*FOCUS*
*STUDY*

outsourcing

electronic
commerce

total cost

ethics

supply chain
management

strategic alliance

global sourcing

purchasing
consortiums

operational
resource management

minority enterprises

# Achieving World-Class
# Supply Chain Alignment:
# Benefits, Barriers, and Bridges

*by*

**Stanley E. Fawcett**
**Department of Management**
**Marriott School of Management**
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# Preface

*Know, develop, and exploit your strengths.*
*Peter F. Drucker*

*You raise productivity or die.*
*Roger Ackerman*

Today's marketplace is more fiercely competitive than ever before. Globalization, technological change, and demanding customers promise to make mediocrity an endangered species. Yet, the performance bar continues to rise. New managerial practices and unique business models emerge and fade constantly. To help their companies succeed in this less kind, less gentle, and less predictable world, managers must follow the advice of Thomas Edison when he said, "If there is a better way, find it."

Supply chain management has been identified and touted as the better way. For several years, the pundits have said that the very nature of competition is changing. They have claimed that the day is rapidly coming when companies will no longer compete against other companies. They foresee a world in which supply chains will compete against other supply chains for market supremacy. For example, Wal-Mart and its suppliers will battle Carrefour and its suppliers in consumer markets around the world. Likewise, Toyota and its suppliers will clash with Ford and its suppliers for global competitive advantage. Similar rivalries will emerge in the other industries from electronics to pharmaceuticals and from apparel to fast food. In other words, companies will choose sides and form cohesive teams that will compete across borders in the quest to increase productivity and capture global market share.

The possibilities in a supply-chain world are astounding, but the challenges that lie along the path to supply chain excellence are equally formidable. Indeed, companies have struggled for years to achieve true cross-functional

process integration within their own four walls. Perhaps this is one reason why the cohesive supply chain team has never fully emerged. Even so, the integrated supply chain concept is relatively new and managers across numerous industries are determined to make it work. They are experimenting with all sorts of alignment mechanisms and organizational forms. They are investing in systems and tweaking measures. They are looking to technology and to people to find the key to greater inter-organizational cooperation.

This focus study has looked at the supply chain phenomenon, examining the forces behind the drive for enhanced collaboration and evaluating the benefits and barriers to supply chain integration. Vital bridges to supply chain success are explored. A process model for supply chain integration is presented along with a best-practices benchmarking diagnostic. It is our hope that the discussion and the tools developed in the study provide some useful insight to help guide managers as they and their companies endeavor to make headway along the arduous journey to supply chain leadership. We join Eckhard Pfeiffer in his assessment that, "Nothing is harder than casting aside the thinking, strategies, and biases that propelled a business to its current success. Companies need to learn how to unlearn, to slough off yesterday's wisdom."

# Executive Summary

*As the economy changes, as competition becomes more global, it's no longer company vs. company but supply chain vs. supply chain.*

*Harold Sirkin, VP Boston Consulting Group*

## Introduction

Supply chain management and electronic commerce are among the most frequently discussed topics in corporate America today. The goal is to combine them to develop value-added processes that deliver innovative, high-quality, low-cost products on time with greater responsiveness than ever before. Even as superior levels of performance are pursued, many managers now realize that their organizations lack some of the competencies required for success. This realization has led them to look beyond their companies' boundaries to evaluate how the resources of their suppliers and customers can be utilized to create the exceptional value demanded by customers. Endeavors to align objectives and integrate resources across organizational boundaries are known as supply chain management initiatives.

In theory, supply chain integration allows the organization to focus on doing exceptionally well a few things for which it has unique skills and advantages. Non-core activities are then shifted to other channel members that possess superior capabilities in those areas. When appropriate, close relationships are formed to assure outstanding performance levels. In effect, "teams" of suppliers, finished goods producers, service providers, and retailers are formed to create and deliver the very best product/service offerings possible. These allied teams of companies form an integrated supply chain, which often competes against other supply chains in today's global economy.

The frequency with which the term "SCM" is used would lead the observer to conclude that it is a well understood concept accompanied by an accepted set of practices. In reality, approaches to SCM vary substantially from organization to organization and even from manager to manager within the same company. While supply professionals can, and do, quote the familiar supply chain mantra of "suppliers' supplier to customers' customer," few companies are engaged in such extensive supply chain integration. Indeed, few companies have adopted a formal definition of SCM. Even fewer have carefully mapped out their supply chains so that they know who their suppliers' suppliers or customers' customers really are.

While definitions of SCM vary greatly, several themes became apparent as this focus study was carried out. Effective supply chain integrators possess the following characteristics:

- They are relentlessly customer centric
- They are driven to improve asset efficiency.
- They recognize interfirm collaboration as critical
- They focus on processes rather than functions
- They view open communication as a must
- They factor people into every decision
- They invest in information technology as an enabler
- They are obsessed with performance measurement

Given the common occurrence of these themes among supply chain leaders, the SCM definition adopted here is as follows:

> **Supply Chain Management is the collaborative effort of multiple channel members to design, implement, and manage seamless value-added processes to meet the real needs of the end customer. The development and integration of people and technological resources as well as the coordinated management of materials, information, and financial flows underlie successful supply chain integration.**

Managers need to better understand the nature of SCM for at least three reasons. First, the convergence of several environmental forces has left many managers believing they have no other options than to participate in integrated SCM programs. Foremost among the forces driving channel collaboration are 1) the emergence of information-empowered customers, 2) the existence of fierce global rivals, and 3) a desire to team with the strongest channel partners possible. The fact that key customers request participation while serious competitors are willing to enter into channel alliances provides a strong impetus to adopt an SCM perspective. Second, today's competitive mandate is to serve valued customers better, faster, and at lower costs. Anecdotal evidence suggests that when implemented appropriately, supply chain management has the potential to help companies do this. Third, attempts to increase supply chain integration often create a sense of organizational vulnerability, requiring workers and managers to step out of traditional comfort zones. Inertia created by the resistance to organizational change makes supply chain integration inherently difficult. The challenge of meshing unique organizational cultures, incompatible information systems, diverse worker attitudes, and different approaches to performance measurement can seem insurmountable. Thus, managers need to understand the forces driving SCM as well as the benefits, barriers, and bridges associated with successful supply chain integration initiatives.

## Literature Review

The supply chain literature has grown tremendously in recent years. Most of the discussion revolves around tighter collaboration among members of the supply chain; however, the perspectives and prescriptions vary greatly. One common tenet is that competitive success depends on managers' ability to recognize changes in the competitive environment and then to structure organizational, and where appropriate, supply chain resources to effectively meets customers' real needs. This contingent response determines how well the firm, and the supply chain, adapt to the needs of a dynamic market to achieve lasting competitive success. It is also the foundation for Figure 1, which provides a framework for understanding SCM implementation.

**Figure 1**
**A Framework for Understanding Supply Chain Implementation**

Strategic Management Initiative

Cross-Functional Process Change
Performance Measurement
Information Systems
Effective Supply Chain Integration
Alliance Design
Alignment Mechanisms
People Environment

Driving Forces

• More Demanding Customers
• Greater Competitive Intensity
• Shifting Channel Power
• Economic Globilization
• Tighter Alliance Relationships
• Compressed Product Cycles
• Continued Merger Activity
• Need for Better Information
• New Information Technologies
• Shifting Competitive Focus; i.e.,
  Companies to Supply Chains

Performance Outcomes

• Unique Products & Services
• Faster R&D Cycle Times
• Superior Quality
• Cost Competitiveness
• Shorter Order Cycles
• Flexible Customer Response
• Enhanced Delivery Performance
• Better Asset Management
• Increased Cash-to-Cash Velocity
• Superior Channel Relationships

Implementation Challenges

• Lack of Top Management Support
• Non-aligned Strategic and Operating Philosophies
• Inability or Unwillingness to Share Information
• Lack of Trust among Supply Chain Members
• An Unwillingness to Share Risks and Rewards
• Inflexible Organizational Systems and Processes
• Cross-functional Conflicts and "Turf" Protection
• Inconsistent/Inadequate Performance Measures
• Resistance to Change
• Lack of Training for New Mindsets and Skills

## RESEARCH QUESTIONS

This focus study was conducted to answer the following research questions:

Research Question 1: What is supply chain integration in practice?

Research Question 2: What factors motivate firms to engage in supply chain arrangements?

Research Question 3: To what extent does organizational support exist for supply chain initiatives?

Research Question 4: What benefits/outcomes are expected from supply chain integration?

Research Question 5: What barriers must be overcome to achieve effective supply chain integration?

Research Question 6: What are the tools and techniques that facilitate supply chain integration?

Research Question 7: To what extent are SCM practices really being implemented?

The answers to these questions provide key insight needed to successfully implement supply chain strategies, better enabling managers to use SCM as a competitive weapon.

## RESEARCH METHODOLOGY

In conjunction with the extensive literature review, a multi-method empirical approach involving both surveys and case study interviews was used to gain insight into SCM strategies. This triangulation approach—literature review, survey, and case studies—provided an opportunity to develop a broad-based understanding of the benefits, barriers, and bridges associated with SCM implementation while identifying and exploring innovative, leading-edge SCM practice.

### Cross-functional Mail Survey

An examination of SCM is different from most purchasing studies in that it is inherently cross-functional and inter-organizational. Most SCM strategies are not owned by the purchasing organization. To document how key functional managers view SCM, a mail survey methodology was targeted to three different managerial groups: purchasers, logisticians, and manufacturing managers. A four-page instrument consisting of 16 questions with 169 separate data points was developed. Three mailing lists were complied from the memberships of three professional associations: *National Association of Purchasing Management, Council of Logistics Management,* and *American Production and Inventory Control Society.* The survey process followed Dillman's Total Design Method and included three mailings of a cover letter, an instruction sheet, and the survey instrument. The adjusted sample size, number of respondents, and response rate are shown in Table 1. Approximately 100 non-respondents from each group were telephoned to investigate why they had chosen not to participate in the study. Following this pre-test, the survey was modified slightly to add an inducement question and eliminate two questions that appeared to cause the respondents difficulty. New mailing lists were compiled. Each manager was telephoned and asked to participate in the study. Table 1 shows the vital response statistics. The findings from the two mailings were compared and no statistical differences were found.

Table 1
Survey Samples and Response Rates

**Pre-Test:**

| | Adjusted Sample Size | Completed Surveys | Response Rate |
|---|---|---|---|
| NAPM | 1,329 | 96 | 7.2% |
| CLM | 1,369 | 129 | 9.4% |
| APICS | 1,351 | 109 | 8.1% |

**Pre-Notification:**

| | Adjusted Sample Size | Completed Surveys | Response Rate |
|---|---|---|---|
| NAPM | 370 | 84 | 22.7% |
| CLM | 398 | 76 | 19.1% |
| APICS | 328 | 94 | 28.7% |

## Case Study Interviews

The case study methodology provided an opportunity not only to contextualize survey findings but also to explore issues of interest in greater detail and identify unique supply chain practices. Interviews were conducted with leading companies at each stage of the supply chain. A total of 52 in-depth interviews were conducted with the companies listed in Table 2. Overall, the study participants were selected because they had a reputation for "doing SCM" well. Once a company agreed to participate, the appropriate manager(s) received a letter of introduction and a brief overview of the research objectives, together with a copy of the interview protocol. The average interview lasted from four to six hours with the shortest interview lasting a little over an hour and the longest taking over 10 hours. In most instances, the interview was conducted with multiple managers from the host organization (the number of company representatives ranged from one to eight). Finally, the researchers used a semi-structured protocol to focus the interview and assure some degree of comparability while allowing for flexibility in pursuing greater insight into unique practices and programs.

## Conclusions and Implications

Based on the totality of the responses, the SCM philosophy of collaborative competition—that is, competing as allied teams of companies—has gained many adherents. Managers view the critical elements of competitive supply chains similarly, regardless of functional area or channel position. These fundamental building blocks of effective supply chains are closer channel relationships, integrative inter-organizational processes, linked information systems, aligned goals and measures, and cross-experienced managers. While managers agree on the core elements of SCM, an overall supply chain framework has not emerged and supply chain practices have yet to be routinized. Thus, supply chain practice is often ad hoc and fragmented. Key findings for the seven research questions follow below.

**Research Question 1:** What is supply chain management in practice?

1) Nobody is managing the entire supply chain from suppliers' supplier to customers' customer. True integration beyond the first tier in either direction is rare. Second-tier purchasing agreements, second-tier supplier audits, and some second-tier training does take place. The task of managing beyond the first tier is "handed off" to the first tier with only minimal measurement and follow-up.

2) SCM is generally viewed as a critical strategic initiative; however, cynicism regarding integrative relationships persists. A full 20 percent of the survey respondents indicated that their companies had yet to implement SCM initiatives because they lack resources/channel leverage and they lack managerial support. Of those respondent companies that had started the SCM journey, nearly 88 percent identified SCM as a vital part of their business strategy. Purchasers are the most reticent in their endorsement of SCM as a valuable strategy—many continue to operate on the basis of adversarial buyer/supplier relationships that emphasize "price, price, price!"

