in the future.

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