



Best value supply chains: A key competitive weapon for the 21st century

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Abstract

All executives would like their organizations to perform better, and most seek ways to make that happen. This paper focuses on how supply chains – the series of activities through which products and services are created and then distributed to customers – can enhance firm performance. For the last couple of decades, most firms have emphasized maximizing speed or minimizing costs within their supply chains. In the current business landscape, however, a broader approach is needed. We describe the main advantages of developing best value supply chains as a tool for enhancing performance. These chains differ from traditional chains in important ways. Best value supply chains are used by organizations as a central element of strategy, not simply as a means to move materials. Rather than focusing primarily on speed or cost, best value supply chains are designed to deliver superior total value to the customer in terms of speed, cost, quality, and flexibility. Our contention is that organizations that develop best value supply chains will enhance their performance. We support this contention with examples from leading firms that reflect a best value approach.

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1. Time, money, and supply chains

“Time is money!” warns a famous aphorism. This simple yet profound statement suggests that organizations which complete work quickly will enjoy greater profits, while slower moving firms will suffer. The

belief that time is money has encouraged the modern emphasis on supply chain management. A supply chain is a system of people, activities, information, and resources involved in creating a product and then moving it to the customer. Many organizations attempt to integrate and closely coordinate the various elements of their supply chains in order to enhance efficiency. Indeed, minimizing cycle time – the time it takes to fulfill a customer’s needs – has been a central goal of executives in recent decades.

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However, indications are that competition in the 21st century will require a different approach. We are beginning to see the emergence of what we label as best value supply chains (Ketchen & Hult, 2007). These chains do not fixate on speed, or on any other single metric. Instead, relative to their peers, best value supply chains focus on the *total value added to the customer*. More specifically, best value supply chains target high quality performance across four competitive priorities: speed, cost, quality, and flexibility. In some cases, best value supply chains are surpassed on one or two of these dimensions by other firms' chains. However, most customers' needs are multi-faceted; few are concerned with just speed or cost. As a result, best value supply chains provide superior outcomes in terms of overall customer satisfaction.

Based on state-of-the-art research literature and observations of leading firms, our belief is that firms can benefit from moving toward a best value approach. The objective of this paper is to develop a description of best value supply chains that can help guide firms toward enhancing their supply chain practices. As shown in Figure 1, best value supply chains use *strategic supply chain management* to excel across speed, quality, cost, and flexibility. These efforts require coordination across at least four supply chain elements: strategic sourcing, logistics management, supply chain information systems, and relationship management. No firm at present has all of the features we describe. However, a variety of very successful firms currently have many of these features, and we anticipate that over time some of them will realize the full potential offered by the best value concept. After developing the key components of the best value concept below, we discuss how one firm, Raytheon Technical Services Company, is moving toward a best value approach to its supply chains.

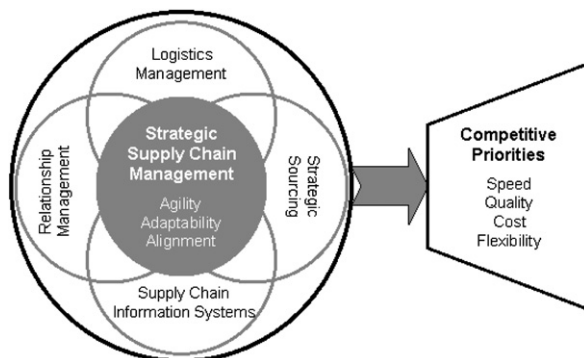


Figure 1 An illustration of best value supply chains

2. Overall features of best value supply chains

2.1. Strategic supply chain management

The traditional view of supply chain management is that it is mainly a process for obtaining and moving goods and services. According to this view, supply chains are tactical and transactional in nature, and are a cost center rather than a revenue driver. Not surprisingly, many firms focus on individual operational metrics such as dock-to-stock time and manufacturing lead time to assess their chains. Indeed, most organizations do not track or have a method of recording total supply chain performance.

