Target Costing for Supply Chain Management: An Economic Framework

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Facing mounting evidence of their inability to sustain competitive advantages in product quality, functionality, or cost, many companies have begun adopting the principles of supply chain management. However, to realize the benefits promised by this management innovation, companies must first discontinue reliance on deficient cost management practices. This article contends that both traditional and activity-based cost management practices are deficient, then offers an economic framework for replacing them in supply chains with target costing processes. The framework combines the two market variables, customer requirements and supply chain agility, to define strategies for performing target costing. The contents of these strategies set the key features of three unique target costing processes for supply chains. Thus, the article provides an economic rationale for applying target costing to supply chain management.

An economic era has ended: Most companies can no longer sustain competitive advantages in product quality, functionality, or cost (Cooper, 1995; Fine, 1998; Schonberger, 1996; Wheelwright and Clark, 1992). The familiar struggle among domestic companies for market dominance has become a global struggle among *lean* competitors for economic parity. Core competencies that once delivered enduring advantages now deliver short-lived first-mover rewards (Collis and Montgomery, 1995; Cooper and Chew, 1996; Cooper and Slagmulder, 1997; see also Shepherd, 1997, chap. 1).

To arrest the financial decline attending this new economic reality, many companies have adopted the following innovative management techniques to enhance competitiveness and control profitability:

- Quality function deployment (QFD) to integrate the voice of the customer into the product development process;
- Design for manufacturability to reduce the variation in manufacturing operations;
- Just-in-time (JIT) to eliminate inventories; and
- Activity-based cost management (ABM) to give managers better levers for controlling value-added costs and for removing non-value-added costs from business processes.

Underwhelmed by the outcomes (cf. Goldman et al., 1995, p. 5; Mabert and Venkataramanan, 1998, p. 538) and having sensed the need for a more integrated approach to managing competitiveness, companies like 3M, Ford, Hewlett-

Packard, Procter & Gamble, and Xerox have adopted the principles of *supply chain management* (cf. Cavinato, 1992). In fact, many have come to believe that supply chain management substantially determines a company's capacity to create shareholder value (Poirier, 1999; Tyndall et al., 1998) and to attain economic security (Bovet and Sheffi, 1998; Lummus and Vokurka, 1999). This belief explains why over 86 percent of the respondents in a recent survey of North American manufacturers by Deloitte & Touche ranked supply chain management as essential to success (Witt, 1998).

Put simply, supply chain management is a collaborative, cross-enterprise operating strategy that aligns the flow of incoming materials, manufacturing, and downstream distribution in a manner responsive to changes in customer demand without creating surplus inventory (Cooper and Ellram, 1993; see also Ganeshan, Magazine, and Stephens,1998, and Quinn, 1998). As noted by Balsmeier and Voisin (1996), supply chain management is not the old wine of "supplier management" poured into a colorful bottle. Instead, supply chain management is a fresh, potent approach that integrates a network of operating entities into a delivery system that enhances customer value and satisfaction and that protects the competitiveness of the entire supply chain (Lummus and Vokurka, 1999), as is demonstrated by benchmarking studies conducted by the Pittiglio Rabin Todd & McGrath consulting company. These studies report that supply chain management affords leading companies:

- A 40 to 60 percent advantage in the cash-to-cash cycle;
- A 44 percent higher value added per employee;
- A 3 to 7 percent reduction in total logistics costs as a percentage of revenue;
- 50 percent lower cost of ownership of materials; and
- A 30 to 50 percent improvement in meeting commitment dates (Allnoch, 1997; PRTM, 1993; Stewart, 1995).

These economic enhancements do not flow inevitably from supply chain management (Jarrell, 1998). Effectiveness is required. Therefore, the traditional approach of managing the supply chain as a loose collection of independent segments, each concerned with achieving its own objectives regardless of the effect on other segments, squanders the promised benefits of supply chain management (Balsmeier and Voisin, 1996). A leading reason for the traditional approach's failure is its reliance on cost management systems that emphasize the minimization of controllable costs (cf. Anderson, Britt, and Favre,1997, Principle 7). Having recognized this, some companies have tried to mitigate the effects of biased cost management practices by expanding their ABM systems to partly cover supply chain activities (see Barr, 1996; Cooper et al., 1992; Player and Keys, 1995; Pohlen and La Londe, 1994; and Ortman and Buehlmann, 1998). Their efforts will likely end in disappointment because ABM focuses on the internal economics of activity costs; it fails to address the issue of how supply chains can improve customer value and satisfaction (cf. Johnson, 1992).

