Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Operations Management 22 (2004) 489–503
JOURNAL OF OPERATIONS MANAGEMENT
www.elsevier.com/locate/dsw

Plant roles and decision autonomy in multinational plant networks

Catherine A. Maritan [a,*], Thomas H. Brush [b], Aneel G. Karnani [c]

[a] *Jacobs Management Center, School of Management, State University of New York at Buffalo, Buffalo, NY 14260, USA*
[b] *Krannert School of Management, Purdue University, 403 West State Street, West Lafayette, IN 47907, USA*
[c] *University of Michigan Business School, 701 Tappan St., Ann Arbor, MI 48109, USA*

Received 25 July 2002; received in revised form 17 May 2004; accepted 27 May 2004

Available online 20 July 2004

Abstract

The paper examines whether plants in a multinational manufacturing firm with different roles have different degrees of autonomy concerning planning, production and control decisions. Building on Ferdows' framework for classifying international plants in a network, we empirically examine the proposition that the degree of managerial autonomy varies according to strategic role of the plant. We ask whether different plant roles require different management systems and different levels of responsibility for decisions and find evidence of differentiated fit.

Keywords: Operations strategy; Global operations

1. Introduction

A company can manage a group of plants as a multinational network to learn more about technology, customers, products or processes than it would learn in one location (MacCormack et al., 1994). It may also gain advantages in cost or flexibility from managing a group of plants as a network that it would not achieve if these plants were managed as stand alone entities (Scherer et al., 1975). One advantage of optimizing a system of plants is that individual plants can specialize in activities. To derive the benefits of specialization, plants must be managed to integrate material flows, management skills, product/process developments, or other knowledge among plants. Plants develop roles and have distinct management systems in place to then transfer the benefits of the specialization back to the other plants in the network. Accordingly, there should be a fit between the way a plant is managed and what is necessary to provide the integration for its particular specialized plant role. An important management characteristic that may differ among plants in such a network is the degree of autonomy the plant management has concerning different types of decisions about the planning, production, and control of the plant. This paper uses a survey of international plant managers to investigate whether there is a fit between the degree of autonomy over these key decisions and the role of a plant in a network.

There are many conceptual articles that address the challenges of coordinating a multiplant network in an international context (Ferdows, 1989, 1997; Flaherty,

* Corresponding author. Tel.: +1-716-645-3245; fax: +1-716-645-6117.
E-mail address: cmaritan@buffalo.edu (C.A. Maritan).

0272-6963/$ – see front matter © 2004 Elsevier B.V. All rights reserved.
doi:10.1016/j.jom.2004.05.007

1986; Oliff et al., 1989). Some of these frameworks are derived for the entire network in terms of material flows (Flaherty, 1986), or for a plant type which characterizes the network (Schmenner, 1982). Another approach describes the role of the plants relative to a network and allows for different plant roles within the same network (Ferdows, 1989, 1997). We build on this approach as developed by Ferdows because of its implications for managing different plant roles within a network. While Ferdows focuses on what the appropriate role for a plant would be in different circumstances, and others focus on how plant roles may change over time (e.g., Khurana and Talbot, 1998), we focus on how to manage a plant given a particular role.

We are particularly interested in the degree of autonomy a plant has over key decisions because this is a critical dimension representing differences in management authority. Centralization is a key dimension of organization structure that concerns the locus of authority to make decisions (Pugh et al., 1968). A plant operating in a business unit with a high degree of centralization would have a low degree of autonomy, with most of the important decisions being made at a higher level in the organization such as business unit headquarters or the corporate office. Conversely, a plant with a high degree of autonomy would control many of its important decisions. We expect that plants with different roles should have different degrees of autonomy. If managers use similar systems throughout the business unit to manage plants with different strategic roles, the systems may be compromised for all plants, or some plants may be managed inappropriately. On the other hand, if managers know which management systems need to be linked to specific plant roles, they can differentiate the management systems within their network to match the roles of plants. We use the empirical findings of our study to identify the specific differences in management systems that occur when different plant types operate within the same network.

The following section positions the Ferdows framework relative to other research on multinational firms which emphasizes fit, and puts our empirical study on the management implications of multinational plant networks in that context. This is followed by a description of the research design and development of our hypotheses. We then report the empirical tests and our findings. We conclude with a discussion of key results and the implication of our findings.

2. Theoretical background

In relationships between corporate headquarters and country subsidiaries in multinational firms (e.g., Prahalad and Doz, 1987; Bartlett and Ghoshal, 1989; Nohria and Ghoshal, 1994), and between corporate headquarters and the strategic business units in diversified firms (Gupta and Govindarajan, 1986, 1991), it is important to consider the "fit" between the context of the subsidiary or the business unit and the systems used to manage them. Different strategic roles of subsidiaries or business units may require different management systems. A similar logic can be applied to the relationship between a business unit headquarters and individual plants in a multiplant network. We draw on this logic to investigate the fit between the context of the plant, which we define as the plant role, and the way in which the plant should be managed (Venkatraman, 1989; Dean and Snell, 1991). While there are conceptual articles arguing for the importance of considering a plant level manufacturing strategy (e.g., Skinner, 1974), empirical work has generally not conditioned the manufacturing strategy of the plant by its position in a network of plants. Empirical studies of taxonomies of manufacturing strategies are primarily interested in the fit of business unit competitive strategy with plant characteristics (Kotha and Vadlamani, 1995; Miller and Roth, 1994; Roth and Miller, 1992; Swamidass and Newell, 1987). In contrast, we are concerned with the fit of a plant level manufacturing role with the differentiation of management systems' relative autonomy among plants within a business unit.

We build our analysis on the plant roles defined by Ferdows (1989, 1997) (refer to Fig. 1). He developed a framework that defines six plant roles based on two dimensions: (1) the primary reason for establishing the factory and (2) the extent of technical activities at the site. Primary reason for the site is divided into three categories: (1) access to low cost production input factors, (2) use of local technological resources and (3) proximity to market. Extent of technical activities is classified as being either low or high. Plants having a low level of technical activities at the site are labeled Off-Shore, Outpost, or Server depending on whether they are located for access to inputs, local technology or markets, respectively. Plants having a high level of technical activities are labeled Source, Lead, or Con-