8-16-1996

Overcapacity Prescription: Downsize, Vertically Integrate or Strategically Partner?

Kristina Setzekorn
Southern Illinois University at Carbondale

Overcapacity Prescription:
Downsize, Vertically Integrate or Strategically Partner?

Kristina Setzekorn
Southern Illinois University at Carbondale

Introduction

Much of the IT and manufacturing literature predicts downsizing and strategic partnering to result from information technology (IT) ubiquity. But every week, the front pages of the Wall Street Journal report mega mergers and acquisitions (M&A), originally concentrated in the pharmaceutical, healthcare, banking, software and entertainment sectors. What characteristic(s) particular to these industries interact with IT ubiquity to determine the firm's or industry's optimal structural response? Firm structure has been studied from the transaction cost economics perspective, which prescribes optimal firm size to be that which minimizes total cost for the firm.

Perhaps firms and industries differentially downsize, vertically integrate or strategically partner, depending on the function they're optimizing. Perhaps the entire value chain needs to be considered in this optimization, and over temporal horizons and uncertainty levels particular to the industries being studied.

IT can change cost functions. Some of the theory regarding IT's effect on costs is summarized below. I then use the concept of value chain linkages to discuss IT's differential effects with respect to systemic overcapacity creation and the resulting structural response.

Coordination Costs

Traditional economic and information processing literature says that hierarchical layers perform information processing, i.e. coordination, functions (e.g., Tushman & Nadler, 1978). These coordination functions entail getting the right things and the right people to the right places at the right time to perform the right tasks to produce the right goods and services.

These coordination costs can be further subdivided into internal and external coordination costs. Gurbaxni & Whang (1991) prescribe that the optimal firm size minimizes the sum of the operations costs, external and internal coordination costs. Internal costs represent the costs associated with internal managers, i.e., agency costs associated with monitoring, bonding and residual loss; decision information costs associated with information and opportunity costs due to poor information. External coordination costs include the suppliers' costs for marketing, sales and billing; plus transaction costs such as buyers' search costs, transportation costs, inventory holding costs, communication costs, risk of suppliers' opportunistic behavior, and contractual costs associated with minimizing these opportunism risks. (Gurbaxni & Whang, 1991; Brynjolfsson, Malone, Gurbaxni & Kambil, 1994; Malone, and Yates & Benjamin, 1987).

When these external coordination functions are performed more costefficiently by enhanced IT, IT can be substituted for relatively more expensive labor, and downsizing results. If IT reduces internal coordination costs more than external coordination costs, firms would grow. If IT reduces the cost of external coordination most, firm size would decrease, as firms buy rather than make. Buying, in turn, can lead to higher coordination costs, but lower production costs, as firms can realize economies of scale by pooling the demands of multiple customers. To the extent that IT reduces both internal and external coordination costs more than production costs, it increases the attractiveness of buying.(Brynjolfsson, et.al.1994) This causes firms to outsource (smaller firm size) and necessitates coordination, as firms thus integrate their value chains with suppliers and customers.

This interfirm value chain integration has been enabled by networking capabilities, CAD, CAM, shared databases, and communications standards. It has been enabled, also, by standardized software and hardware, and by computerbased corporate memory, which have lowered barriers to entry for smaller

firms, lowered the risk of opportunistic behavior from collaborators through decreased relationship-specificity of assets and improved mutual monitoring.

Complementarities and Nonconvexities

Milgrom & Roberts (1990) make the point that costs should not be considered in isolation, but with several relative prices falling, there are interactions among and between the technological factors and the marketing and organizational variables. They use the idea of "complementarity" among groups of activities, in which "...if the levels of any subset of the activities are increased, then the marginal return to increases in any or all of the remaining activities rises. It then follows that if the marginal costs associated with some activities fall, it will be optimal to increase the level of all of the activities in the grouping."(1990:514) They also say these complementarities are a source of "...nonconvexities that are associated with the need to coordinate choices among several decision variables....Thus it may be unprofitable for a firm to purchase a flexible CAD/CAM system without changing its marketing strategy, or to alter its marketing approach without adopting a flexible manufacturing system, and yet it may be highly profitable to do both together....These nonconvexities then explain why the successful adoption of modern manufacturing methods may not be a marginal decision."(1990:514)

There may also be a corollary in which nonconvexities in industry structure also flow from complementarities between IT ubiquity and certain industry variables. These could relate to the presence and magnitude of first mover advantages (i.e., the importance of innovation and of design cycle time), the importance of quality, products' knowledge content, firms' planning horizons, and industry uncertainty level.

Milgrom & Roberts use these nonconvexities and complementarities to explain that increased asset flexibility and integration of the product and process engineering functions (all enabled by IT) shift governance from bureaucracy to that of independently owned suppliers and subcontractors what Venkatraman (1991) calls business network redesign, Johnston & Lawrence (1988) call value added partnership (VAP), Davidow & Malone (1992) call virtual corporation, Jarvenpaa & Ives (1994) call networked organization, Clemons & Row (1993) call "move to the middle".

Information Assets

Brynjolfsson (1994) predicts a similar result, using the GrossmanHartMoore framework, modified to account for information assets. He says that IT "...will result in reduced [vertical] integration and smaller firms to the extent that it leads to better informed workers, who need incentives; enables more flexibility and less lockin in the use of physical assets; and allows direct coordination among agents, reducing the need for centralized coordination. On the other hand, the framework suggests that more integration (larger firms) will result from IT where network externalities or informational economies of scale support the centralized ownership of assets and it facilitates the monitoring and thus contractibility of agent's actions." (1994:1658) That is, he would predict value adding partnerships and markets coordinated through interorganizational information systems in markets characterized by flexible assets like robotics, CIM and CAM; and by better informed or more skilled workers.

