

## Linking the Production Network to Competitive Strategy

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**Abstract:** Global production networks in multinational companies are complex structures. It takes years to put them in place and it is difficult to change them quickly. Diverse factors affect their shapes, and since many of these factors are outside the control of the firm, and their impacts come after varying time lags, these structures can evolve in unintended directions. To use Skinner's (1969) famous analogy, they can easily turn into a "millstone in corporate strategy." If they are carefully constructed and monitored, they will be a formidable source of competitive advantage. If not, they can limit the firm's strategic options or unwittingly cause a change in the strategy to fit their capabilities.

But how does one assess whether a firm's production network is a strategic asset or liability? Currently there are neither many models for classifying production networks nor studies that show which model fits which strategy. We need more research on production networks. In this paper we propose a model to relate the structure of firm's production network to certain characteristics of its products and production processes. The model can be also used to decompose a complex network into simpler sub-networks by dividing the firm's products and processes into different groups with narrower ranges for these characteristics. This approach reduces the complexity of designing, managing and monitoring the evolution of production networks.

The model is based on clinical observations in four multinational companies and more empirical data are being collected at this time (during Spring 2010). In this extended abstract we provide a brief literature review to provide the context and then describe the model. Discussion of the results and conclusions will be presented later when we complete our data collection. *[The preliminary results of the empirical data gathered so far seem to support the model. We hope the new data would provide a stronger support.]*

### Perspectives on global production networks

Several overlapping streams of research provide the context for studying production networks. First stream is the rich literature on multinational companies. In the last three decades, research on the structure and organization of multinationals has shifted from a focus on "a dyadic, hierarchical view of relationships between the company's headquarters and its subsidiaries towards a perspective in

which the multinational organization is viewed as a web of diverse inter- and intra-firm relationships (O' Donnell 2000, p. 526). Theories that have been used to examine these relationships include network theory (Ghoshal and Bartlett 1990, Gulati et al 2000), evolutionary theory (Kogut and Zandar 1993) learning organization (Nonaka 1994, Hedlund 1994, Doz et al 2001) and knowledge transfer (Grant, 1996, Szulanski 1996). A common theme among these theories is that multinational organizations can benefit greatly from transferring resources and competencies developed in different locations within their company.

The second stream is the literature in industrial networks. The focus here is on the external, mostly vertical, networks in which the firms--especially original equipment manufacturers (OEMs)--operate. Relationships with suppliers (Jarillo 1988, Dyer 1996, Jagdev and Browne 1998, Dyer and Singh 1998), subcontractors and contract manufacturers (Greaver 1999, Ernst and Kim 2002, Plambeck and Taylor 2005), in particular, have received considerable attention in recent years. There is a general consensus that increased data, information and knowledge transfer in the "extended enterprise" can be beneficial to all parties. However, there are also warnings against excessive outsourcing and reliance on others for production and design of the firm's core products (Bettis, et al 1992, Arrunada and Vázquez 2006, Pisano and Shih 2009).

Yet another stream of research has focused on the intra-firm production networks. An early article in this stream is Hayes and Schmenner's (1978) "How Should You Organize Manufacturing?" They suggest that a firm's production network can be organized along products, processes, or a combination of the two. Ferdows (1989, 1997) suggests that factories in a network have different strategic roles which define their relationships to headquarters and each other, to other functions in the firm. Vereecke and Van Dierdonck (2002) provide additional empirical support for different roles of factories in a network.

A subgroup of this stream of research uses the *network*—as opposed to factories within the network—as the unit of analysis (Flaherty 1996, Shi and Gregory 1998, Colotla et al 2002, Vereecke et al 2006, Ferdows (2008), and DeMeyer and Vereecke 2009). An important premise here is that intra-firm manufacturing networks can develop capabilities that go beyond factory-level capabilities, and especially with

the advent of new communications and transportation technologies, companies must pay more attention to the design and management of their production network as a whole.

Combined, these streams of research provide valuable insights into how to a) spread the firm's production network globally, b) relate it to the larger industrial network in which the firm operates, and c) assess and chart a strategic course for individual factories in the network.

### The Footloose/Rooted Model

A core managerial issue in all these decisions is how much of the firm's resources should be allocated to each factory in its production network. At one extreme the firm may allocate almost none and rely totally on others to produce its products; at the other extreme, the firm may invest heavily in all its factories and rely on superiority in production as a source of its competitive advantage. Ferdows (2008) suggests that the former is likely to have a "footloose" and the latter a "rooted" production network:

"There are two seemingly irreconcilable models for building production networks. One advocates staying footloose—that is, continuing searching the world for a better factory inside or outside the company and moving production there as soon as the firm finds one; the other advocates developing deep roots—making long term commitment to each production site and giving it the resources to reach its full potential.

