

Technical Note

## The theory of performance frontiers

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### Abstract

This paper seeks to illustrate how the basic theory of performance frontiers proposed by Schmenner and Swink [Schmenner, R.L., and Swink, M.L., 1998. On theory in operations management. *Journal of Operations Management*, 17, 97–113] can be extended to apply to a broader range of operations management issues. It extends the scope of the proposed theory to include a “between-firm” level analysis which can be useful in assessing a firm’s competitive position and for strategic decision making. In addition, this paper provides a link between the resource-based view of organizations that has gained some prominence in the strategy literature and the proposed theory of performance frontiers. This paper argues that the operating frontiers of organizations represent unique resources and they are more important than the asset frontiers in achieving a competitive advantage because these unique resources are valuable, rare and specific to a given firm, and they are difficult to replicate. Future research directions and research methods focusing on the internal resources of competitive advantage are also discussed. © 2000 Elsevier Science B.V. All rights reserved.

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I found the paper “On Theory in Operations Management” by Schmenner and Swink (1998) to be very interesting, refreshing and thought-provoking. In my reading, their paper is much more than just an intelligent collection of arguments about the finer points of theory development; the paper is about the direction of a profession that, to a varying degree, we all shape and control. I agree with the authors on the dangers of being inflicted with “theory envy”. The picture they paint, quoting Kaplan (p. 100), seems to be valid for operations management researchers as well: “There are...scientists who, in desperate search for scientific status, give the impression that they don’t much care what they

do if only they do it right: substance gives way to form. The work of the...scientist might well become methodologically sounder if only he did not try so hard to be so scientific”. I share their fear that operations management driven by “theory envy” will be more and more fixated on methodology and on attempting to be scientific and not on adding to the improvement and betterment (using the term coined by Schmenner and Swink) of the profession.

Schmenner and Swink finish the article with an encouragement and a call for further debates (p. 112): “We encourage others in the field to examine operations phenomena, to propose theories to explain them, and to probe their implications. When our discipline can routinely assault proposed theories, refine them when needed, and abandon them when warranted, then we will shed any legacy of theory envy”. With this encouragement, I would like to rise

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to the challenge and discuss the proposed Theory of Performance Frontiers. Although the Theory of Performance Frontiers is intuitively appealing, further explanations of the inputs and outputs of the theory are required. Specifically, I will discuss the make-up of the performance frontiers and how they relate to well-known capacity management terms (Section One). While Schmenner and Swink focused on within-firm issues, this paper extends the coverage of the theory to between-firm issues that are especially relevant in addressing competition among firms (Section Two). Section Three links this new theory to the resource-based view of organizations. This paper shows that the resource-based view can be refined to deal with special operations management circumstances and the proposed theory of performance frontiers. The paper ends with some suggestions for future research. However, there is no doubt that there are other issues to be addressed and further refinements as debate on this theory continues.

### 1. The make-up of performance frontiers

In Schmenner and Swink (1998) the production frontier is defined as (p. 108) “the maximum performance that can be achieved by a manufacturing unit given a set of operating choices”. In spirit, it is very similar to a manufacturing performance index or a manufacturing performance score (Voss et al., 1995; Vastag and Narasimhan, 1998). Schmenner and Swink go through the operations management literature (p. 108) and summarize the “make-up” of the performance frontier by listing the usual suspects: technology and aggregate set of policies that boil down to choices in plant design and investment and plant operations (or in other words, structural and infrastructural factors). So, at this point we have two kinds of inputs (structural and infrastructural factors) and consequently we can have two performance frontiers (one for the structural and one for infrastructural factors, while keeping the other set of factors constant). We can also notice the similarity between asset frontier and design capacity (maximum output that can be attained at a plant) on one hand, and operating frontier and effective capacity (or measured capacity) on the other. Introducing these traditional capacity management terms (Black-

stone, 1989) also helps us to understand that there is no asset frontier without operating frontier and vice versa—both structural and infrastructural inputs are needed for the operation of a manufacturing unit—, so after aggregating and rescaling the inputs, the two frontiers can be shown on the same graph. Design capacity (like the asset frontier) exists only on paper. As soon as the plant starts operating, it becomes possible to measure actual output and the effective capacity (the operating frontier) can be calculated (taking into account the efficiency and utilization rates).

Schmenner and Swink correctly point out the difference between the performance frontiers based on structural (asset frontier) and infrastructural (operating frontier) inputs, however the question of inputs, other than the above mentioned differentiation is not discussed. They present the relationship between these performance frontiers in Fig. 1. However, I believe that some clarifications of this figure are needed to give us a better understanding of the proposed relationships. Their Fig. 1 shows performance on the horizontal axis and cost on the vertical axis. The axes do not have arrows but I assume that it was just an oversight and the values increase from the left to the right and from the bottom to the top. One of the required clarifications concerns the role of cost in this figure. So far cost has not been mentioned in the text, yet it makes its debut on the vertical axis of Fig. 1. Traditionally, cost is considered as one of the competitive priorities and as such it is a function of investments in equipment (structural factors) and manufacturing systems (infrastructural factors), so I would argue that it belongs to the performance dimension — and the authors agree. On pp. 107 and 108, Schmenner and Swink write that “The performance frontier concept results from enlarging the scope of this definition [Samuelson’s definition]. First, the nature of “output” is expanded to include all dimensions of manufacturing performance (e.g., cost, product range, quality), consistent with the notion of data analysis . . .”

Clearly, the above discussion indicates that the inputs are under our control (the manufacturing unit decides in what and how much it will invest), while the outcome, the performance is not. Therefore, being a traditionalist, I would put “performance” on the vertical axis and the inputs on the horizontal one.

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