Best value supply chains are grounded in a different set of assumptions and practices. Their focus is on *strategic supply chain management*, or the use of supply chains as a means to create competitive advantages and enhance firm performance (Hult, Ketchen, & Slater, 2004; Upson, Ketchen, & Ireland, 2007). Such an approach contradicts the popular wisdom centered on the need to maximize speed. Instead, there is recognition that the fastest chain may not satisfy customer requirements. Best value supply chains strive to excel along four competitive priorities. *Speed* (often referred to as cycle time) is the time duration from initiation to completion of the supply process. *Quality* refers to the relative reliability of chain activities. Supply chains' efforts to manage *cost* involve enhancing value by either reducing expenses or increasing customer benefits for the same cost level. *Flexibility* refers to a supply chain's responsiveness to changes in customers' needs (Hult, Ketchen, Cavusgil, & Calantone, 2006). Through balancing these four metrics, best value supply chains attempt to provide the highest level of total value added.

The value of strategic supply chain management is reflected in how firms such as Wal-Mart, Toyota, and Zara have used their supply chains as competitive weapons to gain advantages over peers. For example, Wal-Mart excels in terms of speed and cost by locating all domestic stores within one day's drive of a warehouse while owning a trucking fleet. This creates distribution speed and economies of scale that competitors simply cannot match. When K-Mart executives decided in the late 1990s to compete with Wal-Mart head-to-head on price, Wal-Mart's sophisticated logistics system enabled it to easily withstand the price war. Unable to match its rival's speed and costs, K-Mart soon plunged into bankruptcy. Wal-Mart's supply chains also possess strong quality and flexibility. When Hurricane Katrina devastated the Gulf Coast in 2005, Wal-Mart used not only its warehouses and trucks, but also satellite technology, radio frequency identification (RFID),

and Global Positioning Systems to quickly divert assets to affected areas. The result was Wal-Mart emerged as the first responder in many towns, and provided essentials such as drinking water faster than local and federal governments could.

Meanwhile, failing to manage a supply chain effectively causes serious harm. For example, in 2003 Motorola was unable to meet demand for its new camera phones because it did not have enough lenses available (Lee, 2004). To give another example, firms whose supply chains were centered in the Port of Los Angeles collectively lost over \$2 billion a day during a 2002 workers' strike. In terms of stock price, firms' market value erodes by an average of 10% following the announcement of a major supply chain problem (Hendricks & Singhal, 2003).

2.2. The three A's

As shown in Table 1 and described below, best value supply chains differ from typical supply chains in how they approach three issues closely tied to strategic supply chain management: agility, adaptability, and alignment (Lee, 2004). Table 1 also identifies keys for moving toward a best value approach for each issue, and provides examples of firms that have made significant strides along this path.

2.2.1. Agility

Agility is the supply chain's relative capacity to act rapidly in response to dramatic changes in supply and demand. Agility can be achieved through the use of buffers. Excess capacity, inventory, and management information systems all provide buffers that allow a best value supply chain to provide better service and be more responsive to its customers. Rapid improvements and decreased costs in deploying information systems have enabled supply chains in recent years to reduce inventory as a buffer. Much popular thinking depicts inventory reduction as a goal in and of itself. However, this cannot occur without corresponding increases in buffer capacity elsewhere in the chain, or performance will suffer. A best value supply chain seeks to optimize the total costs of all buffers used. The costs of deploying each buffer will differ across industries; therefore no solution that works for one company can be applied directly to another in a different industry without adaptation.

Agility in a supply chain can also be achieved or improved by co-locating with the customer. This arrangement creates an information flow that cannot be duplicated through other methods. Daily face-to-face contact for supply chain personnel enables quicker response times to customer demands due to the speed at which information can travel back and forth between the parties. Again, this buffer of increased and improved information flows comes at

an expense, so executives seeking to build a best value supply chain need to investigate the opportunity and determine if this action optimizes total costs.

2.2.2. Adaptability

Adaptability refers to a willingness and capacity to reshape supply chains when necessary. Generally, creating a single supply chain for a customer is desired because this helps minimize costs. However, adaptable firms realize that this is not always a best value solution. For example, in the defense industry, the U.S. Army requires one class of weapon simulators to be repaired in less than eight hours, while another class of items can be repaired and returned inside of one month. In order to service these varying requirements efficiently and effectively, Computer Science Corporation (the firm whose supply chains maintain the equipment) must devise adaptable supply chains. In this case, spare parts inventory is positioned at close proximity to the class of simulators requiring quick turnaround, while the less time sensitive devices are sent to a centralized repair facility. This supply chain configuration allows Computer Science Corporation to satisfy customer demands while avoiding the excess costs that would be involved in localizing all repair activities.