Brynjolfsson, et. al., (1994) say the empirical results of their economywide research imply that "...the current downsizing of firms, the popularity of outsourcing, and the rise of valueadding partnerships is not simply a management fad, but rather may have a technological and theoretical basis." (1994:1642) Gurbaxni and Whang (1991) say, "Modern IT...has the potential to reduce market transaction costs related to contracting, since it facilitates tighter interfirm links through information sharing and mutual monitoring." Clemons and Row (1992) agree that this information sharing reduces coordination costs, and mutual monitoring reduces the transaction risk component of transaction cost, i.e., the risk associated with the opportunism of a firm's trading partners, e.g., shirking, loss of resource control, ex post contract re-negotiation, etc.

Overcapacity

A Theory of Constraints perspective considers firm size a strategic response to overcapacity. When IT enables heightened productivity (partially as a response to minimization of the costs detailed above) in the face of constrained demand, production overcapacity results. A strategic response may be to sell off production capacity. With heightened environmental complexity and firm diversity, strategists may spin off whole business lines, or outsource noncore activities in an attempt to get back to the firm's "distinctive competence." Alternatively, a firm may respond by removing its demand constraint, i.e., by acquiring more customers via vertical integration or strategic partnerships.

IT allows managers to supervise greater numbers of employees, creating "management overcapacity". This could allow companies to structurally "pancake" their hierarchies, discarding layers of managers and supervisory personnel. This also potentially enhances productivity, creating production overcapacity.

IT also enables companies to better coordinate supply chain linkages. JCPenneys transmits sales data from its checkout scanners to suit manufacturers who use that information to anticipate demand and who, in turn transmit the information to fabric manufacturers. This squeezes waste from the systemunfilled demand, large inventories, and over supply of undesired suitsand improves flexibility. IT also allows empowerment of workers lower in the hierarchy to make decisions, by giving them access to necessary data. (James Wetherbe, AIS 95 address) These two effects cause cycle time reduction and create "overcapacity" in that resources, (e.g., capital, cycle time, managerial time and effort, and risk inherent in the preintegration era) are now freed up.

IT creates not only production and managerial overcapacity, but other forms of overcapacity as well. IT can enhance innovative capacity for instance, via internetworkingenabled collaboration; increased availability of information, smart agents, and simulation and modeling capabilities. If a firm has more patentable drugs or copyrighted software than it can market, it can sell these patents or copyrights outright.

As an alternative to selling off capacity, firms may want to leverage their economies of scale and of information. They can increase revenue by buying new customers through distribution channel acquisitions. For instance, Disney may have creative overcapacity (i.e., more films and creative talent than markets for such) for which it wants to assure distribution outlets by buying ABC. This can also be seen in the current round of bank mergers, in that large banks exploiting ATMs and other IT find they can serve more customers. They then buy more banks to get access to those banks' customers. This may also have been Merck's strategy when it acquired Medco, and Eli Lilly's strategy when it bought PCS. Research and development (i.e.,innovative) capacity can be leveraged by a pharmaceutical firm with a promising drug or stream of drugs in the pipeline if it buys another firm (and thereby, its customers), or otherwise gains customers by strategically allying itself through comarketing or licensing agreements with another firm.

Similarly, a firm with a strong sales force and marketing capacity (i.e., more customers), can leverage these strengths by buying firms with strong research and development (R&D) capacity or by forming strategic alliances with these firms, thus giving the firm more products to sell to its existing customer base. This is also the case with the current software company mergers and strategic alliance formations, in that a company may be dynamically efficient, (i.e., innovative), but not have the static efficiency (i.e.,capital, reputation, or marketing savvy) to fully exploit these innovative products.

Manufacturing is a strategic capability that can be similarly leveraged. Small flexible manufacturers using CIM, FMS and CAD/CAM can leverage their flexibility and innovative capabilities through strategic partnerships. Smaller firms can access economies of scale by outsourcing manufacturing operations to large manufacturers, who pool many orders for the same widget into a single production run. Large, statically efficient manufacturers may gain dynamic efficiency by forming strategic partnerships with, or by acquiring, small dynamically efficient (i.e., innovative) firms. This may be especially important in turbulent environments, with highmargin markets and substantial firstmover advantages.

The operations management concept of "bottlenecks" can be considered a metaphor. A bottleneck is anything that limits an organization's ability to maximize tis revenue. This could be a machine that constrains output to be less than the market demand. However, if market demand is less than production capacity, then demand could be considered a bottleneck.

Thus, final demand can be considered a bottleneck in the banking or entertainment value chain. Innovative pharmaceutical products can be considered a bottleneck in the drug company value chain. Vertical integration can be construed as an attempt to remove these bottlenecks by acquiring additional capacityi.e., additional customers, distribution channels or proprietary drugs. Another response would be to allow non-bottleneck resources to remain idlei.e., underutilize human and capital banking resources; maintain unsold entertainment inventory or not fully utilize creative capacity; and market older, offpatent drugs. A third alternative, mentioned previously, is to sell off capacity until production capacity equals demand. The optimal response depends upon the interaction of IT ubiquity with other variables particular to an industry and the environment in which it operates.

References available upon request from author.