**Table 2**
**Case Study Companies by Supply Chain Position**

| Service Providers | Lower-Tier Suppliers | First-Tier Suppliers | Finished Goods Assemblers | Retailers |
|---|---|---|---|---|
| Allegiance | Allied Signal | Detroit Diesel | Black & Decker | Amazon.com |
| Aspen Distribution | Dyno-Nobel | Donnelly | Boeing Procurement | American Stores |
| Boeing—Shared Services | Hermetic Seal | Honeywell | Hewlett-Packard | Associated Foods |
| Corporate Express | | Intel | IBM | Costco |
| Modus Media | | Lucent Technologies | John Deere | Dillards |
| MSCarriers | | Monsanto | Kellogg | Eddie Bauer |
| Schneider National | | Motorola | Nabisco | Fred Meyer |
| ServiceCraft | | Nypro Incorporated | Oxford | Land's End |
| Wencor West | | Rockwell Collins | Paccar | The Limited |
| | | Siemens | Savane | Payless |
| | | Tri-State Hospital Supply | Steelcase | Sam's Club |
| | | TRW | Union Bay | Sears |
| | | | Whirlpool | Starbucks |
| | | | | Wal-Mart |

3) Chain complexity is a major problem. Most companies participate in multiple supply chains. Defining the boundaries and intensity of specific relationships in a world where multiple relationships exist between the same two companies complicates supply chain design and management. Considerable experimentation can be expected as managers attempt to build world-class supply chains.

4) Dyadic functional interaction along the plan-design-source-build-deliver sequence is greater than exists in the broader arena of cross-functional process integration. This increased interaction is a precursor to broader types of integration and to more effective cross-functional teaming. Companies that can bridge dyadic relationships can invest time and effort in more complex process integration.

5) SCM definitions lack cohesion and visibility; therefore, supply chain strategies lack specificity and reach. Definitions range from "cross-functional process integration within the firm" to "complete forward and backward supply chain integration." Managers need to recognize that just about everyone possesses a unique idea of what SCM really entails. Discussions of SCM strategies must include clear definitions to help everyone read from the same page.

6) A chasm of significant size exists between the purchasing and marketing sides of most organizations. This chasm consists of physical and emotional distance and is embedded in organizational structures and culture. It is often easier to develop cooperative relationships with external supply chain members than it is to break down internal silos. Purchasers report lower levels of integration engagement within their organizations than either logistics or production managers.

7) The acronym SCM could just as easily have been DCM—demand chain management. A third of the interviewed companies have as a primary strategy the integrated management of the customer side of the channel. There really is no standard organizational form for supply chain management groups or initiatives. Few companies have managed to link upstream and downstream strategies.

8) World-class supply chain companies never lose sight of customer needs. They have effectively 1) identified key customers, 2) evaluated critical customer success factors and 3) begun to build processes back into suppliers to deliver quality and responsiveness at the lowest possible cost. Even at these companies, 95 percent of the effort is on the triad of their firm plus one tier up/downstream.

9) Many materials managers view SCM as another management fad. In their opinion, the popularity of the term SCM has led managers to simply add the term supply chain to traditional practices without adopting the mindset or developing the infrastructure that underlie SCM integration. Thus, they believe that the term SCM is beginning to mean "everything and nothing" at the same time.

**Research Question 2:** What factors motivate firms to engage in supply chain arrangements?

1) Two forces drive greater supply chain collaboration: a need to meet customer requirements and a desire to reduce costs. Retailers and third-party service providers are focused on customer needs while finished-goods assemblers and suppliers place greater emphasis on supply chain efficiencies. Companies that believe in and advertise only the cost reduction benefits of supply chain management tend to face greater resistance to change and more skepticism from managers and employees.

2) Supply chain champions need to recognize the myriad forces that promote collaboration and then qualify and quantify them to provide a compelling justification for change. Objects at rest tend to remain at rest unless a powerful force moves them. The same is true for companies. Supply chain champions need to make the need for change appear imperative and immediate. This need becomes the significant emotional event needed to overcome organizational inertia.

**Research Question 3:** To what extent does organizational support exist for supply chain initiatives?

1) A strong functional bias was evident in the data. Each functional area viewed itself as very supportive of SCM while identifying the other functional areas as less engaged or even obstructive. Such parochialism is counterproductive and becomes a stumbling block to SCM implementation.

2) Channel support, both up and downstream, was viewed as hesitant by the functional managers. Doubt and suspicion are the lingering artifacts of adversarial and asymmetric buyer/supplier relationships. Support beyond the first-tier diminishes rapidly with efforts to extend collaboration to the suppliers' suppliers or the customers' customers being meager at all but a few advanced companies.

3) Materials managers identified four types of support that are requisites for SCM success: top management support, broad-based functional support, structural support, and channel commitment. Obtaining all four types of commitment simultaneously is the ultimate challenge—there always seems to be at least one piece of the commitment puzzle missing.

4) Only a few of the interviewed companies have created organizational, process, or technology supply chain maps. These firms have not used their supply chain maps to systematically analyze channel costs, value propositions, critical success factors, profitability, channel power, or customer linkage. Most mapping efforts stop at the first tier and are used primarily to aggregate purchases; some go further to evaluate role-shifting opportunities and facilitate second-tier purchasing.

**Research Question 4:** What benefits/outcomes are expected from supply chain integration?

1) The benefits of SCM can help a company achieve much higher levels of customer satisfaction at a lower total cost (see Table 3). However, these benefits are far from automatic—they derive from heightened collaboration, which is inherently difficult to achieve and maintain. Thus, only a relatively small percentage of companies have leveraged supply chain collaboration as a competitive weapon.

2) Each functional area targets a different set of benefits. Purchasers emphasize lower "cost of purchased items," logisticians target "on-time delivery," and production managers identify "reduced order fulfillment lead times" as the most pervasive benefit. This

creates a natural opportunity for organizational friction that may lead to sub-optimal supply chain execution.

3) Channel position impacts managers' view of SCM benefits. Retailers and finished-goods assemblers balance customer service and productivity improvements. First- and lower-tier suppliers as well as service providers place much greater emphasis on cost control. Channel power remains an incredibly important weapon and influences the goals and objectives of different SCM members.

4) The opportunity to establish switching costs or create a relationship or service package that is viewed as indispensable is an infrequently discussed but important benefit of supply chain integration. This channel positioning is the most intangible benefit of SCM and emerges from integrated processes and systems as well as from knowledge gained over the life of the relationship.

**Research Question 5:** What barriers must be overcome to achieve effective supply chain integration?

1) Human nature is a fundamental SCM barrier. People avoid change when possible, and SCM requires change in mindset and practice. Also, corporate cultures and organizational structures impede rather than facilitate change. The failure to articulate a clear supply chain vision exacerbates the problem. People do not understand what SCM is or how it will affect their jobs. At times, SCM is even viewed as the latest attempt to reduce payrolls. Such uncertainty leads to high levels of SCM resistance.

Table 3
Top Ten Benefits, Barriers, and Bridges to Supply Chain Management

| Benefits | Barriers | Bridges |
| --- | --- | --- |
| Increased customer responsiveness | Inadequate information sharing | Senior & functional managerial support |
| More consistent on-time delivery | Poor/conflicting measurement | Open & honest information sharing |
| Shorter order fulfillment lead times | Inconsistent operating goals | Accurate & comprehensive measures |
| Reduced inventory costs | Organizational culture & structure | Trust-based, synergistic alliances |
| Better asset utilization | Resistance to change—lack of trust | Supply chain alignment & rationalization |
| Lower cost of purchased items | Poor alliance management practices | Cross-experienced managers |
| Higher product quality | Lack of SC vision/understanding | Process documentation & ownership |
| Ability to handle unexpected events | Lack of managerial commitment | Supply chain education and training |
| Faster product innovation | Constrained resources | Use of supply chain advisory councils |
| Preferred & tailored relationships | No employee passion/empowerment | Effective use of pilot projects |

2) Materials managers see many roadblocks on the path to supply chain leadership. The most obvious are inadequate information systems, deficient and inconsistent performance measures, non-aligned and conflicting objectives, and insufficient alliance management practices. Individually, each of these barriers is a significant threat to collaboration. Together, they present a daunting challenge to effective SCM. SCM is not a quick or easy remedy to a firm's competitive dilemmas.

3) Systems and technology represent only half of the information dilemma (and perhaps the easy half). The other half is a strident unwillingness of managers to share information with other members of their own firms or with supply chain partners. The critical need is to bring connectivity and willingness together simultaneously.

4) Materials managers are frustrated by the need to show specific SCM initiatives' impact on the bottom line. Many managers feel that the greatest benefits accrue in the area of enhanced customer loyalty, which is extremely difficult to tie back into the profit-and-loss statement. The easiest areas to quantify—inventory levels and turns, delivery performance, and materials acquisition costs—often receive the greatest implementation emphasis. Balance is sacrificed and many good ideas are stifled by the lack of receptiveness that comes from an "excessive" emphasis on financial measures.

5) Constant "tug of wars" and "turf protection" dilute initiative, rendering SCM strategies ineffective. No single mechanism exists to bring an entire organization together in a cohesive fashion. Further, the sheer complexity of supply chain networks almost guarantees that resources will always be tightly constrained. The inability to clearly see the end from the beginning consistently brings managers back to their comfort zones where they continue to make local, sub-optimal decisions.

**Research Question 6:** What are the principal bridges to effective supply chain integration?

1) Vital integration mechanisms have not been widely adopted and the gap between the most advanced companies and their counterparts is growing. SCM is sufficiently complex and intricate that no single practice, or set of practices, can effectively ensure collaboration. Long-term SCM success requires a wide range of changes in organizational culture, measurement, practice, and structure.

2) The facilitator that has been most visible in recent years is information sharing. The system side of information sharing lags behind other bridges in effectiveness. Managers continue to be dissatisfied with their systems capabilities. Managers rely on technological solutions to supply chain integration. Unfortunately, the technologies are often hard to implement, can be adopted by rivals, and seldom deliver the differential advantage that is sought.

3) Most of the bridges to effective supply chain integration are essentially mirror images of the barriers noted above. It is almost impossible to build all of these bridges at once. Priorities must be set based on the importance of the barrier. This seldom happens. Bridge building requires early victories to build momentum, garner support, and earn the resources needed to move forward.

4) Materials managers view the diverse bridges from a distinctly functional perspective, which means they often disagree regarding the appropriateness and effectiveness of any given mechanism. The clear pattern is for managers to favor practices with which they are most familiar because of frequent use in their functional area. Divergent approaches to dealing with integration barriers may become a significant barrier to greater cooperation.

5) Supply chain education and training is one of the singular requirements for implementation success. The need for training extends throughout the company and reaches up and downstream. The sharing of expertise among channel members is an important supply chain facilitator that helps the entire supply chain team become more competitive.

6) Steering committees and advisory councils are key tools for reducing resistance and promoting collaboration. Participation in industry-wide benchmarking initiatives also facilitates learning. Proactive companies engage their partners at every opportunity to solve problems and create value.

**Research Question 7:** To what extent are supply chain practices really being implemented?

1) For the vast majority of today's companies, commitment to supply chain relationships is lacking. Most companies still behave opportunistically. For now it seems that old habits die hard and that when difficulties arise, commitment to team members evaporates. To return to the "team" metaphor, most current supply chain arrangements emphasize the "free-agent" clause in the contract.

2) The customer side of most companies receives more attention and is more clearly in focus than the supply side. Most companies spend more time on and dedicate more resources to building strong customer relations than they do to selecting and developing a world-class supply base. The logistical network is even further out of focus. Most companies do not take a holistic approach to SCM.

3) Critical integrative mechanisms have been implemented unevenly. Information systems, relationship building, and process change have received generous investment over the past decade. By contrast, most companies do not know how to measure supply chain activities or build a skilled and passionate workforce. Alignment mechanisms have been largely ignored. It is imperative that the human resource not be the overlooked piece in the supply chain puzzle. While they may not be empowered to make SCM happen, people can certainly undercut efforts to enhance supply chain collaboration.

4) SCM is truly in its infancy, but materials managers are optimistic. Much progress toward more effective collaboration has been made, but "end-to-end" management of value-added processes is much more a dream than a reality for most companies. Instead of acting as cohesive, integrated teams, supply chains compete as loose coalitions of companies that temporarily join forces to gain advantage through cooperation.

Few companies have devised comprehensive, winning SCM strategies. The SCM rhetoric should be tempered by the recognition that benefits do not accrue immediately. As with many chemical reactions, until the right catalyst is added, progress is slow and impressive results are not obtained.

## A Framework for Supply Chain Integration

Managers rely either on compartmentalized integration programs (ERP, CPFR, VMR, etc…) or on ad hoc approaches to achieving the conceptual ideal of seamless value-added processes. Such approaches fail to provide the vision and understanding needed to build an integrated supply chain team. To help promote more systematic efforts to achieve competitive supply chain collaboration, the six-stage framework depicted in Figure 2 was developed. This framework pieces together the key findings to provide a roadmap for managers to use as they travel the path to supply chain leadership.

**Stage 1: Develop an Overall Understanding of the Supply Chain.** Managers need to recognize the major players in the supply chain. They also need to understand the value proposition of the entire supply chain as well as what role companies at each tier play. Mapping critical processes, core technologies, and linkages to the end customer also help managers make sound SCM decisions.

**Stage 2: Position the Organization within the Supply Chain.** Managers must re-evaluate their organization's value proposition from a supply chain perspective. The critical issue is to define the organization's core competencies. Specific processes needed to support the core competencies must be developed. Outsourcing decisions and role-shifting strategies can be more accurately assessed.