In situations where the interests of one of the firms in the chain and the chain as a whole conflict, most decision makers will choose an option that benefits their firm. This creates a need for alignment among chain members.

2.2.3. Alignment

Alignment refers to creating consistency in the interests of all participants in a supply chain. In many situations, this can be accomplished by carefully writing incentives into contracts. Collaborative forecasting with suppliers and customers can also help build alignment. Taking the time to sit together with participants in the supply chain to agree on anticipated business levels permits shared understanding and rapid information transfers between parties. This is particularly valuable when customer demand is uncertain, such as in the retail industry.

3. Specific features of best value supply chains

Beyond using strategic supply chain management and the three As to service the four competitive priorities, best value supply chain organizations demonstrate certain characteristics in various elements of the supply chain. Specifically, as shown in Table 1, best value supply chains differ from traditional supply chains in at least four key areas: strategic sourcing,

Table 1 From typical to best value supply chains

Issue	Typical supply chains	Best value supply chains	Key to making the transition to a best value approach	Example company
Approach to supply chain management	Supply chains <i>support</i> strategy by ensuring the needed flow of goods and services	Firms should leverage strategic supply chain management, agility, adaptability, and alignment to <i>create</i> competitive advantages	Executives must view supply chains as a strategic weapon rather than as a cost center	<i>Zara</i> keeps pace with and creates transient fads in the fashion industry through very rapid product development and distribution
Agility	Moderate capacity to react to changes	Good capacity to anticipate and react to changes	Executives must devise a company-specific approach to managing the costs of buffers	<i>Raytheon Technical Services Company</i> locates an executive office nearby key customers
Adaptability	Focus on efficiency through the use of discrete supply chains	Maintain overlapping supply chains to ensure customer service	Executives must be willing to accept the added expense of duplication	Based on customer's needs, <i>Computer Science Corporation</i> positions some inventory close to customer locations while other items are warehoused centrally
Alignment	Supply chain members sometimes forced to choose between their own interest and the chain's interest	A rising tide lifts all boats – the interests of supply chain members are consistent with each other	Executives must view problems from the supply chain level of analysis rather than the firm level	When a supplier's suggestion saves <i>R.R. Donnelly</i> money, the firm splits the savings with the supplier
Strategic sourcing	Involve suppliers later in the product development process	Involve suppliers early in product development and throughout	Sourcing managers must adopt a holistic, "big picture" view of their role in the company	Aerospace firms such as <i>Northrup Grumman</i> create product development alliances years in advance of government proposals for new aircraft
	Monitor internal processes	Monitor performance end-to-end		
Logistics management	Treat logistics as a transportation mechanism	Treat logistics as a strategic inventory mechanism	Finding the ideal balance of speed, quality, cost, and flexibility within distribution systems	<i>Dell Computers</i> revolutionized the personal computer business through by-passing retailers and distributing directly to customers
Supply chain information systems	Participants have data at the same time or after a product's movement	Participants have data prior to a product's movement	Information systems must be created that allow data sharing across supply chain participants while protecting each firm's proprietary data	<i>Wal-Mart</i> uses satellite technology, radio frequency identification (RFID), and Global Positioning Systems to track inventory in real time
Relationship management	Moderate success at matching nature of relationship to the task	Effectively match nature of relationship to the task	Recognizing that most supply chain relationships should be managed through contracts, not rich partnerships	<i>Wendy's</i> carefully examined its 225 suppliers to identify less than 40 that were candidates for collaboration

logistics management, supply chain information systems, and relationship management.

3.1. Strategic sourcing

Often viewed as the inbound portion of supply chains (from raw material to the manufacturer), strategic sourcing plays an increasingly significant role in products and services. For example, about 70% of the cost of a John Deere tractor is made up of materials from external suppliers. Similar component allocations can be found in many other industries, such as the aerospace industry where more than 80% of the cost of a given product is directly tied to the cost of materials. Given this importance, best value supply chains involve external suppliers early in product development. In aerospace, teaming partners are often identified and secured years in advance of a government proposal being finalized, so the best solution to anticipated customer requirements can be developed over time. Supply chains that practice early supplier involvement achieve on average a 20% reduction in material cost, a 20% improvement in material quality, and a 20% reduction of development time (Monczka, Trent, & Handfield, 2005). Three strategic sourcing 'enablers' drive these outcomes in best value supply chains: human resources, strategic sourcing design, and measurement systems.