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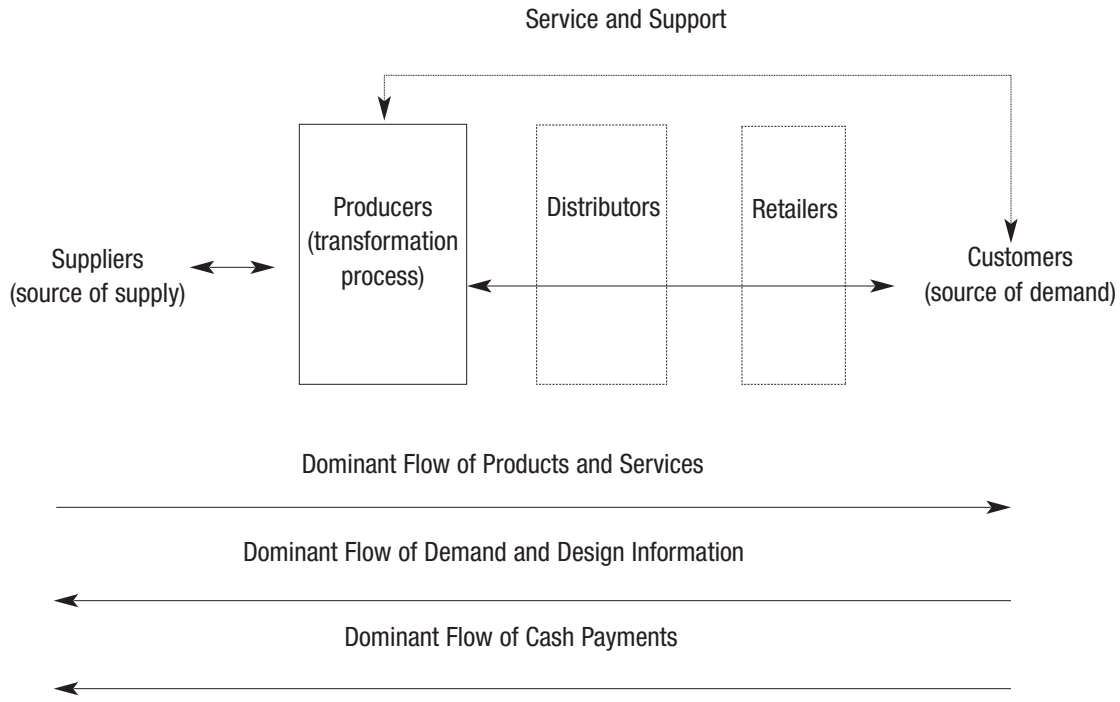
Effective supply chain management requires a less cost-centered cost management system—like (paradoxically) target costing (cf. Cooper and Slagmulder, 1999). Notwithstanding its name, target costing centers on customer requirements. Cost is viewed as an end result, and as an economic umbrella; customer requirements are viewed as binding competitive constraints. Under target costing, the supply chain incurs whatever costs are necessary to satisfy customers' expectations for quality, functionality, and price (cf. Womack and Jones, 1996, p. 35). Cost rationalization, not minimization, is the goal.

This article presents a framework for applying target costing to supply chain management. The framework combines the two market variables of *customer requirements* and *supply chain agility* to define strategies for carrying out target costing. The contents of these strategies set the key features of three unique target costing processes for supply chains. To lay the background for describing these strategies, the article first comments on the shortcomings of traditional and ABM cost systems for supply chain management. Then, after the target costing strategies have been described, the discussion turns to the economics of deploying a target costing process throughout a supply chain.

Exhibit 1

Supply Chain



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COST MANAGEMENT AND SUPPLY CHAINS

A *supply chain* is a network of operating entities through which an organization delivers products or services to a particular customer market (Poirier and Reiter, 1996, p. 5). This network constitutes an indispensable portion of the business system that Porter (1985, p. 35) originally referred to as the *value system*, which Womack and Jones (1996) later called the *value stream*, and which cost management theorists and practitioners now refer to as either the *extended enterprise* (Ansari et al., 1997) or the *value chain* (Drury and McWatters, 1998; Shank and Govindarajan, 1993).