**Stage 3: Build the Supply Chain Infrastructure Needed for Success.** Customer and supplier success infrastructures must be developed. Up and downstream partners are classified based on their importance. Appropriate relationships are then established with the different classes of customers/suppliers. Some relationships merit intense effort while others are best served by efficient and routinized processes and systems. Profitability and long-term growth should be considered in the initial classification.

**Stage 4: Create and Communicate a Common Supply Chain Vision.** Alignment begins with the creation of a common vision. It is critical to make the company's supply chain vision statement unique to the organization. This vision must be sold internally and shared with key supply chain partners. The vision should be widely publicized via the company's web page and used to drive supply chain alignment.

**Stage 5: Cultivate Integrative Mechanisms.** Stage 5 shifts the emphasis to managing for collaboration and begins by identifying internal and external barriers. Once problem areas are discovered and improvement opportunities defined, specific programs must be prioritized. While pilot projects can be carried out in any of the six integrative areas, a balanced approach should be pursued.

**Stage 6: Constantly Re-evaluate and Continuously Improve.** Supply chains must be dynamic and flexible. To promote this, it is vital to institutionalize environmental, technology, and industry scans. Benchmarking efforts should also be used to keep the company at the cutting edge of supply chain practice. Equal in importance to the scanning/benchmarking effort is the need to put in place continuous improvement initiatives that unleash the creativity and knowledge of the people involved in creating value.

**Figure 2**
**Supply Chain Integration Framework**

**Develop Overall SC Understanding**
Map SC: Organizations, technologies, capabilities
    Determine SC value proposition
    Determine value proposition & success factors at each level
    Determine where SC leverage & profitability are located.
      Identify critical value-added processes & technologies
      Evaluate linkage to end customer
Specifically define "As-is" value-added roles of SC members

**Position Organization within SC**
Re-evaluate organization's value proposition from SC perspective
    Identify the organization's core competencies
    Design & develop critical processes to support core competencies
Outsource non-critical activities
Role-shift where appropriate; i.e., move to "To-be" roles

**Build Customer Success Infrastructure**
Classify customers & measure profitability
Establish appropriate customer relationships
    Implement SC partner development initiatives
    Build good relationships with important customers
    Establish mechanisms for transactional relationships

**Build Supplier Success Infrastructure**
Classify suppliers—materials & service
Establish appropriate supplier relationships
    Implement SC partner development initiatives
    Build good relationships with important suppliers
    Establish mechanisms for transactional relationships

**Create & Communicate Common Vision**
Establish vision & mission statements, policies & procedures
    Promote internally & garner broad-based commitment
    Share externally with key SC partners
    Make available to entire SC
Measure alignment among core "partners"
Identify, communicate, and resolve critical gaps

**Cultivate Integrative Mechanisms**
Consensus effort to identify internal & external barriers
Prioritize specific initiatives to build key integrative mechanisms
- Alignment mechanisms
- Cross-experienced managers
- SC information sharing
- Cross-functional processes
- SC performance measurement
- Alliance management techniques

**Constantly Re-evaluate—Scan & Plan**
Monitor market & competitive conditions
    Conduct periodic environmental & technology scans
    Periodically evaluate industry and SC structure
Re-evaluate SC fit—beware of and be aware of role shifting
Benchmark value-added: competitors, best-in-class & customers
Establish continuous improvement programs

The integrative framework emphasizes supply-chain level planning and scanning. Companies must plan and scan to continuously select and build the right capabilities and establish the most creative and productive relationships. This endeavor is the essence of strategy, and strategic SCM can help an organization survive and prosper in an ever-changing world.

## A Benchmarking Diagnostic

Throughout the research, best practices were identified and compiled into a benchmarking diagnostic (see pages 167-168). The best practices are organized into two main sections—the first targeting supply chain design and the second looking at supply chain integration and management. Even the most advanced companies in the study can find many opportunities to progress down the path to supply chain excellence by benchmarking their design and integration practice. Indeed, the very best supply chain companies are the ones that have mastered the art of learning. They avoid complacency and are viewed by their rivals as agile, lean, and tough competitors. They recognize that while they are ahead of the pack, they are only in the very early stages of a long journey. Balance, experimentation, focus, intuition, tenacity, and vision are the attributes that will help them become tomorrow's supply chain champions.

# Design of the Study

*As the economy changes, as competition becomes more global, it's no longer company vs. company but supply chain vs. supply chain.*

*Harold Sirkin, VP Boston Consulting Group*

## Introduction

What initiatives are being discussed most often in strategic planning sessions across corporate America today? The odds are that topics related to electronic commerce and supply chain management are at the top of the priority list. Indeed, the quest to meet the needs of demanding customers is driving dramatic change in the way companies operate. For the past decade, companies have restructured, reorganized, and re-engineered in order to increase organizational effectiveness and better satisfy key customers. The goal is to develop value-added processes that deliver innovative, high-quality, low-cost products on time with shorter cycle times and greater responsiveness than ever before.

Yet, even as superior levels of performance are pursued, many managers have begun to realize that their organizations lack some of the resources and the competencies required for success. This realization has led them to look beyond their companies' organizational boundaries to evaluate how the resources of their suppliers and customers can be utilized to create the exceptional value that is demanded by downstream customers. Endeavors to align objectives and integrate resources across organizational boundaries in order to deliver greater value are known as supply chain management initiatives. The typical supply chain involves various tiers of materials suppliers, service providers, the firm itself, and one or more levels of customers (see Figure 3), each of which depends on the others to a greater or lesser extent to achieve high levels of competitiveness.

In theory, supply chain integration allows the organization to focus on doing exceptionally well a few things for which it has unique skills and advantages. Non-core activities and processes are then shifted to other channel members that possess superior capabilities in those areas, regardless of their positions in the supply chain. When appropriate, close relationships are formed to assure outstanding and seamless performance levels. In effect, "teams" of suppliers, finished-goods producers, service providers, and retailers are formed to create and deliver the very best product/service offerings possible. As with other teams, successful supply chain teams not only comprise the best players available but have established true chemistry—a common understanding of supply chain success factors, an understanding of individual roles, an ability to work together, and a willingness to adjust and adapt in order to create superior value. These allied teams of companies form an integrated supply chain, which often competes against other supply chains in today's global economy.

**What Is Supply Chain Management in Practice?**
The frequency with which the term "supply chain management" is used in today's materials management environment would lead the casual observer to conclude that supply chain management is a well understood concept accompanied by an accepted set of managerial practices. In reality, definitions of and approaches to supply chain management vary substantially from organization to organization and even from manager to manager within the same organization. While most purchasing and materials managers can, and do, quote the familiar supply chain mantra of "suppliers' supplier to customers' customer," few companies are actually engaged in such extensive supply chain integration. Indeed, few companies have adopted and disseminated a formal definition of supply chain management. Even fewer organizations have carefully mapped out their supply chains so that they know who their suppliers' suppliers or customers' customers

## Figure 3
### A Simplified Supply Chain
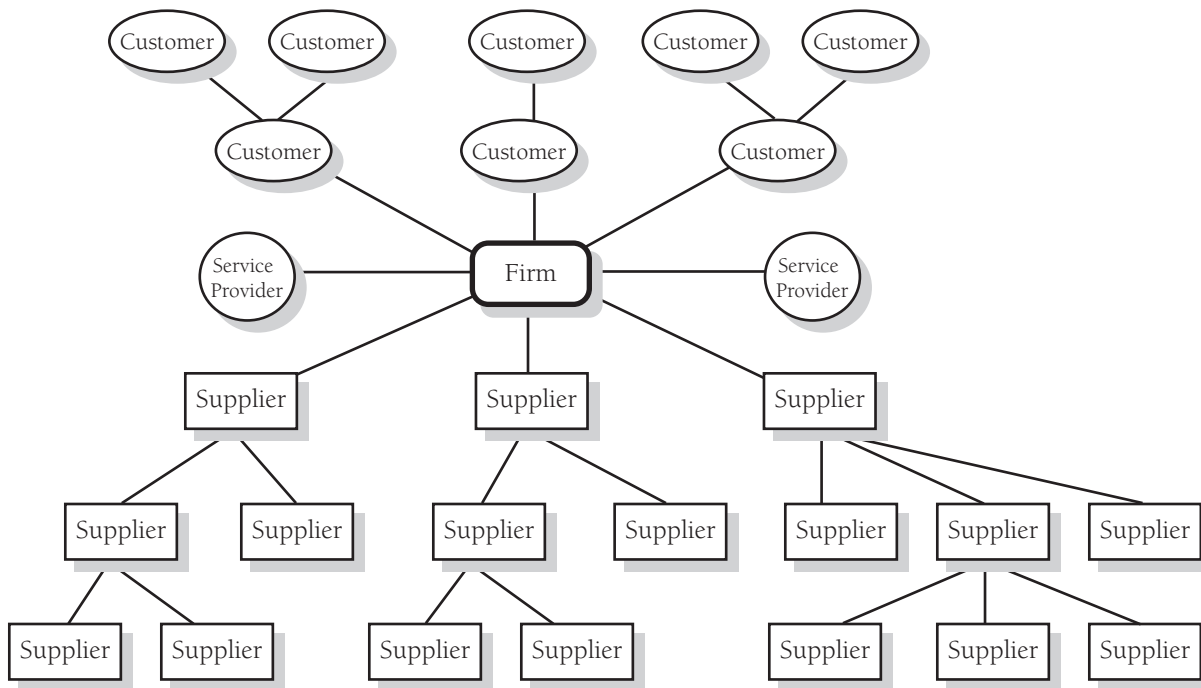


A distinction is made between materials suppliers and service providers because these two types of suppliers are typically managed differently, often by different functional areas within the organization. That is, materials suppliers are managed by purchasing while service providers such as distributors and transportation providers are managed by logistics, marketing, and at times purchasing. To provide superior augmented products, companies must manage both types of suppliers in a coordinated, seamless manner.

really are. Separating the rhetoric from the reality with respect to supply chain management is one of the central goals of this CAPS focus study.

While definitions of SCM vary greatly (see Table 4), several themes are common to most successful SCM initiatives. Effective supply chain integrators possess the following characteristics:

- They are relentlessly customer centric.
- They are driven to improve asset efficiency.
- They recognize interfirm collaboration as critical.
- They focus on processes rather than functions.
- They view open communication as a must.
- They factor people into every decision.
- They invest in information technology as an enabler.
- They are obsessed with performance measurement.

Given the common occurrence of these themes among supply chain leaders, the definition of supply chain management used throughout this focus study is as follows:

**Supply Chain Management is the collaborative effort of multiple channel members to design, implement, and manage seamless value-added processes to meet the real needs of the end customer. The development and integration of people and technological resources as well as the coordinated management of materials, information, and financial flows underlie successful supply chain integration.**

### Why Study Supply Chain Management Now?

Managers need to better understand the nature of supply chain management for at least three reasons. First, the convergence of several competitive factors has left many managers feeling that they have no options other than to participate in integrated supply chain management programs. Foremost among the environmental factors driving channel collaboration include the following:

- The emergence of information-empowered customers who demand greater responsiveness.

Table 4
Definitions of Supply Chain Management

- The network of organizations involved, through upstream and downstream linkages, in the processes and activities that produce value in the form of products and services in the hands of the ultimate consumer. (Christopher, 1992)

- SCM is the delivery of enhanced customer and economic value through synchronized management of the flow of physical goods and associated information through sourcing to consumption. (LaLonde, 1994)

- SCM is the coordination and integration of all activities associated with moving goods from the raw materials to the end user, for sustainable competitive advantage. This includes systems management, sourcing, production scheduling, order processing, inventory management, transportation, warehousing, and customer service. (Cooke, 1997)

- SCM embraces and links all of the partners in the chain. In addition to the departments within the organization, these partners include vendors, carriers, third-party companies, and information systems providers. (Quinn, 1997)

- SCM is a process for achieving a clear line of sight from the supply base to our customers with buyer and seller working jointly to drive out non-value-added costs, improve quality, speed order fulfillment, and introduce new product and process technology.—Maytag (Porter, 1997)

- The global network used to deliver products and services from raw materials to end customers through engineered flows of information, physical distribution, and cash. (Alber and Walker, 1998)

- Supply chain management is characterized by control based on networking and integration of processes across functional, geographical, and organizational interfaces (van Hoek, 1998)

- SCM is the coordinated flow of materials and products across the enterprise and with trading partners. It also includes the management of information flow, cash flow, and process/work flows. (Tyndall, Gopal, Partsch, & Kamauff, 1998)

- SCM is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders. (Lambert, Cooper, and Pagh, 1998)

- The network of facilities and activities that performs the functions of product development, procurement of material from vendors, the movement of materials between facilities, the manufacturing of products, the distribution of finished goods to customers, and after-market support for sustainment. (Mabert & Venkataramanan, 1998)

- Integrated SCM is a process-oriented approach to procuring, producing, and delivering products and services to customers and has a broad scope that includes sub-suppliers, suppliers, internal operations, trade customers, retail customers, and end users. ISCM covers the management of material, information, and funds flows. MIT (Metz, 1998).