Human resources are of course critical in almost any line of work, and best value supply chains are no different. However, the knowledge and skills needed are specific to the chain setting. Requirements of best value supply chains include the ability to develop supply chain managers who view the chain holistically, meaning with a perspective of how strategic sourcing contributes to chain operations. These managers must also have the capability to manage critical relationships, understand the chain's integration into the firm's overall business model, and engage in value-based decision-making. Perhaps most importantly, these managers must have the capability and foresight to integrate strategic sourcing with other critical supply chain functions (e.g., logistics, information systems, and relationship management).

The development of an appropriate *strategic sourcing design* is critical to achieve the benefits of best value supply chains. Firms often build their strategic sourcing designs independently from supply chain relationships. Such firms may end up being efficient and effective in their strategic sourcing operations, but the overall supply chain often suffers. Requirements for best value supply chains' design efforts include centrally supported management teams, a focus on coordinating strategic

sourcing activities, often the co-location of strategic sourcing personnel with internal and external customers, and coordination across the firm's business units.

The *measurement system* is the last of the three enablers of strategic sourcing that helps make best value supply chains superior to traditional supply chains. Most strategic sourcing (and supply chain) managers monitor the performance of internal processes and strategic sourcing functions. In contrast, best value supply chains track end-to-end performance of the entire supply chain processes, including both the strategic sourcing portion and the entire supply chain, as well as the logistics function, information systems, and the relationship management processes.

3.2. Logistics management

As a critical component within best value supply chains, logistics should be managed as an integrated effort to achieve the value associated with the four competitive priorities: speed, quality, cost, and flexibility. Typical supply chains use logistics as an extended transportation mechanism, while best value chains integrate logistics as a strategic mechanism at the level of corporate strategy. Specifically, best value chains go beyond traditional logistics requirements by stressing a holistic logistical value proposition, emphasizing the value of positioning inventory, and developing a flexible chain structure (Bowersox, Closs, & Cooper, 2007).

The *logistical value proposition* involves finding the ideal balance of speed, quality, cost, and flexibility. The law of diminishing returns dictates that the ideal balance cannot develop by achieving the extreme on any of the competitive priorities. For example, very seldom will either the highest attainable quality or the lowest cost constitute the desired logistics strategy in the best value supply chains. In addition, the appropriate combination of the competitive priorities will be different for different customers, situations, and product/service offerings, which is a practical realization that best value chains can incorporate effectively. A well-designed logistical effort in best value chains stresses high customer impact, consistent performance, and optimal inventory management. Minimization of any one element, such as flexibility, should not be a goal of a best value supply chain. Rather, executives should realize that the optimal performance along each of the four priorities should be pursued relative to the value delivered to the customer.

The number, size, and geographical network of facilities used for logistical operations affects the four competitive priorities. Accordingly, *positioning*

inventory to achieve the desired time, place, and possession benefits at the lowest practical cost is a key feature of best value supply chains. This means that for a supply chain to realize maximum strategic value from logistics, all critical operations must be integrated (i.e., decisions in one area will affect operations in others). These operations include order processing, inventory, transportation, warehousing, materials handling, packaging, and facility networks.

A *flexible structure* for the logistics function and process refers to preplanned contingency strategies to prevent logistical failures. Most supply chains have little, if any, flexibility. For example, when the port of New Orleans shut down in 2005 due to Hurricane Katrina, many chains that were linked through the port could not function. However, the best value supply chains build in sufficient flexibility, and also add buffers, either in the form of inventory, capacity, or cycle time, to offset unforeseen contingencies. The advantages of having flexibility include allowing firms to be nimble in product offerings, preventing security/terrorism-related failures, and being at the forefront of customer responsiveness. Best value supply chains plan for contingency operations, and practice them, thereby testing their responsiveness in the face of adversity.

3.3. Supply chain information systems

As recently as 10 years ago, the average time to fulfill customer orders ranged from two to four weeks. Incredible changes have occurred as the result of improvements in the information systems now used to manage supply chains, bringing delivery times down to days and, in some cases, hours. Overall, effective supply chain information systems provide important benefits, including cost reductions, productivity improvements, and alignment of an appropriate product/market strategy (Handfield & Nichols, 2002). Thus, the development of these systems is critical to the achievement of best value supply chain management.