As a segment of this larger system, a supply chain is charged with performing those value chain activities that span the sourcing of materials and parts to making the product to delivering the product or service to customers (Ganeshan et al., 1998; Handfield and Nichols, 1999, Chap. 1; Kaplan and Norton, 1996, p. 27). As Exhibit 1 shows, all supply chains contain three core elements:

- Suppliers;
- Producers; and
- Customers.

Not all, but many, also contain distributors and retailers as well as service and support functions. Whatever the composition, the elements of a supply chain must operate in a coordinated manner: Products and services generally flow from "sources of supply" to "sources of demand"; information and cash payments generally flow in the reverse direction. The goal of the coordinated efforts among the elements of the supply chain is to achieve operational excellence that results in superior customer value and satisfaction (Johnson, Marsh, and Tyndall, 1998).

For-profit companies use financial data from their cost management systems to plan and control the operations of supply chains and to establish the costs of products and services that move through supply chains (Johnson, 1992, p.18). Most of their cost systems are *traditional*, in that the operating

principles and concepts underlying them were largely developed before 1925 (Johnson and Kaplan, 1987a, p. 12). Those few companies that do not use traditional systems run some version of ABM. But, these companies are only marginally better off, for neither a traditional nor an ABM cost system provides optimal information for managing integrated supply chains.

Accounts of the shortcomings of traditional cost management are plentiful (see Cooper, 1989; Kaplan, 1984; Johnson and Kaplan, 1987b; Turney, 1991). Although they are not repeated here, the weaknesses of traditional cost management information for managing supply chains illuminate these accounts. The most glaring of these weaknesses is the treatment of customers: Except for cost, customers' perceptions of value and customer requirements are ignored. Customers are viewed as uninteresting entities to be cajoled into purchasing products and services. Managers, according to the tenets of traditional cost management, should focus on the internal economics of the supply chain to minimize its costs. Suppliers, manufacturing methods, and distribution channels should all be selected based on their impact on unit cost. Other aspects of the supply chain strategy are ignored. Moreover, traditional cost management does not distinguish between low- and high-value processes or activities. The only distinction maintained is between more and less costly activities. The implicit—though unjustified—assumption is that all costs add some value that savvy companies can recoup from customers.

Compared to the traditional cost approach, ABM offers substantially better information for supply chain management. Its cost information is more accurate, it is capable of supporting and monitoring the supply chain strategy (Turney, 1992), and it partially integrates customer requirements into the analytical procedures used to establish the value of an activity. Nevertheless, ABM is not a fully satisfactory framework for managing supply chains, as can be deduced from ABM's practice of labeling activities as "non-value-added." The labeling has two problems. First, in the typical ABM analysis, the designation of an activity as "non-value-added" occurs without the benefit of customer input. The designation may reflect the company's policy, the recommendation of an ABM consultant, or the best guesses of the participants in the ABM study (Brimson, 1994; Cokins, 1996; Pryor, Sahm, and Diedrich, 1992; Sharman, 1994). In either case, there is no guarantee that the value of an activity established by an ABM study reflects the customers' true requirements (see Butz and Goodstein, 1996, and Gale, 1994).

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The second problem with ABM's activity valuations is that they become inputs for the calculation of "non-value-added" cost. Managers are expected to use these cost figures to identify improvement opportunities. This "cost-world" use of ABM information encourages managers to become more effective and efficient in performing *existing* activities—that is, to become better at doing what they are already doing—which may not be right! It does not encourage managers to engage in the relentless search for new opportunities to create customer value or to find ways to reconfigure existing activities to provide greater customer value (Johnson, 1992). For this reason, ABM may lead managers to optimize the short-run efficiency of a supply chain to the detriment of its long-run survival and profits.

TARGET COSTING FOR SUPPLY CHAINS

Target costing is a process for ensuring that a product launched with specified functionality, quality, and sales price can be produced at a life-cycle cost that generates the desired level of profitability (Cooper and Slagmulder, 1997). Though partially masked by variation in its implementations, the targeting costing process has a general structure. Early in the process, a company determines the price customers are willing to pay for a product, given its functionality, quality, and the substitute products offered by competing companies. From this price, the company subtracts the profit margin required to satisfy its stakeholders and to fund the research and development of future products. The resulting quantity is the *allowable* cost for the product—the maximum cost that the company should incur in the manu-

facture, distribution, service, and disposal of the product. In the simplest cases, the allowable cost constitutes the target cost for the product.