- SCM increases customer service and profitability through coordination/integration of multiple echelons, processes, and functions like suppliers, purchasing, manufacturing, distribution, marketing/sales, & customers. (Akkermans et al., 1999)

- SCM involves all activities associated with the transformation and flow of goods and services, including their information flows, from sources of raw materials to end users. For coordination to continue, there is a need for metrics that can identify and capture chain-wide benefits and costs, an information sharing mechanism to distribute this data among chain members, and an allocation mechanism for redistributing the rewards of collaboration. (Ballou et al. 2000)

- SCM is a set of approaches to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements. (Simchi-Levi, Kaminsky, & Simchi-Levi, 2000)

- SCM is more than the physical movement of goods from 'earth to earth.' It is also information, money movement, and the creation and deployment of intellectual capital. (Ayers, 2000)

- Efforts to link customer requirements, new product, process and service development, and order fulfillment activities so as to gain competitive advantage. (Michigan State University)

- SCM is about linking suppliers to customers and driving time out of the chain. (Sun Microsystems)

- The existence of fiercely competitive global rivals that impose cost pressures and squeeze margins.
- A recognized need to focus resources on core competencies.
- A desire to team with strong channel partners before competitors do.
- High levels of merger activity, which alter the balance of channel power.

Ultimately, the fact that key customers request participation while serious competitors are willing to enter into integrated channel alliances provides a strong impetus for adopting a supply chain management perspective. Thus, a better understanding of the motivations driving supply chain management initiatives is needed. Second, today's competitive mandate is to serve valued customers better, faster, and at lower costs. Anecdotal evidence suggests that when implemented appropriately, supply chain management has the potential to help companies do this. Thus, it is important to document SCM's competitive benefits and impact.

Finally, attempts to increase supply chain integration often create a sense of organizational vulnerability, requiring workers and managers to step out of traditional comfort zones. Inertia created by the resistance to organizational change makes supply chain integration inherently difficult. Many emotionally charged questions arise as an organization begins to consider supply chain integration (Elliff, 1996):

- Who is really in charge?
- Can we really trust the other supply chain members not to take advantage of us?
- What does supply chain management really mean for our bottom line performance?
- How is our role going to change in the new, integrated supply chain environment?
- How am I going to develop the skills needed for success in the new "team" environment?
- Who are the best partners to align our competitive efforts with?
- How are we going to measure who adds what value?
- With how many different supply chains can we work effectively?

Even when these questions are answered, the challenge of meshing unique organizational cultures, incompatible information systems, diverse worker attitudes, and different approaches to performance measurement can seem insurmountable. Thus, managers need to understand the nature of the many barriers that impede supply chain integration as well as the mechanisms that can facilitate SCM success.

## Literature Review

A tremendous quantity of material has appeared in recent years regarding supply chain management in both the trade press and academic journals. While most of the discussion revolves around greater cooperation and tighter collaboration among members of the supply chain, the perspectives and prescriptions vary greatly. However, one tenet appears as a common thread tying the literature together: competitive success depends on managers' ability to recognize changes in the competitive environment and then to structure organizational, and where appropriate, supply chain resources in a manner that more appropriately and effectively meets customers' real needs. This contingent response determines how well the firm, and the supply chain, adapt to and meets the needs of a dynamic market. Figure 2 captures this sequential relationship and provides a framework for not only categorizing the existing literature but also for understanding supply chain management implementation. A complete review of the extant literature is found in Appendix A at the end of this focus study. A bottom-line summary of the literature suggests that managers need to understand the following factors and evaluate their impact on the organization's ability to utilize supply chain strategies for competitive success.

- The environmental and competitive forces driving the decision to adopt supply chain initiatives: Are they industry based or company specific? Are they compelling? Are they transitory? Are there any better competitive responses to meet the existing and emerging exigencies?

- The expected benefits from effective supply chain integration: Are the benefits real or illusory? Which benefits can the organization realistically obtain? Which supply chain member will actually receive the benefits? When will the benefits be obtained? Are the obtainable benefits sufficient to justify the investment and organizational change required by the supply chain strategy?

- The barriers and impediments to effective supply chain integration: Does the organization really understand the nature and magnitude of the existing impediments? Does a supply chain champion exist? Can early successes be achieved? Does the organization have the commitment and patience to work through the various challenges? Are managers and workers ready to get out of the box?

- The mechanisms (bridges) that facilitate cross-functional and inter-organizational collaboration: Do managers recognize the importance and role of each integrative mechanism? How advanced is the

## Figure 4
## A Framework for Understanding Supply Chain Implementation

Strategic Management Initiative

Driving
Forces

- More Demanding Customers
- Greater Competitive Intensity
- Shifting Channel Power
- Economic Globilization
- Tighter Alliance Relationships
- Compressed Product Cycles
- Continued Merger Activity
- Need for Better Information
- New Information Technologies
- Shifting Competitive Focus; i.e.,
  Companies to Supply Chains

Cross-Functional
Process Change

Performance
Measurement

Information
Systems

Effective
Supply Chain
Integration

Alliance
Design

Alignment
Mechanisms

People
Environment

Performance
Outcomes

- Unique Products & Services
- Faster R&D Cycle Times
- Superior Quality
- Cost Competitiveness
- Shorter Order Cycles
- Flexible Customer Response
- Enhanced Delivery Performance
- Better Asset Management
- Increased Cash-to-Cash Velocity
- Superior Channel Relationships

Implementation Challenges

- Lack of Top Management Support
- Non-aligned Strategic and Operating Philosophies
- Inability or Unwillingness to Share Information
- Lack of Trust Among Supply Chain Members
- An Unwillingness to Share Risks and Rewards
- Inflexible Organizational Systems and Processes
- Cross-functional Conflicts and "Turf" Protection
- Inconsistent/Inadequate Performance Measures
- Resistance to Change
- Lack of Training for New Mindsets and Skills

organization in its use of each mechanism? Is top management committed to the continued development of each mechanism? Are the resources available to develop and support integrative mechanisms?

## Research Questions

This focus study was conducted to answer the following research questions:

**Research Question 1:** What is supply chain integration in practice? Do definitions vary across functional areas? Do definitions vary by channel position?

**Research Question 2:** What factors motivate firms to engage in supply chain arrangements? Are the motivating forces viewed differently by different materials management functions? Are the motivating forces the same across channel positions?

**Research Question 3:** To what extent does organizational support exist for supply chain initiatives? Do perceptions regarding the level of support vary by functional area? Do perceptions regarding the level of support vary across the supply chain?

**Research Question 4:** What benefits/outcomes are expected from supply chain integration? How do they compare with real life results? Are different benefits/outcomes sought by the different materials management functions? Are the benefits/outcomes the same regardless of channel position?

**Research Question 5:** What are the principal barriers to effective supply chain integration? Do different materials functions view the critical barriers differently? Do perceptions of the

barriers vary across channel position?

**Research Question 6:** What are the principal bridges to effective supply chain integration; that is, mechanisms, tools, and techniques that facilitate supply chain integration? Do different materials functions emphasize different mechanisms? Are the same mechanisms used throughout the supply chain?

**Research Question 7:** To what extent are supply chain management practices really being implemented? Do perceptions of the level of supply chain activity vary by functional area? Do perceptions of the level of activity vary by channel position?

As these questions are answered, key insight needed to successfully implement supply chain strategies is obtained and managers are better enabled to use SCM as a competitive weapon.

## Research Methodology

To answer the above research questions, it was necessary to tap the experience of industry leaders who have undertaken supply chain integration efforts. Thus, in conjunction with the extensive literature review that was performed, a multi-method empirical approach involving both surveys and case study interviews was used to gain insight into SCM strategies. This triangulation approach—literature review, survey, and case studies—provided an opportunity to develop a broad-based understanding of the benefits, barriers, and bridges associated with SCM implementation while identifying and exploring innovative, leading-edge SCM practice.

### Cross-functional Mail Survey

An examination of supply chain management is different from most purchasing studies in that it is inherently cross-functional and inter-organizational. That is, most supply chain management strategies are not owned by the purchasing organization. The literature review combined with numerous informal discussions with materials managers quickly confirmed this reality, indicating that a wide variety of opinions exist regarding the nature and applicability of SCM. It rapidly became apparent that managers from different functional areas use the terminology "supply chain management" in their discussions of a host of programs and projects. It is worth noting that many of these so-called supply chain initiatives are very

similar to traditional materials management practices; only the name has changed. Indeed, purchasing, manufacturing, and logistics managers have at times used the term "supply chain management" to describe almost any pet materials management initiative. To document how key functional managers view supply chain management, a mail survey methodology was adopted and targeted to three different groups of managers: purchasers, logisticians, and manufacturing managers.

A mail survey is the most cost-effective methodology for gathering substantial quantities of data from a large number of managers. A mail survey also provides an opportunity to obtain broad-based, generalizable findings. Based on the literature as well as the pre-survey interviews, a four-page instrument consisting of 16 questions with 169 separate data points was developed (see Appendix B). The initial survey was reviewed by several practitioners and academics who served as members of the study's advisory board. Their comments provided feedback that was used to modify the survey instrument to make it more user friendly while improving its ability to capture relevant information. A large-scale pre-test was then conducted. Three separate mailing lists of approximately 1,500 middle- and senior-level managers were compiled from the leading professional associations' membership rosters. The professional associations that assisted in the research were the *National Association of Purchasing Management,* the *Council of Logistics Management,* and the *American Production and Inventory Control Society.*

The survey process followed Dillman's Total Design Method and included three mailings of a cover letter, an instruction sheet, and the survey instrument. The adjusted sample size, number of respondents, and response rate are shown in Table 2. Approximately 100 non-respondents from each group were telephoned to investigate why they had chosen not to participate in the study. Three answers dominated the responses: 1) the manager was simply too busy, 2) the manager is constantly inundated by surveys and no longer participates in survey studies, and 3) the manager's organization has yet to adopt a supply chain philosophy. Non-respondents were also asked to provide some basic demographic data so that respondent and non-respondent profiles could be compared. No differences were found.

The pre-test results were reviewed and the survey was modified slightly to add an inducement question and eliminate two questions that appeared to cause the respondents difficulty. New mailing lists were compiled. These mailing lists were considerably shorter, consisting of about 500 names. Each manager was then telephoned and asked to participate in the study. If the manager could not be contacted in person, a voice-mail message was left requesting participation. Approximately 20

Table 5
Survey Samples and Response Rates

**Pre-Test:**

| | Adjusted Sample Size | Completed Surveys | Response Rate |
|---|---|---|---|
| NAPM | 1,329 | 96 | 7.2% |
| CLM | 1,369 | 129 | 9.4% |
| APICS | 1,351 | 109 | 8.1% |

**Pre-Notification:**

| | Adjusted Sample Size | Completed Surveys | Response Rate |
|---|---|---|---|
| NAPM | 370 | 84 | 22.7% |
| CLM | 398 | 76 | 19.1% |
| APICS | 328 | 94 | 28.7% |

percent of the telephone numbers were inaccurate; the individual no longer worked at the company or the telephone number was simply wrong. The mailing list was adjusted accordingly and the mailing process was begun. The adjusted sample size, number of respondents, and response rates are shown in Table 2. The findings from the two mailings were compared and no statistical differences were found.

### Case Study Interviews

The case study method emphasizes in-depth qualitative analysis and is useful for answering questions regarding what, why, and how. The case study approach was considered essential to this research because of the number of what, why, and especially how questions associated with SCM implementation. Further, the case study methodology provided an opportunity not only to contextualize survey findings but also to explore issues of interest in greater detail and identify unique supply chain practices. The initial research design was to interview companies at each stage or channel position of leading, integrated supply chains in key industries such as consumer electronics, aeronautics, and automotive. However, after the first several interviews, it became apparent that truly "integrated supply chains" are extremely rare. In fact, none of the companies interviewed managed in a serious and strategic way beyond the first tier backward or forward. Therefore, it was determined that interviews would be conducted with leading companies at each stage of the supply chain. Fifty-one in-depth interviews were conducted with the companies listed in Table 6.

Table 6
Case Study Companies by Supply Chain Position

| Service Providers | Lower-Tier Suppliers | First-Tier Suppliers | Finished Goods Assemblers | Retailers |
|---|---|---|---|---|
| Allegiance | Allied Signal | Detroit Diesel | Black & Decker | Amazon.com |
| Aspen Distribution | Dyno-Nobel | Donnelly | Boeing Procurement | American Stores |
| Boeing—Shared Services | Hermetic Seal | Honeywell | Hewlett-Packard | Associated Foods |
| Corporate Express | | Intel | IBM | Costco |
| Modus Media | | Lucent Technologies | John Deere | Dillards |
| MSCarriers | | Monsanto | Kellogg | Eddie Bauer |
| Schneider National | | Motorola | Nabisco | Fred Meyer |
| ServiceCraft | | Nypro Incorporated | Oxford | Land's End |
| Wencor West | | Rockwell Collins | Paccar | The Limited |
| | | Siemens | Savane | Payless |
| | | Tri-State Hospital Supply | Steelcase | Sam's Club |
| | | TRW | Union Bay | Sears |
| | | | Whirlpool | Starbucks |
| | | | | Wal-Mart |

Potential case study participants were initially identified based on their participation at annual meetings of leading professional associations where they were presenting some aspect of leading-edge supply chain practice. Additional companies were identified during the first wave of interviews as well as from SCM articles in the trade press. A few companies were selected on a convenience basis. Overall, the study participants were selected because they had a reputation for "doing SCM" well. Once a company agreed to participate, a letter of introduction and a brief overview of the research objectives were mailed together with a copy of the interview protocol to the appropriate manager(s). This information was sent several weeks before the actual interview so that the manager could adequately prepare for the interview session. The average interview lasted from 4-6 hours with the longest interview taking over 10 hours. Where appropriate, a facility tour was included as part of the visit. In most instances, the interview was conducted with multiple managers from the host organization (the number of company representatives ranged from one to eight). Finally, the researchers used a semi-structured protocol to focus the interview and assure some degree of comparability while allowing for flexibility in pursuing greater insight into unique practices and programs (see Appendix C). Supporting documents were also collected whenever possible.