The main goal of the information system is to link all elements of the supply chain seamlessly so an "information trail" tracks a product's "physical trail" and does so proactively (Simchi-Levi, Kaminsky, & Simchi-Levi, 2004). A proactive focus is critical. It means that participants in the chain should have information about each step of the chain prior to the product's physical movement through those steps. This allows for planning, tracking, and predicting lead times based on actual data. Ideally, all participants in the supply chain are continuously provided relevant information in real time. However, the information system should also be constructed in a way that protects each firm's sensitive data from being revealed to others unless necessary.

A best value supply chain develops systems that effectively manage four types of functionality: transaction systems, management control, decision analysis, and strategic planning (Bowersox et al., 2007). *Transaction systems* are characterized by certain established procedures, including the tracking of the volume of transactions, and an operational focus (for most firms this operational focus is on day-to-day activities). At the most basic level, the transaction system records outbound activities such as order entry, inventory, shipping, pricing, invoicing, and customer relationship management. More sophisticated systems include 'inbound activities' related to each step from raw materials to finished goods, with each step of work-in-process being recorded.

Management control focuses on effective performance measurement and reporting. For example, the Supply Chain Council has developed the *SCOR Model*, a process reference model that integrates the concepts of business process reengineering, benchmarking, best practices analysis, and process measurement related to five distinct supply chain processes: plan, source, make, deliver, and return (Supply Chain Council, 2007). *Plan* refers to processes that balance aggregate demand and supply to develop a course of action which best meet sourcing, production and delivery requirements. *Source* denotes processes that procure goods and services to meet planned or actual demand. *Make* encompasses processes that transform product to a finished state to meet planned or actual demand. *Deliver* refers to processes that provide goods or services to meet planned or actual demand, typically including order management, transportation management, and distribution management. *Return* indicates processes associated with returning or receiving returned products for any reason. Best value supply chains use this model or similar models to rapidly detect and correct deviations.

Decision analysis focuses on software tools that can assist supply chain managers in identifying, evaluating, and comparing strategic and tactical alternatives to improve the effectiveness of each step in the supply chain. Common types of analyses include supply chain design, inventory management, resource allocation, routing, and customer-segment profitability. Best value chains effectively use numerically weighted criteria in order to sort through possible alternatives. Analytical skills and models used in conjunction with strategic planning drive the logistical operations of best value supply chains.

Strategic planning often involves organizing large amounts of data into a coherent asset (such as a database) to assist in evaluating strategic alternatives. The information system needs to help decision makers assess, for example, the desirability of entering strategic alliances, the development of manufacturing

operations, and opportunities that can enhance customer responsiveness. A critical concern is how much data to maintain, how to make it available when needed, and in what format to present the data to users. For example, very few firms know what they have purchased, in what quantities, at which prices, and from which suppliers for the past decade around the globe. Such a database would be far too expensive to justify in most situations. Best value supply chains find the optimal balance between maintaining comprehensive supply chain information on one hand and cost considerations on the other.

3.4. Relationship management

Effectively integrating the participants in a supply chain is crucial to supply chain success. There are two basic ways to organize associations with other supply chain participants. *Cooperation* refers to contractual relationships, such as outsourcing or subcontracting. Such relations are highly structured, often complex, and can require extensive negotiation. Terms are laid out in advance and in detail (Miles, Miles, & Snow, 2005). As discussed previously, incentives must be aligned among supply chain participants. Effective cooperation in the form of well-conceived contracts can ensure such alignment. In contrast, *collaboration* refers to trust-based relationships centered on a sense of shared purpose. In these links, each partner comes to view the other as an extension of itself. Collaboration is very sophisticated, requires much time and energy, and is ambiguous and learning-intensive. For example, rather than explicitly defining exchange terms in advance, collaborative partners must postpone discussion of returns. This is because each side's relative contributions cannot be predicted in advance, and only become clear over time (Miles, Miles, & Snow, 2006).

Popular wisdom emphasizes the use of rich and deep collaborative partnerships among supply chain participants. In contrast, best value supply chains attempt to fit the approach to the problem. Managers leading such chains recognize that collaboration is not the 'one best way' to address relationships. For example, firms should look to contracts first when dealing with suppliers and other partners because contracts are faster and simpler to execute than rich partnerships (Narayanan & Raman, 2004). If desired outcomes can be achieved without collaboration, then collaboration should be avoided. Given the complex problems supply chains face, however, some collaboration is often beneficial.