Both models have their own logic. Those in search of more agility in an increasingly uncertain and volatile world usually argue for more footloose networks; and those who want more stability to develop unique production capabilities, ironically to cope with the same uncertain and volatile world, argue for more rooted networks. The first group wants to leverage capabilities of others and conserve own resources for other functions like design and marketing; second group wants to use own production capabilities as a competitive weapon." (Ferdows 2008, p. 150).

He suggests that production networks are being constantly pulled in one of these two directions. Sometimes this pull is abrupt and visible—like a decision to close a factory and outsource production of a product; other times it may be gradual and subtle—like continuing reduction (or increase) of new capital investments in factories. The cumulative effect of these movements can cause the production network evolve in an unintended direction. Ferdows (2008, p. 156) suggests the following framework as a guide for designing production networks and monitoring their evolution:

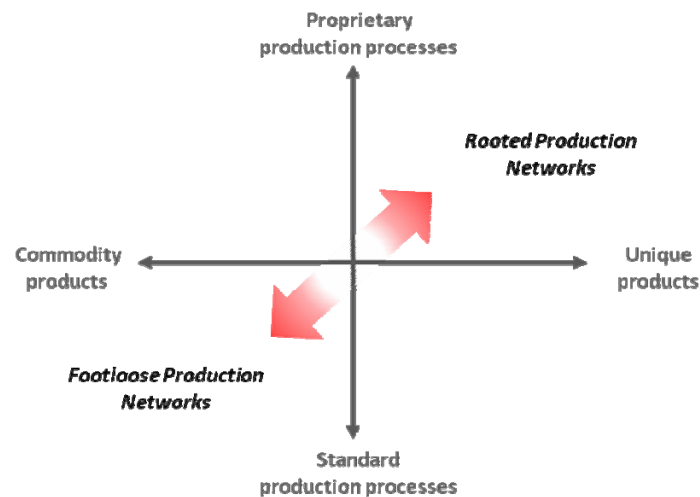


Figure 1. Footloose/Rooted Model

According to this model, moving towards a footloose network is appropriate when the products are turning into a commodity and the processes used for production are becoming standardized and widely available. A footloose network can naturally work well in these conditions because the requisite know-how to produce a commodity product is usually highly codified and easy to transfer from one factory to another, inside or outside the company.

Conversely, when a firm competes through producing unique products with proprietary production processes, it needs a rooted network. Such a firm has distinct capabilities in its factories that are based mostly on tacit know-how accumulated through the years. It is not easy to transfer this know-how (hence production capability) from one factory to another, especially one outside the firm. The firm needs the stability of the rooted network to succeed with such strategy.

Figure 2 shows a more "testable" version of the Footloose/Rooted Model, where:

$N_j$  is the degree of rootedness of the network  $j$ ,

$P_j$  is the degree of uniqueness of typical product group produced in network  $j$ ,  $M_j$  is the degree proprietary production processes used in typical factories in Network  $j$

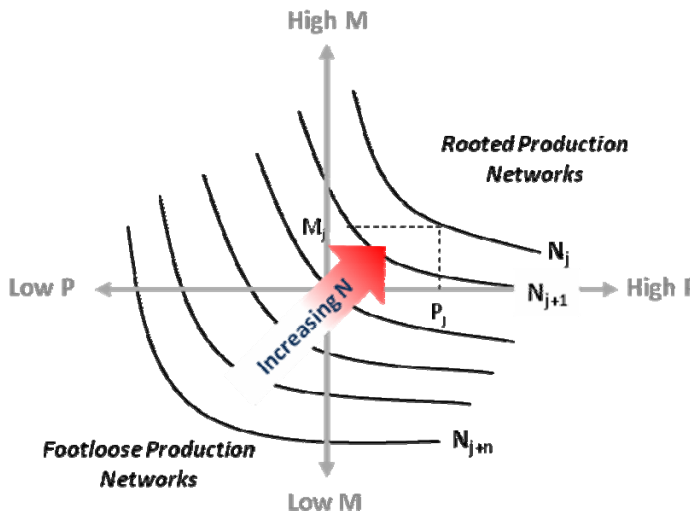


Figure 2. Relationship between  $N_j$  and  $P_j$  and  $M_j$

Our objective in this paper is to test and extend this model. The model has considerable managerial implications, most important of which is that firms need “focused networks” for producing their different groups of products. The structure, organization and key performance indicators for each of these networks can vary considerably and must be carefully chosen and monitored.

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