# Achieving World-Class Supply Chain Alignment: Benefits, Barriers, and Bridges

*Great firms will fight the war for dominance in the market-place not against individual competitors in their field but fortified by alliances with wholesalers, manufacturers, and suppliers all along the supply chain. In essence, competitive dominance will be achieved by an entire supply chain, with battles fought supply chain versus supply chain.*

*Roger Blackman*

If the competitive battle is truly shifting from company versus company to supply chain versus supply chain, managers need to understand better why SCM is needed, how it can be implemented, and when it is feasible and appropriate. A supply chain roadmap that helps answer these questions is vital to the quest to achieve greater supply chain alignment. Such a framework begins to emerge as managers gain an understanding of the benefits, barriers, and bridges associated with SCM implementation. These three issues determine not only if and when, but how supply chain strategies should be implemented:

- Understanding the benefits helps managers make informed decisions about whether or not it is worthwhile to undertake the arduous supply chain integration journey. Quantifying the benefits also makes it possible to justify the cost.

- Understanding the barriers to successful supply chain integration enables managers to weigh both the costs and the viability of adopting a supply chain strategy. Knowing where the barriers are likely to be found also makes it possible to establish valid expectations about the integration process as well as appropriate contingency plans for overcoming some of the expected challenges.

- Understanding the bridges to successful supply chain integration defines the scope and the nature of the integration initiative. It also helps managers evaluate specific mechanisms that facilitate cross-functional and inter-organizational collaboration. This evaluation is needed to develop an overall supply chain integration plan and establish priorities regarding individual integration activities.

This focus study was undertaken to help answer the why, how, and when questions pertaining to SCM and to take a step toward developing the needed understanding of the benefits, barriers, and bridges to successful SCM. The following discussion presents the findings, organizing them into two major sections. The first section discusses the functional findings from the mail surveys while the second section explores the channel-position findings from the in-depth interviews. This approach—looking at the critical issues from two distinct perspectives—promises to provide valuable insight into the state and direction of supply chain practice.

## Supply Chain Management—A Functional Perspective

Because SCM is inherently cross-functional and integrative, purchasers need to understand how other materials managers perceive the vital issues surrounding supply chain design and management. Indeed, supply chain initiatives have become vital components of most materials-related functional strategies. Therefore, three distinct groups of materials managers—logistics managers, production managers, and purchasing managers—were surveyed. How these three groups view SCM is critical since they make a majority of the decisions that affect the value-added flow of materials, information, and money. To a large extent, these three groups of managers determine the true value-added nature of an organization's key processes.

The discussion on the following pages takes a functional approach to examining this study's seven research

hypotheses. Data for each hypothesis is analyzed and discussed from two perspectives. First, the responses from all three groups of materials managers are combined to provide an overall perspective of the state of SCM practice. Second, similarities and differences in the way that these materials managers define and operationalize supply chain strategies are identified and discussed.

## The Status of Supply Chain Management

The words "supply chain management" began to appear in the literature in the mid 1980s. More importantly, by 1996 the notion of "supply chain integration" had become widely used by academics and practitioners alike. The frequency with which the topic has appeared in the literature as well as on the programs of professional meetings over the past five years would lead the observer to believe 1) that SCM is a well-defined concept, 2) that it is a widely-accepted strategy and 3) that general agreement exists as to what constitutes SCM practice. An anecdotal look at the current state of integrative efforts, however, suggests that substantive ambiguity exists regarding actual practice. Not only do managers from various functional areas define SCM in unique and varied ways, but they also view the integrative nature of SCM differently. Thus, the first research question was designed to clarify what diverse materials managers are thinking about when they talk about supply chain integration.

**Research Question 1:** What is supply chain integration in practice? Do definitions vary across functional areas?

**SCM As a Critical Strategy.** The first question asked respondents to indicate whether they view supply chain integration as a management fad or a critical competitive strategy. This question was deemed important because the words "supply chain management" have been applied to many different types of activities and because so many "new and improved" management practices have been widely hyped in recent years. During the initial exploratory discussions, several materials managers expressed doubt regarding their companies' commitment to greater integration. Others expressed cynicism that SCM was just the latest fad and that it would disappear from the front-page of popular management practices. They cited business process re-engineering as an example of a "hot topic" that had emerged quickly but had no real staying power. One individual compared SCM to TQM, noting that they both had come to "mean everything and nothing at the same time." With this background, it was important to find out to what extent materials managers view SCM as a legitimate strategy that could realistically help their companies compete over the long haul.

The data clearly show that the respondents believe supply chain management is a critical component of their firm's business strategy. Nearly 88 percent of all the respondents rated SCM to be an important part of their business strategy (rating of five or higher). The aggregate average score of 5.70 (1=Passing Fad, 7=Critical Strategy) provides strong evidence that materials managers view supply chain management as an important contributor to organizational competitiveness now, and for years to come. Drilling down into the functional data reveals some variation in viewpoint. Logistics managers are the most bullish on the role and importance of SCM. The average logistics rating was 5.92 with 93.4 percent of managers rating it at five, six, or seven. As a boundary-spanning function, logistics is positioned to sense where industry is headed and is called on to achieve higher levels of inventory and delivery performance in a supply chain world. The responses from the logistics managers clearly communicate the pressure logistics managers are feeling to work more closely with other supply chain members in order to meet emerging performance expectations.

Purchasing managers, by contrast, tended to be more cautious in their evaluation of SCM as a critical strategy. The mean response of 5.48 with 82.1 percent of purchasers rating SCM at a five or higher suggests that while purchasing managers perceive SCM as an important strategy, they are not universally convinced of its importance or staying power. That is, these findings can be interpreted from a pessimistic, "half-empty" perspective in that nearly 20 percent of purchasing respondents consider supply chain management to be "faddish" and merely a temporary approach of doing business. One explanation emerged from some of the letters that were received from purchasing managers who chose not to respond to the survey. They noted that their companies do not use collaborative supply chain relationships; rather, they continue to use adversarial buyer/supplier practices that focus on "price, price, price." It seems that some purchasers are instilled with a "flavor-of-the-month" mindset and are waiting for the SCM "rhetoric" to subside so they can resume the "old" ways. These managers are either personally comfortable with traditional skills and philosophies or continue to respond to measures that reward non-collaborative behavior.

Interestingly, manufacturing managers were positioned almost exactly at the midpoint between the purchasers and logisticians. The manufacturing average strategy/fad score was 5.73, indicating a belief that SCM is valuable and here to stay, at least for the foreseeable future (over 87 percent of the production managers rated SCM at a five or higher). This finding is likely an artifact of the pressure manufacturers feel to enhance core competencies and outsource non-critical activities.

**The Nature of SCM Integration.** The second area that was explored focused on the nature of integration being

pursued. Once again, the initial informal discussions with materials managers revealed that definitions of supply chain integration vary, ranging from "cross-functional process integration within the firm" to "complete forward and backward supply chain integration." In fact, the preliminary discussions revealed that four primary types of integration are often described as supply chain management:

- Internal, cross-functional process integration was identified as the crux of several supply chain initiatives. Such integration follows the pattern set by earlier process re-engineering initiatives.

- Backward integration with valued first-tier suppliers was identified as the most common form of supply chain integration. Of course, a natural extension of this form of integration involved more extended efforts that involved second-tier suppliers (that is, the suppliers' suppliers). Deeper upstream integration (the second, third or higher tiers) was believed to be relatively rare.

- Forward integration with valued first-tier customers was also identified as supply chain integration. The early discussions revealed no tendency to move forward integration to the customers' customers.

- Complete forward and backward integration was also associated with supply chain management. This notion was typically expressed as integration from the "suppliers' supplier to the customers' customer." Interestingly, further discussion revealed that such extended integration was perceived as very rare—more of a theoretical ideal than a reality.

Based on the pre-survey discussions (combined with insight gained from the literature review), respondents were asked to indicate the extent to which their firms were engaged in each of the four types of integration. A seven-point scale ranging from 1=Not Engaged to 7=Totally Engaged was used. The data in Table 7 indicate that on average, organizations are more comfortable, or at least more engaged, with internal integration efforts.

Almost all of the respondents indicated that their organizations had begun some kind of internal integration effort. About 60 percent of all respondents feel that their organizations are somewhat to fully engaged in integration efforts across functional boundaries within the firm (rating of five or higher). However, the variability in responses is revealed by the moderate mean response of 4.67 (ratings ranged from two to seven). The relatively low scores for within-firm integration denote the difficulty of knocking down the walls that impede functional collaboration and may be viewed as a leading indicator for the challenges that await inter-organization collaboration.

Turning to integration across the supply chain, it can be seen that most organizations are at relatively early stages in their inter-company collaborative efforts. Interestingly, respondents indicated that their forward integration efforts are on pace with, or slightly ahead, of their backward integration efforts. The mean score for forward integration engagement was 4.33 compared to 4.26 for backward integration. Approximately 51 percent of all respondents rated their forward and backward integration engagement at a five or higher. It seems clear that organizations of all types and materials managers from all three functional areas are seriously talking about supply chain integration and are experimenting with various integration programs. As was the case with internal integration, individual companies find themselves at different points all along the integration journey. Finally, complete integration up and down the supply chain received the lowest rating, with a mean of 3.37, while just 25.80 percent rated it five or higher. Clearly, this indicates there is much work to do in order to realize the full potential of supply chain integration and that the work will be difficult. If it is challenging managing integration issues within the context of a single firm, tackling those same issues across organizations will likely be even more difficult. Indeed, when fissures exist between marketing and purchasing, it is almost certain that breaches will persist between an organization's suppliers and its customers.

Taking a moment to compare functional responses highlights the fact that logisticians perceive their organizations

### Table 7
### Status of Integration Efforts

| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 |
| Internal process integration | 4.67 | 1 | 60.5 | 4.30 | 1 | 48.1 | 4.72 | 1 | 65.70 | 4.95 | 1 | 66.60 |
| Forward 1st-tier integration | 4.33 | 2 | 51.1 | 4.15 | 3 | 49.1 | 4.33 | 2 | 49.40 | 4.52 | 2 | 56.30 |
| Backward 1st-tier integration | 4.26 | 3 | 50.9 | 4.12 | 2 | 46.9 | 4.28 | 3 | 50.90 | 4.35 | 3 | 52.50 |
| Complete integration | 3.37 | 4 | 25.8 | 3.28 | 4 | 25.7 | 3.27 | 4 | 23.90 | 3.53 | 4 | 27.80 |

How extensively is your firm engaged in the above integration efforts. (1=Not Engaged, 7=Totally Engaged)

to be more fully engaged in integration efforts. Purchasers are once again the most hesitant in applauding their firms' efforts to engage in integrative endeavors. Production managers occupy the middle ground. It is interesting to note that the largest gap in perceptions is found in the area of internal cross-functional integration. The purchasing mean was 4.30 compared to 4.72 for manufacturing and 4.95 for logistics. Purchasing managers simply do not see the same degree of integration engagement taking place within their organizations. It may well be that purchasers are excluded from some cross-functional initiatives (or at least they feel that they are). By contrast, the downstream/customer-facing view of logistics may translate into an atmosphere more conducive to integration and collaboration, where all parties are focusing efforts on company-wide customer satisfaction initiatives. Another interesting point is that purchasers provided the lowest mean scores for backward integration. The point here is that of all the managers within the organization, no other group should have a better feel for backward integration, which involves the establishment of collaborative supplier relations. Purchasing respondents appear to be experiencing more frustration with both internal and backward coordination efforts.

**Degree of Functional Interaction.** Because integration is a complex and challenging task and because coordination among functions is a critical skill for effective supply chain integration, respondents were also asked to indicate the degree to which cooperation/interaction takes place among personnel in their organizations. Seven different dyadic relationships involved in the plan-design-source-build-deliver sequence found in most companies were examined (see Table 8). The general level of function-to-function interaction is greater than existed in the broader arena of cross-functional process integration. Four dyadic relationships obtained aggregate mean interaction scores greater than 4.90. Certainly, part of the increased interac-

tion stems from the fact that the different dyads must work together on a day-to-day basis simply to perform their normal responsibilities. This finding suggests that the foundation is being put in place to move toward greater process integration as well as increased participation on cross-functional teams. This implication is vital to increased supply chain integration since cross-functional and inter-organizational teams are a basic building block of supply chain initiatives. The ability of cross-functional teams to navigate through a firm's history and culture, while attacking the supply chain problems at hand, has a tremendous impact on that firm's success in satisfying customers. Companies that have difficulty navigating the "waters of their own harbor" must spend the majority of their time and resources on these issues, rather than collaborating with supply chain partners.

