



On the relationship between business environment and competitive priorities: The role of performance frontiers



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ARTICLE INFO

Article history:

Received 16 June 2013

Accepted 4 February 2014

Available online 10 February 2014

Keywords:

Manufacturing strategy

Competitive priority

Asset frontier

Operating frontier

ABSTRACT

The current study aims to explore the connections between business environments and firms' competitive priorities, which establish the basis for manufacturing strategy. This study explicitly considers the effects of asset and operating frontiers, as well as trade-offs across competitive priorities, a topic which has not been thoroughly studied by prior research. We collected data from 434 Chinese firms and analyzed the data using regression analysis. It was found that the operating frontier is affected by the asset frontier, as well as by environmental forces, such as business costs, competition intensity, and market and institutional dynamism. The operating frontier affects competitive priorities, such as cost, quality, and delivery. The asset frontier exerts direct effects on delivery and flexibility, but indirect effects on cost and quality, through the operating frontier. Environmental factors also exert various effects on the priorities. This analysis suggests that Chinese managers do not consistently follow a specific sequence for improving competitive priorities.

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1. Introduction

In the past three decades, multiple researchers have studied the relationships between business environments and firms' manufacturing strategies (Amoako-Gyampah and Boye, 2001; Badri et al., 2000; Chi et al., 2009; Merschmann and Thonemann, 2011; Qi et al., 2011; Swamidass and Newell, 1987; Ward et al., 1995). We continue this tradition in order to consider manufacturing strategy in its larger strategic context, specifically, firm-level performance frontier and business environment. We focus on Chinese companies' strategic choices in terms of their competitive priorities. The development of competitive priority is the first step in developing a firm's manufacturing strategies. With the established priorities solidly in place, the firm then develops a set of plans that is operationalized through programs, processes, and technologies to be pursued in order to accomplish those plans. Together, the competitive priorities and action plans constitute the firm's manufacturing strategy, which ultimately affects the firm's operational capabilities and business outcomes.

In doing so, we seek to address three persistent research gaps. First, the aforementioned studies suggest that various environmental factors, such as business costs, labor availability,

competitive hostility, and dynamism, affect competitive priorities such as quality, cost, flexibility, and delivery. Yet empirical findings are mixed. Many relationships between individual environmental forces and competitive priorities appear significant in one study, but insignificant in another. These differences might reflect the varying manufacturing environments or the traits of the studied companies; but, we posit that the difference also could arise because these studies have not explicitly considered performance frontiers in their models. Importantly, a firm's output is bounded by its performance frontier (Schmenner and Swink, 1998), which comprises its policy and procedures (i.e., an operating frontier) and investments in plants (i.e., asset frontier). Similarly, the extent to which a firm emphasizes various competitive priorities depends on its asset and operating frontiers. Specifically, firms must analyze their business environment, consider their own asset and operating capabilities (performance frontiers), and then determine their manufacturing strategy. Thus, without considering performance frontiers, it would be difficult to define relationships between environmental factors and competitive priorities.

Second, business environments affect firms' business policies (Camerer, 1985). Because operating frontiers are defined by firms' plant operation policies, they also are subject to the influence of the business environment (Schmenner and Swink, 1998). To the best of our knowledge, no research has studied these effects thoroughly. Third, development of a manufacturing strategy demands a trade-off of competitive priorities (Miller and Roth, 1994; Sarmiento et al., 2013). Firms typically emphasize some

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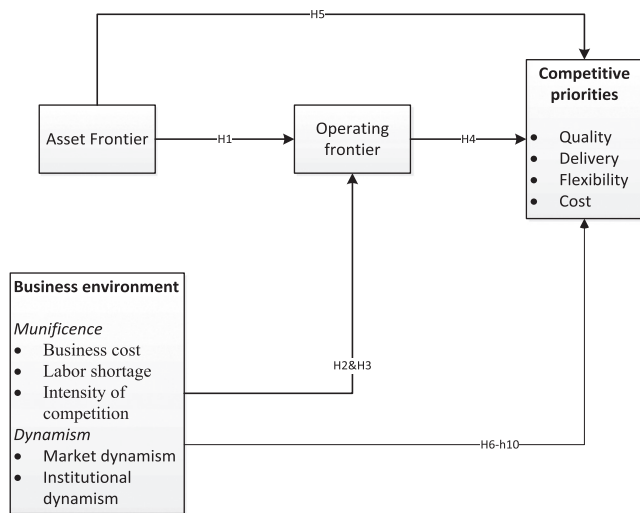


Fig. 1. The research model.

priorities and place less emphasis on others, resulting in different strategies. Prior studies have attempted to explore the relationship among priorities, especially the sequence by means of which firms develop various operational capabilities corresponding to the priorities (e.g., Flynn and Flynn, 2004; Schroeder et al., 2011). However, they do not directly explore the trade-off across priorities. For example, we do not know whether firms tend to trade off cost in favor of quality, delivery, or flexibility. This question is an important one, answering this question could offer critical insights into the mechanisms underlying the development of manufacturing strategies.