After the target cost has been established, the company begins the tasks of cost attainment. This entails using managerial techniques such as *value engineering* to redesign the product, its manufacturing process, and its distribution and service systems so as to remove any gap between the current cost and the target cost of the product. The objective is to uncover ways to satisfy customer requirements for quality and functionality at the target cost. The target costing process ends when the company achieves this objective or abandons the product.

Toyota invented target costing during the 1960s (Tanaka, 1993). Since then, its use has spread extensively among Japanese companies. U.S. companies, being more wedded to traditional cost management practices than Japanese companies (Hiromoto, 1988; Sakurai, 1996), have deployed target costing systems comparatively slowly and less widely. That difference in adoption rates notwithstanding, one likely reason why many companies have adopted target costing is that its underlying economic principles embody the recent dramatic shift of market power from "producers" to customers. Specifically, target costing places customer requirements at the heart of a company's efforts to develop and deploy product strategies. "Manufacturing efficiency" is ousted from its long-held, uppermost position in management's thinking about product competitiveness. Despite this, target costing should not be uncritically adopted as a tool for supply chain management. It should be introduced into only those supply chains that are *ready*. These are chains whose members (and potential members), having clearly defined their operations strategies (cf. Lummus et al., 1998; PRTM, 1996), are committed to five ideals:

1. Creating maximal value for the end customer;
2. Fairly sharing the financial rewards and burdens of operating the supply chain;
3. Continuously improving the capabilities of the supply chain;
4. Freely exchanging management information among members of the supply chain; and
5. Becoming *prepared* to deploy target costing (see Ansari, Bell, and CAM-I Target Cost Core Group, 1997; CAM-I, 1995; Poirier and Reiter, 1996; Womack and Jones, 1996, p. 277).

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Besides having members that share the values expressed in these ideals, to be *ready*, a supply chain must also operate under an enforceable business *protocol* (Cooper and Slagmulder, 1999, p. 118). This protocol, which might be formalized as Joint Service Agreement (PRTM, 1995), governs the buyer-supplier relationships throughout the chain and establishes the obligations of its members to cooperate for the benefit of the entire supply chain (Cooper and Slagmulder, 1999, p. 118; see also New, 1996). Along with other stipulations, the protocol prescribes:

- The governance structure for achieving and controlling the required linkages (product, knowledge, and process) among the members of the chain;
- The method of sharing risks, rewards, and costs of operating and improving the supply chain; and
- The types of support members of the chain are to provide for any interorganizational cost management system installed within the supply chain.

Through such prescriptions, the protocol codifies the business practices of, and power relationships within the supply chain. For example, the protocol for Kodak's supply chain requires that suppliers share operating and financial information with Kodak as a precondition for becoming part of the chain (Ansari et al., 1997, p. 96). Under a similarly demanding protocol, the Japanese companies of Tokyo Motor Works, Yokohama Corporation, and Kamakura Iron Works Company operate as a supply chain wherein sales prices among its members are determined through a set of linked target costing systems (Cooper and Slagmulder, 1999).

While all *ready* supply chains enjoy a palpably higher

probability of successfully deploying target costing, they may implement different target costing systems because various competitive forces affect how target costing gets employed in supply chain management (see Ansari et al., 1997, and Cooper and Slagmulder, 1997). Two of the more important of these forces are the *agility* of the supply chain and the nature of *customer requirements*. As illustrated in Exhibit 2 and further discussed below, different combinations of agility and customer requirements affect three important aspects of target costing for supply chains:

1. The basis for determining target costs;
2. The effort expended on the process; and
3. The activities most critical to the success of the target costing process (cf. Laseter, Ramachandran, and Voigt, 1997; Cooper and Slagmulder, 1997).