Looking at the aggregate cooperation/interaction scores shows that purchasers participate in the two most cooperative dyads, interacting at high levels with both manufacturing and logistics. Logisticians and production managers also participate in two of the top three interactive dyadic relationships. For each of the top four dyads, nearly two-thirds of respondents listed the degree of cooperation at five or higher. All of the dyads listed, even those functions not represented in our sample (i.e., engineering and marketing), received scores over 4.0. The relative strength of the most interactive dyads indicates that despite the challenges, good, strong intra-organizational relationships are forming which can provide a foundation for broader types of integration. As firms outsource an increasing proportion of their direct requirements, the interaction between purchasing and manufacturing will be increasingly critical to ensuring timely satisfaction of customer orders. The strength of the perceived levels of integration between logistics and the purchasing and manufacturing functions is also encouraging. Together, these three functions have primary responsibility for the entire order fulfillment cycle. Increased cooperation among them will support the

Table 8
Degree of Cooperation/Interaction among Functional Personnel

| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 |
| Purchasing & Manufacturing | 5.21 | 1 | 70.0 | 5.57 | 1 | 77.3 | 5.51 | 1 | 77.7 | 4.65 | 3 | 57.1 |
| Purchasing & Logistics | 5.16 | 2 | 67.1 | 5.47 | 2 | 72.4 | 5.23 | 2 | 66.0 | 4.88 | 1 | 64.2 |
| Manufacturing & Logistics | 4.93 | 3 | 65.3 | 4.87 | 4 | 64.0 | 5.09 | 3 | 64.1 | 4.83 | 2 | 67.5 |
| Engineering & Manufacturing | 4.91 | 4 | 64.6 | 5.07 | 3 | 67.8 | 5.07 | 4 | 65.7 | 4.64 | 4 | 60.9 |
| Purchasing & Engineering | 4.39 | 5 | 47.7 | 4.78 | 5 | 60.3 | 4.53 | 5 | 54.9 | 3.96 | 6 | 31.2 |
| Manufacturing & Marketing | 4.13 | 6 | 40.8 | 4.18 | 7 | 40.1 | 4.07 | 7 | 41.7 | 4.14 | 5 | 40.5 |
| Engineering & Marketing | 4.07 | 7 | 38.2 | 4.25 | 6 | 44.8 | 4.24 | 6 | 43.2 | 3.79 | 7 | 28.6 |

Indicate the degree of cooperation/interaction among personnel in your business unit. (1=Low, 4=Average, 7=High)

desires of companies to increase customer satisfaction while simultaneously increasing asset productivity and reducing operating costs.

The data also suggest there is plenty of opportunity for improved collaboration. Only the purchasing/manufacturing dyad received a score of 5.5 or higher (both production managers and purchasing managers rated this dyad at 5.5). In fact, three of the four dyads that are often involved in integrated product development activities received relatively low interaction scores (below 4.5). One of the areas that has long been discussed as needing more cooperation, the marketing/manufacturing dyad received quite low marks, especially from the production managers. Finally, logisticians consistently perceived the degree of cooperation among the different dyads to be at much lower levels than their purchasing and manufacturing counterparts. This difference in perception is particularly relevant for the logistics/purchasing and logistics/manufacturing dyads. Such differences of opinion strongly suggest that more time and effort need to be spent in training, rotation programs, and other efforts designed to help managers better understand the roles and responsibilities of other functional managers. These efforts will help managers recognize and take advantage of untapped opportunities for cooperation. Of equal importance, materials managers will develop the relationships needed to work more cohesively across functional boundaries and responsibilities.

To summarize, most but not all materials managers view supply chain integration as an important competitive strategy. However, a substantial minority of managers continues to believe that SCM is just the latest in a long list of management fads that will eventually fall out of favor. This minority seems to believe that their companies either do not value truly cooperative channel relationships or lack the staying power to build long-term relationships. Materials managers also sense that there are varying degrees of emphasis on the different types of integration. Many companies place most of their SCM emphasis on improving integration within the four walls of the organization. Others focus on building relationships with upstream customers while still others emphasize downstream supplier relationships. Few materials managers see comprehensive integration from "suppliers' suppliers to customers' customers" taking place. Purchasers seem to be the most reticent to note that real integration is taking place.

### Forces Driving Supply Chain Integration

A critical issue for managers thinking about the relative merit of supply chain integration as well as its applicability to their organization is the question of why. That is, why should they undertake a strategy that is clearly resource intensive and inherently difficult not just to initiate but to make successful over the long haul? Another way to view this question is to ask, are there compelling reasons in my particular industry or for my specific organization to engage in SCM? If there are no compelling reasons, it will be next to impossible to generate the organizational support and establish the momentum required to successfully align and integrate the supply chain. Respondents were therefore asked to indicate the extent to which ten different factors have led their organizations to seek greater supply chain integration. The discussion for Research Question 2 reveals what forces are driving SCM in today's business world.

**Research Question 2:** What factors motivate organizations to implement supply chain strategies? Are the motivators viewed differently across materials management functions?

**Meeting Customer Needs.** Improving customer satisfaction is clearly the dominant motivation spurring organizations to begin the journey toward supply chain integration (see Table 9). The perceived need to enhance customer value is universal across the three functional areas examined and supports what business analysts have been saying for years—that customers matter most. The underlying implication is that companies must continually strive to *improve customer satisfaction* and that *supply chain integration can help them do so.* In today's world, inhabited by demanding customers, companies can no longer rely on the operational efficiencies provided by lean activities within the four walls of the organization to drive profitability. Rather, an organization's value-added activities and efforts must be targeted at delivering value to customers and must include other supply chain entities. The focus on customer satisfaction emerges from a combination of several issues including the following:

- The cumulative effect of years of quality management thinking, which has emphasized the importance of meeting customers' real needs.

- The globalization of competition, which has brought an increased number of viable competitors to the marketplace—giving customers access to a variety of legitimate competitive options.

- The emergence of the internet, which has greatly empowered customers by providing access to comparative quality, price, and performance information.

- The compression of innovation cycle times coupled with higher levels of cost, quality, and delivery performance, which has led to elevated expectations and therefore more demanding customers.

Table 9
Factors That Motivate Supply Chain Integration

| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 |
| Improve customer satisfaction | 5.86 | 1 | 88.0 | 5.76 | 1 | 87.0 | 5.93 | 1 | 88.3 | 5.87 | 1 | 88.5 |
| Improve SC productivity | 5.71 | 2 | 85.1 | 5.58 | 2 | 83.0 | 5.69 | 2 | 84.3 | 5.84 | 2 | 88.0 |
| Intensifying competition | 5.24 | 3 | 76.5 | 5.15 | 3 | 74.0 | 5.13 | 3 | 73.4 | 5.42 | 3 | 81.7 |
| Build SC team | 4.73 | 4 | 60.1 | 4.96 | 4 | 67.7 | 4.57 | 4 | 55.4 | 4.69 | 4 | 58.4 |
| Compete against global SCs | 4.39 | 5 | 54.6 | 4.22 | 5 | 49.2 | 4.36 | 5 | 55.6 | 4.56 | 5 | 58.2 |
| Focus on core competence | 4.29 | 6 | 50.1 | 4.22 | 6 | 53.8 | 4.33 | 6 | 44.9 | 4.40 | 6 | 52.0 |
| Customers initiated integration | 4.21 | 7 | 49.3 | 4.04 | 7 | 45.0 | 4.23 | 7 | 53.3 | 4.24 | 7 | 49.0 |
| Access to global markets | 3.98 | 8 | 43.5 | 4.00 | 8 | 41.4 | 3.80 | 8 | 42.5 | 4.13 | 8 | 46.3 |
| Shifting channel power | 3.65 | 9 | 34.6 | 3.57 | 9 | 33.3 | 3.55 | 9 | 29.8 | 3.83 | 9 | 40.3 |
| Suppliers initiated integration | 3.22 | 10 | 20.4 | 3.23 | 10 | 20.3 | 3.13 | 10 | 19.5 | 3.30 | 10 | 21.3 |

To what extent have each factor led your firm to seek greater SC integration? (1=Not a Factor, 7=Critical Factor)

The bottom line is that materials managers view supply chain management as an effective tool to increase customer satisfaction.

**Supply Chain Productivity.** The second most critical motivating factor is a desire for organizations to increase supply chain productivity, and thereby reduce the costs associated with satisfying customers. Herein lies the reason why supply chain management is receiving so much attention these days—if planned and managed correctly, changes in supply chain relationships can simultaneously increase revenues and decrease costs. This "double-impact" of supply chain management enables companies to financially justify the expense and difficulties inherent in supply chain integration. That is, when increased revenue flows and reduced day-to-day expense streams are factored into net present value (NPV) or other financial models, supply chain management projects can clear the bar that is set via hurdle rates and payback periods. In recent years, the connection between supply chain management and value creation as measured by economic value added (EVA) and shareholder value analysis (SVA) has been highlighted. Indeed, companies like Whirlpool have relied heavily on EVA to justify supply chain initiatives and then measure their impact.

**A Competitive and Dynamic Environment.** The third-ranked motivating force has increased industry competition. Simply stated, companies are paying more attention to supply chain management because they have to in order to stem the competitive tide. As with customer satisfaction, a multitude of factors including globalization, better information availability, and more demanding customers are responsible for the perception that the business world is increasingly competitive. Likewise, regardless of the source of competition in any given industry, the consensus is that supply chain integration can at least partially counter the adverse impact of intensifying competition. Once again, the simultaneous supply chain benefits of increased customer satisfaction (higher revenues) and higher productivity (lower costs) can help mitigate the challenges of increased competition.

Four additional factors received recognition as being moderately important in driving the adoption of supply chain initiatives (average scores above 4.0). Foremost among these is the perception that the time to *build the best team of supply chain partners* is now. That is, there is some competition to link up with the best partners available before a competitor establishes unassailable relationships with them. Toyota recently announced that it is increasing its ownership stake in many of its best suppliers in order to keep competitors like General Motors from making too much of an inroad in tapping the technologies and expertise of these world-class suppliers. The desire to lock up the best supply chain partners is consistent with the belief that competition is moving from the company level to the supply chain level, which was the fifth-ranked motivating force. This raises a couple of interesting questions, "What is the value of working to help a supplier build superior capabilities if the supplier is going to aid and abet your key competitors?" and "Short of vertical integration, how can a company create and maintain proprietary supply chain relationships?"

Materials managers also noted that the desire to *focus on the company's core competencies* is a force that leads to greater efforts to build stronger supply chain relationships. In a highly competitive world, it is difficult to meet the competitive standard across a broad range of activities. Recognizing that it is increasingly challenging to be all things to all people, companies have focused more intently on those activities where they possess a unique skill or technology. As a result, they have chosen to outsource non-core activities. Perhaps the most surprising point here is that outsourcing was ranked only sixth out

of the ten factors evaluated. Anecdotal stories found in the trade press suggest that desire to specialize and outsource is more pervasive than was indicated by the 588 materials managers who participated in this study. Even so, greater emphasis on outsourcing combined with the emphasis on customer satisfaction requires more efficient and effective supply chain management. Finally, many companies have entered the supply chain arena at the request of key customers. Indeed, the desire to be a "supplier of choice" makes it very difficult to turn down invitations to participate in supply chain integration initiatives. This is especially true when other suppliers are ready, and often anxious, to improve the quality and intensity of their relationships with the same customer.

Three factors—access to global markets, shifting channel power, and supplier-initiated integration—received relatively low scores and were ranked eighth, ninth, and tenth respectively. With a combined average score of 3.98, the desire to access global markets is still a motivating factor worth considering. However, the reality is that for many companies, cultivating stronger supply chain relationships in the home market is a complex and difficult task with which they are still struggling. Dealing with the diverse cultures, longer distances, language barriers, unfamiliar laws and regulations, exchange rates, and infrastructure problems found in the global marketplace greatly magnifies the difficulty of building tight supply chain relationships. Thus, while expanding supply chain initiatives worldwide is often viewed as desirable, global supply chain management has yet to make it to the top of the planning agenda for most companies.

Anecdotally, the shifting of channel power downstream toward the end consumer has often been cited over the past decade as a key reason for greater supply chain integration. To cope with the emergence of super-powerful retailers, many manufacturers have recently attempted to alter the balance of power through mergers and acquisitions. Technology is also influencing channel relationships. For example, the emergence of the internet--complete with its ability to connect manufacturers directly to end customers—has redistributed channel power, mitigating somewhat the power of traditional retailers. The reality is that the pace of change in today's competitive landscape makes it difficult to predict exactly where channel power will reside in the next several years. As a result, shifting channel power is viewed by most materials managers as a relatively insignificant factor in the design of supply chains. Finally, few materials managers see suppliers as the motivating force in supply chain integration. On a comparative basis, suppliers tend to wield less leverage and influence than customers and in many cases lack the size and sophistication to be major drivers of supply chain initiatives. Overall, the data suggest that most organizations adopt supply chain strategies largely

for their own competitive benefit and not in response to invitations from other supply chain members (customer initiatives and supplier initiatives are ranked seventh and tenth respectively). This self-interest might make it more difficult to realize the full benefits of supply chain integration since individual firms are likely to work to retain the benefits of integration rather than sharing them "equally" with other supply chain members.

**A Functional View.** The above discussion looked at the combined responses from the purchasing, manufacturing, and logistics managers. Additional insight is gained by looking at the specific results for each group of materials managers. Perhaps the first point of interest is the remarkable consensus that is found in the responses. While the average scores do vary somewhat, the relative rankings for all 10 factors are identical across the functional areas. The fact that all three functions ranked the desire to *improve customer satisfaction* as the most important factor (by a relatively large margin) indicates that the focus on customer satisfaction is beginning to make its way through the entire company. The overall agreement in ranking lends credibility to the responses, suggesting that the opportunity to improve customer satisfaction, reduce costs, and meet the challenge of intensifying competition really are the issues being evaluated by materials managers today. This congruence of motivation should provide a solid foundation for communication and collaboration among purchasers, logisticians, and production managers.