We aim to achieve these contributions to extant research by studying relationships among environmental factors, asset and operating frontiers, competitive priorities, and their trade-offs, according to the theoretical framework in Fig. 1, depicting how asset frontier affects operational frontier, which subsequently affects competitive priorities. Asset frontier also exerts direct effects on competitive priorities. Business environments affect both operational frontier and competitive priorities. We first present our theoretical foundations and research hypotheses. Then, we discuss the research methodology and analysis results. Finally, we conclude with a discussion of our findings and their implications.

2. Theoretical foundations

Schmenner and Swink (1998) argue that a performance frontier exists for manufacturers, which is defined as the maximum performance achieved by a manufacturing unit, given a set of operating choices. Specifically, a firm's investment in its plant and operations defines the maximum possible output that the firm can achieve (asset frontier). However, the constraints of its operations procedures and the management system create a second, lower limit on its output, which constitutes the operating frontier. In this sense, the concept of asset frontier is similar to design capability (maximum output that can be obtained); whereas, the operating frontier is similar to effective capability (the maximum output, given operating hours, product mix, scheduling effectiveness, delays, and machine maintenance) (Stevenson and Hojati, 2007; Vastag, 2000).

The plant's performance is immediately bounded by the operating frontier, which is ultimately bounded by its asset

frontier. In the same vein, we argue that competitive priorities, defined by the firm's choices about quality, cost, flexibility, and delivery, are immediately bounded by the operating frontier, which defines the extent to which firms are able to emphasize these priorities and develop the related capabilities. For example, a firm is unlikely to emphasize cost reduction as a strategic priority and improve this feature if it lacks a specific management system to control and continuously improve the production process.

The logic of performance frontier is consistent with the resource-based view (RBV) (Vastag, 2000). Firm resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc., controlled by a firm that enable it to conceive of and implement strategies that improve its efficiency and effectiveness (Barney, 1991). From this perspective, both asset and operating frontiers reflect a firm's resources. The asset frontier is based on tangible resources; whereas, the operating frontier is related to intangible resources. The latter thus represents *unique* resources, which are valuable, rare, and specific to a given firm. Such resources are more important for offering a sustained competitive advantage than the asset frontier (Vastag, 2000).

Arguably, how a firm utilizes its resources is affected by its business environment. The original resource-based view does not consistently take into account the social context within which resources are embedded, such as business environment, and how context might affect sustainable firm differences (Richard, 2000). Recent RBV researchers, however, begin to include contingency perspective. The contingency perspective maintains that superior firm performance is a result of proper alignment of endogenous organizational design with exogenous context (Aragón-Correa and Sharma, 2003). Following the same logic, a firm's choice of priorities is not only affected by its resources, as reflected in asset and operating frontier, but also by the business environment.

3. The operating frontier and its antecedents

We maintain that the operating frontier is affected by both the firm's asset frontier and its business environment. First, the operating frontier is defined by operations policy and processes, given a set of assets that plant managers can access, i.e., the asset frontier (Schmenner and Swink, 1998). Schmenner and Swink (1998) offers an example: an increase in the number of different products produced at a single plant is likely to increase unit costs if the operating frontier remains unchanged. However, improving the plant's policies might shift the operating frontier, such that the plant can produce more products without higher unit costs. Ultimately though, further improvement must be constrained by the limits of the plant's technological assets (asset frontier). A firm with a relatively lower asset frontier has less room for improvement of its operating frontier than does one with a higher asset frontier. Theoretically, a firm with a high asset frontier does not necessarily work to improve its operating frontier. However, we argue that, in practice, firms always need to deal with environmental hostility and compete in the marketplace; so, they consider a higher operating frontier desirable. That is, a firm with a higher asset frontier should be motivated to improve its operating frontier, to ensure that it corresponds with the asset frontier. Therefore

H1. A firm's operating frontier is positively affected by its asset frontier.

Furthermore, two major dimensions of the business environment, munificence and dynamism, should affect a firm's operations (Bourgeois, 1980; Ward et al., 1995). Munificence refers to the level of resource slack or scarcity, while dynamism refers to unpredictable changes in the environment (Dess and Beard,

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