Quadrant I Supply Chains

Supply chains that operate in "quadrant I" environments serve sophisticated customers that have diverse and rapidly changing requirements. Satisfying these customers requires that supply chains deliver a large

Exhibit 2

An Economic Framework for Applying Target Costing to Supply Chain Management

Supply Chain Agility	*Customer Requirements: Dynamic*	*Customer Requirements: Static*
High	I Value-Based Target Costs (*moderate* effort expended on the target costing process) Key Activity Assembling a supply chain capable of creating superior customer value	II Price-Based Target Costs (*little* effort expended on the target costing process) Key Activity Assembling a price-competitive supply chain
Low	III Value-Based Target Costs (*moderate* effort expended on the target costing process) Key Activity Performing *value engineering* analysis of supply chain activities	IV ABM-Based Target Costs (*considerable* effort expended on the target costing process) Key Activity Establishing the cost of low-value, low-quality, inefficient supply chain activities

variety of high-value products, most of which, failing to become "business classics" (Sanderson and Uzumeri, 1997), are short-lived. Quadrant I supply chains succeed at this because of their agility. These chains are easily disassembled and reassembled with more able members and improved capability; they are easily expanded or contracted to improve responsiveness; and their vital activities are easily reassigned among the members of the supply chain to improve efficiency (cf. Oleson, 1998, chap. 12). For a modest investment of financial resources and no lasting detrimental impact on intercompany relationships, the supply chain can be reconfigured so that its core competencies closely match current customer requirements. Effectively used, such agility allows the supply chain to sustain its ability to provide superior customer value.

The role of target costing in quadrant I environments is to support the process of reconfiguring the supply chain. After techniques such as QFD have been used to establish customer requirements and to establish where customer value is created in the supply chain, target costing is used in two important ways. First, target costing techniques are used to apportion the allowable product cost among supply chain activities in proportion to the value the activities create. These "prorated costs" become the prices paid to members of the supply chain, other than the *market maker* (or *channel leader* or *nucleus company* or *core company*),[1] for performing the activities. With the cost or price of supply chain activities determined, target costing procedures are again used to identify members of the supply chain that are capable of performing the supply chain activities at the "allowed" cost. The set of most capable members combines to operate as the supply chain until further changes in customer requirements or member performance necessitate another reconfiguration.

Quadrant II Supply Chains

Quadrant I and quadrant II supply chains are alike in a notable respect: They are agile, and their members can be switched at relatively low cost. Beyond that, they differ considerably. Quadrant II supply chains operate in stable business environments where customer requirements are homogeneous and change slowly. Thus, servicing customers' needs places light demands on these supply chains: The supply chains need to carry only a few product models, and new generations of products have to be introduced only infrequently.

Quadrant I and quadrant II supply chains are alike in a notable respect: They are agile, and their members can be switched at relatively low cost.

In quadrant II, where the value propositions of products are relatively stable and well understood, target costing is primarily used to determine the market prices and profit margins for products and to provide an economically sound basis for negotiating prices for performing supply chain activities among supply chain members. Getting the members to agree on prices is the most difficult—yet most vital—step in target costing. A successful end to the negotiation meets two criteria:

- The prices paid to all members of the supply chain, excluding the market maker, total no more than the market maker's allowable product cost.
- The agreed-upon prices are adequate to protect the long-run profitability and survival of the members of the supply chain.

Quadrant III Supply Chains

Supply chains operating in quadrant III environments face competitive difficulties. Whereas customer requirements are *dynamic*, the supply chains are rigid and enormously difficult to reconfigure. In most situations, switching supply chain members would simply prove to be prohibitively costly. If the supply chain is to succeed, its existing members must find ways to satisfy the increasingly exacting changes in customer requirements.

Target costing functions in a quadrant III environment much as it does in a quadrant I environment. The allowable cost is allocated to supply chain activities in proportion to the customer value created. However, unlike what happens in quadrant I, incapable members of quadrant III supply chains are not dropped. Instead, the members of the supply chain undertake joint value engineering efforts. The goal is to reengineer supply chain activities such that each member's value contribution is

properly aligned with the "allowed" cost.

Quadrant IV Supply Chains

Quadrant IV business environments are severely constraining: Customer requirements are uniform, stable, and well known, and the supply chains are fixed. To be effective, supply chains operating in these environments must control and reduce their overall costs. For that reason, members of these supply chains devote considerable effort to building intercompany activity-based models of supply chain costs (see Statement on Management Accounting 4P for an example; IMA, 1992). They use the knowledge about the cause and cost of low-value, low-quality, inefficient supply chain activities gleaned from these models to design joint cost-improvement projects and to fashion equitable agreements for sharing the burdens and rewards of any joint project.