Within best value supply chains, executives determine the best relationship to develop between themselves and a partner based on the value each delivers. If a product or service is commodity based,

or a fungible item, developing a strategic partnership does not make sense. Instead, a transactional focus is often pursued. However, as skills become more and more specialized and unique in the marketplace, executives building a best value supply chain will look to more complex relationships to leverage the value inherent in another firm's capabilities.

Deciding which supply chain participants are candidates for collaborative relationships is a key challenge for firms. Rating them along important dimensions is one possible solution. For example, Wendy's used such a process to sort through its 225 suppliers. Each supplier was ranked as 'high' or 'low' along two dimensions: complexity (e.g., taste, safety), and purchasing volume. The result was a two-by-two matrix that mapped the suppliers. Approximately 40 suppliers were rated as high on both dimensions and were therefore considered as possible collaborative partners. Ultimately, fewer than 10 were selected. Similarly, Colgate-Palmolive classified its suppliers in terms of their potential for cost reductions and their potential for innovation. Those firms that ranked high on both dimensions were viewed as potential partners (Lambert & Knemeyer, 2004). Although Wendy's and Colgate-Palmolive used two dimensions to assess potential partners, the same approach could be used with multiple dimensions.

4. Toward best value supply chains: The Raytheon approach

We are not aware of any firms that currently possess all the attributes of best value supply chains. However, Raytheon Technical Services Company, LLC (Raytheon) is one of a number of firms moving toward providing best value for its customers via the three As and the four functions of strategic sourcing, logistics management, supply chain information systems, and relationship management. The modern US military outsources many supporting functions, such as certain training activities and fuel provision, to private contractors. Raytheon is one of the "defense industry" firms that perform these functions.

In the Cold War era, key potential military adversaries were well known and their behavior was fairly predictable. This meant that defense firms' tasks in providing support were relatively simple and stable. However, today's current and potential adversaries are very unpredictable. Many do not wear uniforms, and their tactics often do not fit the 20th century model of fair combat. In response to its complex and dynamic environment, Raytheon has enacted innovative approaches to supply chain issues in recent years. We believe the firm's experiences to date can provide insight to both academics and managers interested in improving their supply chains.

Raytheon is developing *agility* by co-locating adjacent to its key customers. For example, a current contract requires Raytheon to provide a wide variety of support activities for live combat simulations (i.e., “war games”) ranging from repairing equipment to training people to play the role of civilians caught in a combat area. Raytheon operates a management facility very close to the military office that runs the simulations. The frequent direct contact between the parties, and the working relationships that develop as a result, provide unique insights into the customer’s needs. For example, as training needs evolve, Raytheon works with the customer directly to jointly refine and develop procedures. Issues that could have taken weeks to resolve via phone calls and e-mails can be resolved in hours through face-to-face meetings.

Adaptability is vital to Raytheon’s efforts to support combat simulations. Current insurgent tactics in Iraq center on Improvised Explosive Devices (IEDs) that adapt cell phones and other electronics as detonators for concealed explosives. Once insurgents’ preference for these devices became clear, Raytheon had to act quickly. The firm created a new “rapid response” supply chain by redeploying the most capable internal and external players from other chains. Development of training tools began with the creation of a new device which simulates an IED. Raytheon’s supply chain managers immediately began to work with industry leading suppliers to help develop the technology needed for this device. Production work and the deployment of the devices to training sites around the globe occurred within a compressed cycle time. Although the new rapid response chain was redundant with existing, reactive chains, it was needed to offer the customer the best value solution to a vexing problem. Raytheon has maintained this redundant process in anticipation of other rapid-response needs that may arise.

To help create *alignment* among the members of its supply chains Raytheon utilizes financial incentives. When partners’ practices and decisions save Raytheon money while still maintaining quality, the firm splits the savings evenly with the partners. In situations where there are preventable cost overruns, Raytheon applies penalties to its partners. To maintain a positive and collaborative culture across the supply chains, the incentives are slotted at a far higher level than the penalties. Through this incentive-based system, supply chain participants’ financial outcomes are tied together in terms of both upside and downside risk.