A second point of interest is the magnitude of decrease in the importance ratings for the other factors. With the exception of purchasing's view that *building the best team of supply chain partners* is a strong motivating force, no other factor obtained an average score above the mid fours. Of course, purchasers tend to be highly sensitive to the importance of working with the best suppliers available. They therefore place greater emphasis on the need to solidify relationships with the highest quality suppliers before other chains lock them in as partners. Finally, logistics managers appear to be more highly sensitized to the changes in today's competitive environment, especially as they relate to meeting customers' real needs better than the competition. Logisticians gave eight of the ten factors higher scores than either purchasers or production managers. This fact is reflected in the cumulative importance rating for the ten different factors: the cumulative average score for logistics managers is 4.62 compared to 4.47 for both of the other groups of materials managers. Again, logistics managers place significantly greater emphasis on factors that impact competitive intensity (e.g., supply chain productivity, intensifying industry competition, competition against other supply chains, and shifting channel power).

Despite the differences that do exist among the three groups of materials managers, a clear and unified message emerges: because supply chain management can simultaneously reduce costs and increase revenues, it is viewed as a valuable weapon in the battle to capture the mind of the customer and respond to increasing levels of competition.

## Managerial Support for Supply Chain Management

All major competitive initiatives, especially those that demand substantial resource dedication or a dramatic change in organizational philosophy require high levels of management support. Supply chain integration initiatives are no different. The need for managerial support is particularly critical when cross-functional collaboration is a requirement. Moreover, this managerial support must come from all levels of the organization. Managers and workers involved in the actual implementation of the initiative must buy into the new program or it cannot succeed. Likewise, top management (all the way up to the CEO) must endorse the initiative and provide the resources necessary for success. In their article, "Competing on Capabilities," Stalk et al. (1992) noted that only the most senior levels of management can dedicate the resources and realign the incentives to assure that true cross-functional capabilities are developed. Further, as collaboration moves to higher levels in an organization, the impediments to cooperation seem to grow in magnitude as organizational politics and internal turf issues must be overcome. SCM inherently involves high-level integration, making organizational support a prerequisite to success. Respondents were therefore queried regarding the level of organizational support that they see for supply chain initiatives.

**Research Question 3:** To what extent does organizational support exist for supply chain initiatives? Do perceptions regarding the level of support vary by functional area?

**Organizational Support.** Respondents were asked to indicate using a seven-point scale (1="No Support," 7=Very High) the level of organizational support that exists for supply chain integration initiatives. The aggregate data in Table 10 provide valuable insight regarding where managerial support is generally found as well as where inadequate support may inhibit SCM. For example, the combined scores reveal that the purchasing function is most active in supporting SCM endeavors. Of course, to the extent that the integration efforts focus on upstream suppliers, this finding makes sense. Supply chain integration really provides purchasing an ideal opportunity to increase its value-added capability and elevate itself to a more strategic position within the organization. Unfortunately, while purchasing was recognized as the most ardent supporter of SCM, its mean support score of 5.29 highlights a real challenge for supply chain initiatives—no truly outspoken SCM champion has emerged. Fortunately, senior management is seen as a solid, if not zealous, supporter of SCM. The mean score of 5.03 suggests that top management now clearly has SCM on its agenda. Even so, it seems that top management has yet to truly decide how to support SCM implementation. Given the imperative need for top management support, a score over 6.0 would be highly desirable.

The downside of the story told by the support data is that manufacturing, information, systems, and marketing appear to provide only lukewarm support for SCM. Manufacturing often finds itself taking a very narrow "in-house" view of supply chain initiatives. Some reticence exists among production managers since SCM is often associated with outsourcing, which can foreshadow layoffs and/or diminished organizational stature. The dilemma raised by the relative lack of IS support derives from the fact that SCM is highly information dependent (SCM has been called "relationship and technology management"). Ultimately, the advent of modern information systems has really made SCM feasible. For SCM initiatives to have significant impact now and in the future, information systems people must take on a more

Table 10
Organizational Support for Supply Chain Management

| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 |
| Purchasing support | 5.29 | 1 | 75.8 | 5.76 | 1 | 87.0 | 5.34 | 1 | 78.6 | 4.85 | 3 | 63.50 |
| Logistics support | 5.21 | 2 | 71.8 | 4.71 | 3 | 60.1 | 4.92 | 4 | 65.4 | 6.19 | 1 | 87.20 |
| Top management support | 5.03 | 3 | 66.5 | 4.83 | 2 | 64.9 | 4.99 | 3 | 63.7 | 5.23 | 2 | 70.80 |
| Manufacturing support | 4.82 | 4 | 62.9 | 4.65 | 4 | 58.0 | 5.23 | 2 | 75.9 | 4.56 | 5 | 54.20 |
| Information systems support | 4.49 | 5 | 51.1 | 4.19 | 5 | 67.3 | 4.59 | 5 | 55.5 | 4.64 | 4 | 54.20 |
| Marketing support | 4.32 | 6 | 45.1 | 4.16 | 6 | 43.5 | 4.21 | 6 | 40.9 | 4.56 | 5 | 50.50 |

Indicate the level of organizational support within your firm for supply chain initiatives. (1=No Support, 7=Very High)

high-profile, high-energy support role. Perhaps it is necessary to highlight the word "support." Systems support the SCM strategy—they must not be viewed as a substitute for the value proposition and processes. Finally, marketing has yet to fully respond to the opportunities to enhance customer satisfaction through more fully integrated supply chain processes. Marketers tend to see only forward to the immediate customer, often failing to recognize instances where manufacturing, purchasing, and logistics activities come together to create unique value-added products and service. As a result, some tension often exists between marketing and the other major supply chain functions.

A more interesting view of managerial support arises from comparing the responses of the three respondent groups. Not coincidentally, each functional area considers its own group to be among the most supportive of SCM. Purchasers and logisticians view their own functions not just as the most supportive but as the most supportive by a huge margin—almost a full point (5.76 vs. 4.83 and 6.19 vs. 5.23, respectively). Manufacturers are a little more modest in their view of manufacturing support for SCM. They rate manufacturing as highly supportive, but second to purchasing. Noteworthy is the fact that while logistics managers scored logistics support at a 6.19, purchasers rated logistics support at only 4.71 and production managers evaluated logistics support at a 4.92. The same relationship was evident for manufacturing. Production managers rated manufacturing support at 5.23 while purchasers gave manufacturing a 4.65 support score and logisticians scored manufacturing at a 4.56. The lack of consistency in perceptions of functional support reveals what might be considered to be an outright functional bias. The existence of parochial attitudes typifies a challenge inherent in moving toward cross-functional and/or supply chain process integration—individual groups see themselves as cooperative while viewing others as obstructive. While it is certain that not all functions support SCM equally, the reality is that blaming other functions for integration difficulties is counterproductive. Real functional collaboration can only occur when individual functions are willing to respect the challenges and the solutions that emerge in other functional areas.

**Channel Support.** Since supply chain integration is essentially an inter-organizational effort, internal managerial support is not sufficient to assure success. Other key channel members must also be committed to the collaborative effort. Obtaining such support can be a challenge. For example, garnering supplier support for SCM activities can be difficult given the long history of adversarial and asymmetric dealings that have often governed buyer/supplier relationships. These relationships have been characterized by dominant buyers that have used their leverage to squeeze suppliers' profit margins. Dave Nelson, former vice-president of purchasing at Honda of America, has discussed the cynicism that suppliers often express toward customers who talk about collaborative improvement efforts. They seem to have a natural tendency to believe that such efforts are "all talk" or just another way to seek additional concessions from suppliers. Given the reticence that is a natural vestige of past competition within the supply chain, it was important to gauge the level of channel commitment for supply chain initiatives. Managers were thus asked to evaluate the level support that they witness from suppliers, customers, and service providers (see Table 11).

On average, the support from other channel members is viewed as tepid. Looking at the aggregate data, first-tier customers and first-tier suppliers provide the greatest amount of support. Even so, their scores are only in the mid fours, which while low is comparable to the level of support seen for several functional areas within the organization. Thus, it may well be that the support from primary suppliers and customers is adequate to support synergistic collaboration. Service suppliers and lower-tier suppliers as well as more distant customers all tended to be viewed as much less enthusiastic about supporting supply chain initiatives. This specific outcome is consistent with the earlier finding that complete supply chain integration up and down the supply chain is rare. An

Table 11
Channel Support for Supply Chain Integration

| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 |
| First-Tier customer support | 4.55 | 1 | 57.5 | 4.82 | 1 | 66.2 | 4.35 | 1 | 53.7 | 4.75 | 1 | 61.4 |
| First-Tier supplier support | 4.49 | 2 | 56.4 | 4.57 | 2 | 57.3 | 4.15 | 2 | 47.9 | 4.54 | 3 | 56.3 |
| Service supplier support | 4.10 | 3 | 43.0 | 4.00 | 3 | 40.7 | 3.90 | 3 | 38.8 | 4.60 | 2 | 49.2 |
| Second-Tier customer support | 3.97 | 4 | 38.6 | 3.93 | 4 | 39.8 | 3.79 | 4 | 34.8 | 4.17 | 4 | 41.3 |
| Second-Tier supplier support | 3.73 | 5 | 30.9 | 3.86 | 5 | 34.3 | 3.55 | 5 | 28.9 | 3.81 | 5 | 29.8 |

Indicate the level of organizational support across the chain for supply chain initiatives. (1=No Support, 7=Very High)

invisible wall appears to enclose the triadic relationship that consists of a company and both its first-tier suppliers and first-tier customers. Eventually, mechanisms must be found to extend the influence and synergies of closer relationships throughout the supply chain. Emerging technologies, better measurement, and changed relational philosophies may well open the door to greater commitment up and down the supply chain. Finally, it should be noted that the boundary-spanning functions of purchasing and logistics were inclined to rate the levels of external support somewhat higher than their manufacturing counterparts. Perhaps this is a signal that channel relationships and cooperation are slowly but surely beginning to strengthen.

The bottom line is that there is some genuine commitment to supply chain integration both within the organization and throughout the supply chain. Most of the support that is found internally emanates from logistics, purchasing, and top management. Yet, none of these groups were viewed as being consistently and outspokenly committed to SCM. Without higher levels of support, it is doubtful that the typical company will find a champion to help cultivate highly synergistic relationships and put in place the integrative mechanisms needed to support them. Efforts to extend collaborative programs to the "suppliers' suppliers as well as to the customers' customers" remain in their infancy at all but the most advanced and committed organizations. Much work remains to be done to generate greater commitment and enthusiasm for supply chain integration.

## Benefits of Supply Chain Integration

Before beginning a long and difficult implementation journey, most managers want to know that the results will make the effort worthwhile. Identifying and quantifying the expected benefits is a critical part of any cost/benefit analysis used to evaluate the attractiveness of strategic supply chain initiatives. If the benefits are viewed as sizable and managers believe that the company can realistically attain them, then it makes sense to thoroughly evaluate SCM to develop a viable implementation plan. To help quantify the competitive benefits of supply chain integration, materials managers were asked to indicate the extent to which supply chain integration has impacted firm performance in 15 different areas. Their responses provide the basis for the discussion of Research Question 4:

**Research Question 4:** What benefits/outcomes are expected from supply chain integration? Are the benefits viewed similarly by the different materials management functions?

**Customer Service Benefits.** The four highest-ranked benefits, based on the cumulative scores, all relate to enhanced customer service (see Table 12). The top-rated benefit is responsiveness to customer requests and is followed closely by improved on-time delivery and better customer satisfaction. Additionally, supply chain integration also reduces order fulfillment lead times. Three of

### Table 12
### Benefits of Supply Chain Integration

| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | | % 5-7 | Mean | R | % 5-7 |
| Respond to customer requests | 4.69 | 1 | 62.0 | 4.75 | 3 | 62.7 | 4.67 | 2 | 60.5 | 4.65 | 3 | 62.9 |
| On-time delivery | 4.65 | 2 | 61.0 | 4.63 | 6 | 57.3 | 4.49 | 5 | 58.5 | 4.83 | 1 | 67.0 |
| Customer satisfaction | 4.62 | 3 | 59.4 | 4.67 | 5 | 59.9 | 4.49 | 4 | 53.9 | 4.72 | 2 | 64.7 |
| Order fulfillment lead times | 4.59 | 4 | 54.5 | 4.49 | 9 | 53.2 | 4.69 | 1 | 51.3 | 4.56 | 4 | 59.1 |
| Cost of purchased items | 4.58 | 5 | 59.6 | 4.98 | 1 | 71.7 | 4.34 | 8 | 50.1 | 4.49 | 6 | 59.0 |
| Firm profitability | 4.51 | 6 | 53.7 | 4.75 | 2 | 63.7 | 4.34 | 7 | 43.9 | 4.47 | 7 | 55.1 |
| Handle unexpected challenges | 4.49 | 7 | 59.2 | 4.52 | 8 | 61.8 | 4.53 | 3 | 56.6 | 4.43 | 8 | 59.6 |
| Inventory costs | 4.48 | 8 | 53.0 | 4.56 | 7 | 55.1 | 4.37 | 6 | 51.3 | 4.52 | 5 | 53.0 |
| Overall product cost | 4.38 | 9 | 51.0 | 4.71 | 4 | 61.3 | 4.11 | 10 | 42.6 | 4.37 | 10 | 50.8 |
| Productivity | 4.31 | 10 | 52.7 | 4.46 | 10 | 57.3 | 4.09 | 11 | 44.9 | 4.42 | 9 | 56.5 |
| Overall product quality | 4.16 | 11 | 44.3 | 4.43 | 11 | 54.1 | 4.11 | 9 | 41.6 | 3.97 | 13 | 38.7 |
| Transportation costs | 3.88 | 12 | 37.9 | 3.94 | 13 | 62.0 | 3.43 | 14 | 20.9 | 4.29 | 11 | 54.0 |
| Market penetration | 3.85 | 13 | 34.2 | 3.89 | 14 | 38.8 | 3.66 | 12 | 27.5 | 4.00 | 12 | 36.9 |
| Product innovation lead times | 3.75 | 14 | 31.3 | 3.98 | 12 | 35.2 | 3.56 | 13 | 28.0 | 3.75 | 14 | 31.2 |
| Cost of new product develop. | 3.43 | 15 | 24.2 | 3.70 | 15 | 30.3 | 3.26 | 15 | 21.2 | 3.37 | 15 | 21.8 |

To what extent has SC integration improved your firm's performance? (1=Not Improved, 7=Greatly Improved)

these benefits directly target the company's ability to compete on the basis of time. Closer, cooperative relationships enable more accurate information to be shared on a more timely basis. Supply chain partners are also better able to anticipate their collaborators' needs and handle unexpected events. Time and inventory can be taken out of the supply chain system. These benefits foster collaboration, promote interdependence, and raise switching costs. Equally important, such benefits are directly aligned with the top-rated motivating factor for supply chain integration—the desire and need to increase customer satisfaction.

