

Manufacturing flexibility and business strategy: an empirical study of small and medium sized firms

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Abstract

This study investigates the practice of manufacturing flexibility in small and medium sized firms. Using the data collected from 87 firms from machinery and machine tool industries in Taiwan, we analyzed and prescribed the alignment of various manufacturing flexibility dimensions with business strategies. Several practical approaches to developing manufacturing flexibility in small and medium sized firms were discussed. In addition, statistical results indicate that the compatibility between business strategy and manufacturing flexibility is critical to business performance. The one-to-one relationship between business strategy and manufacturing flexibility is established to enable managers to set clear priorities in investing and developing necessary manufacturing flexibility. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

Unlike some of the industrialized countries in Asia (e.g., Japan and Korea), where major conglomerates account for the majority of economic activities, Taiwan has traditionally relied on its small and medium sized firms to compete in international markets since the 1970s. These firms are known for being flexible and quick to adapt to changes in the highly demanding international market. Over the last decade they have found themselves facing increasing technological innovation and more severe competition from nearby developing countries such as China and Malaysia. Constantly changing technology induces product and process innovation and shorter product life cycles, thus providing customers with more choices and manufacturers with more ways to compete. To deal with a more dynamic and competitive market, the literature has suggested the development of manufacturing flexibility as a new strategic imperative (Gerwin, 1993; Suarez et al., 1996). This study investigates the practice of developing manufacturing flexibility of small and medium sized firms in Taiwan.

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While there are many research issues pertaining to manufacturing flexibility, this paper specifically studies the incorporation of developing flexibility into business strategy planning as suggested by previous studies (Sethi and Sethi, 1990; Gerwin, 1993; Suarez et al., 1996; Gupta and Somers, 1996). The concept of manufacturing flexibility is regarded as “vague and difficult to improve yet critical to competitiveness” (Upton, 1995, p. 75). Upton (1995) studied 61 factories and found that 40% of flexibility improvement effort was regarded unsuccessful. One of the major factors contributing to such failure was the inability of managers to identify and agree on the kind of flexibility to develop. The choice of type of flexibility to develop can be difficult, considering that there are so many different dimensions of flexibility. If manufacturing managers do not carefully assess their strategic needs before embarking on a flexibility program, the result can be competitively destructive. As evidenced by many studies, flexibility cannot be bought by simply installing computer-integrated systems. It needs to be planned, managed and integrated with a firm’s strategy. Accordingly, the research questions that we intend to address are “Are different types of manufacturing flexibility important to firms in different business strategies?” If so, “How should managers develop and implement manufacturing flexibility based on their business strategies?” Our purpose is to prescribe the alignment of manufacturing flexibility with business strategy in order to enhance business performance. The research assumption is that more flexibility does not necessarily lead to better business performance.

This study hypothesizes that not all manufacturing flexibility types are useful in all manufacturing environment. In addition, we propose that matching the two, flexibility and business strategy, would improve business performance such as profit and sales growth. To our knowledge, while the issue of aligning of manufacturing flexibility with specific business strategy has been briefly discussed in theory, no empirical studies have thoroughly verified the impact of such compatibility on business performance. Therefore, this research investigates the current practice of developing manufacturing flexibility in alignment with business strategy and empirically verifies the positive impact of this matching on business performance. We first review the effect of manufacturing flexibility on business performance and the theoretical relationship between various flexibility dimensions and business strategies. Next, we discuss the research design including hypothesis and statistical methods. Finally, statistical results and discussions are presented.

2. Manufacturing flexibility, business strategies and business performance

2.1. Manufacturing flexibility and business performance

Upton (1994) defines manufacturing flexibility as the ability to respond to environmental changes with less time and cost. Other researchers suggest that flexibility is a multi-dimensional construct and could be measured in many different ways (Sethi and Sethi, 1990; Gerwin, 1993; De Toni and Tonchia, 1998). Several studies have classified flexibility into *internal* and *external* flexibility (Lynch and Cross, 1991; Upton, 1994). External flexibility is relative to the need of customer requirements and thus to a firm’s competitive advantage. It is also referred as “first order” flexibility (Suarez et al., 1996) or market based flexibility (Chen et al., 1992). Examples of external flexibility are new product, product mix, modifications, delivery, and volume flexibility. External flexibility is usually recognized and perceived better, since it directly affects a firm’s competitiveness. In contrast, internal flexibility is relative to the need for operations efficiency, and it is not directly related to market demand and environmental uncertainties. Examples of internal flexibility are machine, material handling and routing flexibility. Its impact on a firm’s market competitiveness is rather indirect and is usually not recognized by customers. For the purpose of this study we focused on the relationship between business strategy and external flexibility.

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