Raytheon has also devised a Supplier Ratings System (SRS) as a tool for creating alignment. The SRS measures a variety of performance factors including on-time delivery and quality. The system’s

design is based on statistical analyses that prove that using providers with superior SRS ratings leads to lower total supply chain costs for Raytheon. Suppliers with superior ratings are rewarded through inclusion on Approved Supplier Listings (ASLs) that facilitate the receipt of significant additional business. Suppliers with poor ratings are monitored regularly, and are removed from future projects if their performance does not improve. To ensure equity, the SRS is a jointly agreed upon process between Raytheon and its suppliers, and is jointly monitored. Overall, financial incentives and the SRS build consistency between the parties’ interests.

Supporting the military’s training needs requires purchasing a broad and varied array of materials. Raytheon’s approach to *strategic sourcing* centers on matching the strengths of large and small firms with the nature of the materials needed. Large firms provide the stability, infrastructure, and mature practices that are required to consistently meet customer expectations. For example, Cubic Corporation provides Raytheon with laser-based simulators. This firm has approximately 5,950 employees at 140 locations worldwide, and therefore has the scale and scope required to provide the large number of systems needed. Because of Cubic’s vast experience and knowledge base, Raytheon enlists the firm early in the sourcing process in order to collaborate on designs and forecast likely demand. Meanwhile, Raytheon draws on small firms for specialized skill sets and technical expertise. For example, Pacific Coast Systems (PCS) is a three-person company that manufactures the training IEDs described above. Although PCS has unique capabilities, it lacked the infrastructure to fully develop the devices. As a result, Raytheon and PCS jointly developed the patented technology embedded in the devices.

Raytheon’s supply chain managers carefully orchestrate sourcing activities, a main channel through which the firm adds value to the supply chains. In recognition of the importance of human resources to strategic sourcing, these managers are developed in a number of ways. An MBA level leadership development program provides thorough exposure to a minimum of three different Raytheon business units and three functional areas in a two year period. This provides individuals with the ability and foresight to integrate strategic sourcing across functional areas, cultures, and businesses. In addition, Raytheon provides a series of courses designed to improve decision making. Raytheon has also created competency models for each supply chain function. These models enable an employee to readily identify what skills he or she needs to acquire to earn a promotion.

Raytheon relies on best value practices within its *logistics* activities. One of these practices is using mobile repair vehicles to service equipment at multiple unmanned training locations. The vehicles are staffed by a trained technician, contain an inventory of common repair items, and are strategically located within a few hundred mile radius of several customer locations. The vehicles allow Raytheon to quickly meet unpredictable demand across a wide geographic area without maintaining an expensive permanent infrastructure. Repairs that exceed the mobile technician's capabilities are sent to a central warehouse in order to gain economies of scale. This approach is not the cheapest or the quickest, but it enables strong performance along both dimensions as well as in terms of quality and, in particular, flexibility.

In general, the offering of better data provided by advanced *information systems* has improved supply chain execution by reducing buffers such as on-hand inventory. However, there are diminishing returns beyond a certain level of spending on any given system. Raytheon has attempted to add value to its supply chains by developing an information system that blends the best elements of multiple computer data sources and systems. The resultant overarching system provides data reliably, in near-real time, to all members of the supply chain, including Raytheon, its suppliers, and the customer. Moreover, all three of these entities can initiate supply chain activities within the system. This enables high levels of coordination and fast deployment of products and services.

Lastly, Raytheon has adopted a best value approach to *relationship management* in its dealings with small business partners. Although small firms are creative and innovative, they share certain liabilities of smallness including a lack of scale economies and slack resources, as well as a limited knowledge base. In response, Raytheon has facilitated the formation of "small business federations" within its supply chain activities. A small business federation is a formal consortium composed of the small business partners supporting Raytheon on a given contract. The focus of a federation is providing the infrastructure needed for members to exchange ideas, combine their skills, and work together to solve problems (Miles et al., 2005, 2006).

5. Final thoughts

In the recent past, the notion that time is money effectively captured the value provided by speedy supply chains and the danger of falling behind com-

petitors. A new approach to supply chain management that we label as best value is now emerging as a powerful means for creating competitive advantages. Best value supply chains leverage strategic supply chain management, agility, adaptability, and alignment not simply to create low costs, but also to maximize the total value added to the customer. Relative to traditional supply chains, best value supply chains also take much different approaches to key functions such as strategic sourcing, logistics, information systems, and relationship management. Looking towards the future, it appears likely that competition will become more supply chain vs. supply chain and less firm vs. firm over time. If so, firms that develop best value supply chains will be well positioned for exceptional success.

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