The role of target costing in quadrant IV environments is to stimulate and structure efforts to continuously improve the cost-competitiveness of supply chains. This is accomplished by operating the target costing process as a modern version of a cost-plus pricing system (see Bayou and Reinstein, 1997): That is, prices among members of the supply chain are computed by applying the market markup to the activity-based waste-free cost of performing supply chain activities (cf. Womack and Jones, 1996, p. 35). This pricing scheme motivates self-interested members of the supply chain to eliminate waste from their processes and, thereby, reduce their costs and increase their profits. However, self-interest should not be allowed to proceed unchecked. The "gain sharing" arrangements among members of a supply chain must protect the viability of the chain against the threats posed by members' efforts to optimize local cost (Cooper and Slagmulder, 1999; Poirier and Reiter, 1996). In general, gains should be shared in a way that removes financial incentives for supply chain members to improve their separate short-run operating efficiencies and profits by taking manipulative actions—such as deferring R&D expenditures—that might impair the long-run competitiveness of the supply chain.

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From Design to Deployment

Identifying the quadrant of Exhibit 2 in which a supply chain operates is just the first step. After that, under the guidance of the market maker, the members of a chain must deploy and control the target costing process. Whether they are successful depends importantly on the industrial structures under which the companies operate.

For example, in concentrated industries, companies might participate in numerous supply chains—in some as a market maker, in some as a minor supplier (see Cooper et al., 1997; Handfield and Nichols, 1999, p. 42; and Womack and Jones, 1996, chap. 12). Accordingly, some companies might confront both high- and low-agility supply chains and both static and dynamic customer requirements. And the mix of supply chain characteristics these companies confront might change continually over the life cycle of the product family, for a chain that begins in quadrant I might migrate to quadrant IV as agility decreases and customer requirements become more stable. Moreover, the several chains in which a company participates might migrate through the quadrants at varying rates.

To handle such complexities, companies would need to deploy multiple types of target costing systems, possibly one that is value-based and another ABM-based. Not surprisingly, the financial and human resources committed to target costing by the companies would increase commensurately. This could pose a cost management challenge for the supply chains containing the companies because the marginal cost of any chain's target costing process should not be allowed to outstrip the value of the customer benefits the process delivers. Exactly how supply chains would satisfy this economic standard depends on agility. Where agility is high, reconfiguring supply chains based on the target costing capability of its members might prove practicable. Where agility is low, the presence of high switching costs would make joint reengineering efforts a better choice for driving down the costs of the target costing processes of supply chains. However, where such agility-

guided actions are incapable of making target costing processes affordable, supply chains should operate outside of the framework of Exhibit 2 and should decline to deploy formal, channelwide target costing processes.

CONCLUSIONS

Many leading companies have begun adopting the principles of supply chain management (cf. PRTM, 1996; Quinn, 1998). While their motivations vary, all undoubtedly hope to obtain operational improvements and to gain sustainable advantages in creating shareholder and customer values (cf. Johnson et al., 1998; Cooke, 1998). Whether these hopes are realized depends partly on the fitness of the company's cost management practices. Those companies that still use internally focused, cost-centered traditional or ABM systems will need to replace them with process-oriented, customer-centered systems. Target costing is one such system. For situations where customer requirements are dynamic, a value-based target costing process is recommended for the supply chain, regardless of the level of agility in the chain. In contrast, the combination of static customer requirements and high supply chain agility points to the need for a price-based target costing process. And where static customer requirements confront low supply chain agility, an ABM-based target costing process is suggested for the chain. By following these prescriptions, companies in a supply chain can select and deploy a target costing process that supports their move to supply chain management and, thereby, improve their chance of reaping the full competitive benefits of supply chain management.

NOTE

1. Ansari et al. (1997) provides a detailed account of the role of market makers in supply chains, and a succint accounting of the role of channel leaders and nucleus companies can be found in Cooper et al. (1997) and Poirier (1999), respectively. Cooper and Slagmulder (1999) explains the core company's leadership role within three archetypal supply chain networks. For editorial simplicity, the phrase "market leader" is used throughout the remainder of the article to denote that company which provides leadership to the supply chain.

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