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Sources of volume flexibility and their impact on performance

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Abstract

This research uses three in-depth case studies to establish the drivers and sources of volume flexibility. We find that in all three firms, there is significant concern among managers for gaining competitiveness through volume flexibility. We also find that there are several avenues for developing a volume flexible response and that deployment of these tactics is dependent on the availability of resources and systems. To verify some of these propositions we report on the outcomes of a field survey that measures the importance firms place on volume flexibility as well as the corresponding actions they take to remain volume flexible. Our critical finding is that short- and long-term sources of volume flexibility have a positive, albeit differential, impact on a firm's performance.

Keywords: Operations strategy; Case study research; Volume flexibility; Empirical research

1. Introduction

Volume flexibility is defined as the ability of an organization to change volume levels in response to changing socio-economic conditions profitably and with minimal disruptions. Several developments have led to the emergence of volume flexibility as a key competitive strategy. As we witness the US economy going through a slowdown in the business cycle, there is overwhelming evidence in the current business press of companies who are struggling to adjust their upstream functions (resources) in order to respond to fluctuation in their downstream demand. For example, in response to slowing demand for their products and services, several major companies have announced workforce reductions and plant closures (e.g. Motorola, Lucent Technologies, Daimler Chrysler and General Motors, many airlines). On the other hand, in emerging industries such as networking and wireless communications, many of these companies are increasing their workforce and expanding their production capacity (e.g. Endwave and JDS Uniphase). At Delta Airlines, the pilots' refusal to work overtime led to flight cancellations in November–December 2000 and Delta's rankings on on-time performance dropped from best to worst in the industry. Timeliness of deliveries for Internet based orders posed a severe capacity management challenge for many firms. Many firms are considering flextime, enforced Fridays off (for example, at Charles Schwab) and "perma-temps" (temporary workers who have a near permanent status) in order to provide a volume flexible response. At the heart of many of these episodes, we find firms making strategic operational decisions in order to efficiently satisfy the fluctuating

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volume levels that their customers demand. Thus, volume flexibility has emerged as a key competitive strategy.

A significant case can be made for increased demand volatility in recent times. For example, hyper-competitive rivalries in recent times arguably destabilize even conventionally stable industries (D'Aveni, 1995; D'Aveni and Gunther, 1994). Internet based business transactions create dual channels for the ordering process for many conventional retailers such as Wal-Mart and Barnes and Noble. "Anytime" ordering from the Internet increases demand variability in two ways—demand timing has a wider range as well as the variance is exaggerated by creation of another channel in the distribution process. The increased emphasis on availability of products and services as well as on-time delivery creates unique needs for a volume flexible response even in environments where demand volatility has been somewhat controlled (Vickery et al., 1999). The evidence of more volume flexible response is most significant in human resource management. Delson (1995, p. 58) concludes that in The Netherlands, the number of "flexible jobs" as a percentage of total number of jobs rose from 7.9% in 1987 to 9.8% in 1994. In EU-12 countries the percentage of workers on temporary contracts in 1993 was 10.4%—further, these types of contracts no longer apply to just unskilled labor; it includes highly skilled professionals. Transferring the risk associated with uncertainties and fluctuations in production to temporary staff from employment agencies or to another organization (through sub-contracting, outsourcing, self-employed workers, etc.) is clearly an emerging tendency across the world. But human resource policies such as flextime, temporary workers and use of overtime represent only one source for creating a volume flexible response.

Firms deploy varying strategies for creating volume flexible responses—these include using overtime and temporary workers, cross-training workers, developing complementary product portfolios, creating and maintaining slack resources, creating a network of facilities, improving forecasting and planning systems with information technology, as well as leveraging the firm's ability to negotiate on volume with suppliers and customers. While it can be argued that firms make these choices for a variety of reasons, it is not clear how such choices are made and what benefits they generate. It is in this business context that we pose our research questions:

- What are the sources of volume flexibility?
- What are the deployment routines in organizations; that is, what motivates a firm to select one source over another?
- What are the payoffs from alternative volume flexibility options?

The rest of this paper is organized as follows. In Section 2 we summarize the current literature on volume flexibility and show how our work extends this research stream. Section 3 presents our case study methodology, data collection process, propositions and results from the case study. Section 4 describes specific hypotheses, our survey methodology and data collection procedures. In Section 5 we summarize our analysis and present our findings from a quantitative assessment of the survey data. Finally, in Section 6, we present some triangulated conclusions and suggest avenues for future research.

2. Literature review

Since our work extends existing operations strategy literature by developing and testing theory on the sources of volume flexibility, we summarize the relevant literature in order to clearly position our current contribution. De Toni and Tonchia (1998) classify the vast literature regarding manufacturing flexibility; the aim is to contribute to the conceptual systemization of the abundance of themes and the difficulty of obtaining a unitary and univocal framework. In this paper, we focus exclusively on only one dimension of the multi-faceted construct, manufacturing flexibility. Volume flexibility of a manufacturing system is "its ability to be operated profitably at different overall output levels" (Sethi and Sethi, 1990, p. 307). This definition is consistent with Gerwin (1993), Suarez et al. (1996), Gupta and Goyal (1989) and Brown et al. (1984), and is similar to the demand flexibility of Son and Park (1987). The main strategic purpose of volume flexibility is to help cope with aggregate demand uncertainty. Volume flexibility permits the firm to adjust production upwards and downwards within wide limits. In terms of range, mobility and uniformity, volume flexibility is "the extent of change and the