Each of the four most highly ranked benefits received average "benefit" scores of approximately 4.60 or higher with around 60 percent of all respondents rating the degree of performance improvement at a five or higher. These average "benefit" scores for the most frequently obtained benefits of supply chain integration are considerably lower than the scores for the most pervasive motivations. They are also somewhat lower than the high scores for the barriers to supply chain integration. This implies that hoped-for benefits have yet to fully materialize. More pointedly, perhaps, these ratings underscore the notion that supply chain collaboration is inherently hard to achieve, requiring considerable effort over a sustained period of time. As has been seen in the areas of total quality control, just-in-time production, and other high-profile strategic initiatives, early efforts often fail to deliver potent results. A certain threshold of change in practice seems to be needed for the touted benefits to be realized. Anecdotal evidence from these other strategic endeavors suggests quite strongly that many companies are not patient enough to pursue difficult implementations that require changed mindsets and altered organizational responsibilities. This precedence could present a substantial hurdle for supply chain champions.

**Productivity Benefits.** The next most recognized benefit of supply chain integration is in the area of cost reduction and control. Four of the top ten most highly ranked benefits emphasize productivity improvements. The fifth-ranked benefit is a reduction in the cost of purchased items with a mean score of 4.58 and almost 60 percent of managers giving it a performance improvement score of five or higher. Improvements in the cost of purchased items was by far the most touted benefit among purchasers (rank=1, mean=4.98, percent five and above=72). This was the only "benefit" score that came close to a five. The three other cost-related benefits were as follows: reduced inventory costs (mean=4.48), reduced overall product costs (mean=4.38), and enhanced productivity (mean=4.31). Tighter, more collaborative relationships improve information exchange and facilitate joint problem solving and/or improvement activities. For example, some of the most visible supply chain initiatives include

continual improvement clauses and supplier development. Buying organizations expect their best suppliers to constantly reduce the costs of purchased items and in many instances are willing to work with them to improve their processes in ways that increase productivity and bring down costs. It should be noted that the number two motivating force was improved supply chain productivity. The findings regarding performance improvements thus show a nice correlation between motivating factors and achieved benefits. Finally, the sixth-ranked benefit is increased organizational profitability—a logical outcome of a firm's ability to more efficiently meet customer expectations.

**Other Benefits.** Two types of benefits—better quality and faster innovation—are noteworthy simply because of their conspicuous absence from the top ten benefits list. For many years, closer supplier relationships supported by supplier certification programs have been discussed as a critical element of quality improvement programs. The shifting of quality responsibility back to the source—the supplier—is a practice that is representative of the larger notion of supply chain integration. This is particularly true when supplier training and development initiatives support supplier certification programs. From this perspective, it is a little surprising that overall product quality improvement is not rated as one of the foremost benefits of supply chain collaboration. A possible explanation is that materials managers had already achieved a certain comfort with buyer/supplier quality programs before the "supply chain craze" emerged. A second possibility is that joint quality initiatives are not as widely practiced among all supply chain levels as they are between leading finished goods assemblers and their most important first-tier suppliers. The interviews suggest that both explanations combine to explain current perceptions about the impact of SCM on quality performance.

The notion that collaborative product development leads to higher-quality, lower-cost products brought from concept to market in dramatically less time is not fully supported by the data. While respondents do acknowledge that their organizations have obtained some innovation performance improvements through integrated product development efforts, the mean scores for reduced innovation leads (3.75) and reduced development costs (3.43) are not compelling. Looking at the data more closely reveals that only a relatively small percent of organizations have been able to successfully develop joint collaboration as a competitive weapon (managers rating these benefits a five or higher: 31 percent for lead times and 24 percent for cost). These numbers indicate that many companies have either not implemented joint product development programs or are in only the early stages of implementation. Establishing the trust and communication necessary to share technology, co-locate personnel,

and accept supplier-generated design improvements is not easy and may require "higher-level" forms of supply chain integration. Fundamental "turf" issues must be addressed for innovation benefits to arise.

**Functional Perspectives.** The functional ratings of supply chain benefits vary widely. Each functional area identified a different top-rated benefit. Nearly 72 percent of purchasers scored "cost of purchased items" a five or higher, for a mean score of 4.98. Logisticians identified "on-time delivery/due-date performance" as the greatest benefit of supply chain integration (67 percent, mean=4.83), and manufacturing respondents scored "reduced order fulfillment lead times" as the most pervasive benefit (51 percent, mean=4.69). More revealing, the most prevalent benefits identified by one functional area were viewed by the other functional areas as relatively less important. Each functional area appears to be interpreting strategic direction in its own terms. Looking at the top four rated benefits identified by each functional area provides some insight into the priorities of each function:

With the exception of responsiveness to customer requests, functional managers target distinct benefits and are therefore likely to analyze, and value, specific supply chain initiatives differently. For example, purchasers are focused intently on cost issues, manufacturers on operating flexibility, and logisticians on customer responsiveness. This brief analysis reveals that purchasers are "reading from a different page" than either production managers or logisticians. Managers really do see the world through functional lenses that are crafted from their own experience. This reality increases the difficulty of obtaining cross-functional buy-in for different initia-

tives since they deliver mixed benefits to each functional area. That is, initiatives in one function may be focused on efficiency while others may be addressing effectiveness. To the extent that collaboration is needed to successfully implement a specific program, managers must understand how other key functional managers see the world. Only then can common ground be found to discuss and analyze the relative merits of a proposed initiative. A corollary implication that arises from this disparity in appreciation of integration benefits is that managers should proceed carefully to ensure that one function's supply chain initiatives do not conflict with other functional goals being pursued in the company.

While a review of the benefits of supply chain integration reveals some caveats, the overall picture is quite attractive. A well-thought-out supply chain strategy that is carefully executed promises to help a company achieve much higher levels of customer satisfaction, and do so at a lower total cost. This combination of service and efficiency presents a tantalizing invitation to materials managers. From this perspective, it is not surprising that SCM has become a hot topic in both academic and practitioner circles. Even so, managers should be careful to analyze their company's specific position to verify that the benefits discussed above can realistically be achieved. The data clearly show that many companies have yet to be able to devise and implement a winning supply chain strategy. Not a single benefit was obtained by more than 62 percent of the respondent organizations. The optimism surrounding SCM should be tempered by the recognition that benefits do not accrue automatically. Without the assurance that the organization is committed to SCM and understands the challenges and requirements

| | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|
| Benefit | Rank | Mean | Percent | Rank | Mean | Percent | Rank | Mean | Percent |
| **Purchasing**: | | | | | | | | | |
| Cost of purchased items | 1 | 4.98 | 59.6 | 8 | 4.34 | 50.1 | 6 | 4.49 | 59.0 |
| Firm profitability | 2 | 4.75 | 63.7 | 7 | 4.34 | 43.9 | 7 | 4.47 | 55.1 |
| Response to customer requests | 3 | 4.75 | 62.7 | 2 | 4.67 | 60.5 | 3 | 4.65 | 62.9 |
| Overall product costs | 4 | 4.71 | 61.3 | 10 | 4.11 | 42.6 | 10 | 4.37 | 50.8 |
| **Manufacturing**: | | | | | | | | | |
| Order fulfillment lead times | 9 | 4.49 | 53.2 | 1 | 4.69 | 51.3 | 4 | 4.56 | 59.1 |
| Response to customer requests | 3 | 4.75 | 62.7 | 2 | 4.67 | 60.5 | 3 | 4.65 | 62.9 |
| Handle of unexpected challenges | 8 | 4.52 | 61.8 | 3 | 4.53 | 56.6 | 8 | 4.43 | 59.6 |
| Overall customer satisfaction | 5 | 4.67 | 59.9 | 4 | 4.49 | 53.9 | 2 | 4.72 | 64.7 |
| **Logistics**: | | | | | | | | | |
| On-time delivery | 6 | 4.63 | 57.3 | 5 | 4.49 | 58.5 | 1 | 4.83 | 67.0 |
| Overall customer satisfaction | 5 | 4.67 | 59.9 | 4 | 4.49 | 53.9 | 2 | 4.72 | 64.7 |
| Response to customer requests | 3 | 4.75 | 62.7 | 2 | 4.67 | 60.5 | 3 | 4.65 | 62.9 |
| Order fulfillment lead times | 9 | 4.49 | 53.2 | 1 | 4.69 | 51.3 | 4 | 4.56 | 59.1 |

associated with SCM, managers may be better off focusing their competitive efforts elsewhere.

## Barriers to Effective Supply Chain Integration

The potential benefits of supply chain management appear to be substantive and compelling. It is quite easy to see why a company may want to pursue SCM to gain even a portion of these benefits. However, because collaboration requires a new way of thinking accompanied by the establishment of new practices and programs, realizing these benefits is not easy or without cost. The goal many firms are striving for—satisfied customers through lean, efficient, and responsive supply chains—can be accomplished only through overcoming the barriers that impede enhanced cooperation and more integrated decision making. The literature and anecdotal discussion have revealed at least five types of barriers: alignment issues, technology deficiencies, relationship challenges, structural concerns, and human resource dilemmas. To gain a clearer picture of which barriers really impede progress on the journey toward supply chain integration, the fifth research question assessed the magnitude of 12 barriers.

**Research Question 5:** What barriers must be overcome to achieve effective supply chain integration? Do different materials functions view the critical barriers differently?

**Technology Barriers.** The most pervasive barrier to greater supply chain coordination and cooperation is the lack of adequate information systems (see Table 13). Based on the overall combined score of 5.19 (1=Not a Barrier, 7=Serious Barrier), inadequate information systems was the only barrier to receive an average score

greater than five and to be viewed as a truly serious barrier. In fact, all three groups of managers indicated that a lack of information systems technology is the most prevalent barrier—the average score for each group hit the 5.0 threshold. Inadequate information systems support is a critical barrier since collaboration is intrinsically information dependent. It is simply impossible to coordinate value-added activities across functional and organizational boundaries without shared information regarding product designs, order status, shipping notices, delivery schedules, and inventory levels among other operating and transaction-oriented variables. Moreover, the availability of (and the ability to communicate) accurate, timely, and relevant information is vital to supply chain efforts to reduce inventory, improve asset productivity, and enhance customer service.

Inadequate information systems present a twofold dilemma. First, the complexity of managing complicated supply chain networks requires the collection and analysis of tremendous amounts of data. Advances in computer technology have led to much greater use of data warehouses that collect and store vast quantities of data touching on everything from supplier performance to product flow through statistics in retail outlets. Unfortunately collecting data is a much simpler task than analyzing it correctly and disseminating it to the people who will use it to make decisions. Second, as already alluded to, data only become valuable information when it is in the hands of the people who need it and know how to use it. If all of participants in a supply chain arrangement do not have ready access to vital information, opportunities cannot be evaluated and tradeoffs cannot be analyzed. As a result, the full benefits of supply chain integration will not be realized.

Table 13
Barriers to Effective Supply Chain Integration

| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 |
| Inadequate info. systems | 5.19 | 1 | 71.2 | 5.07 | 1 | 69.4 | 5.00 | 1 | 65.3 | 5.48 | 1 | 78.4 |
| Lack clear alliance guidelines | 4.87 | 2 | 62.4 | 4.74 | 3 | 59.3 | 4.87 | 2 | 63.6 | 4.97 | 2 | 68.5 |
| Inconsistent operating goals | 4.84 | 3 | 64.0 | 4.75 | 2 | 58.2 | 4.83 | 3 | 65.8 | 4.94 | 4 | 66.8 |
| Lack shared risks & rewards | 4.83 | 4 | 65.6 | 4.73 | 4 | 61.1 | 4.76 | 4 | 66.3 | 4.97 | 3 | 64.0 |
| Processes poorly costed | 4.61 | 5 | 56.4 | 4.63 | 5 | 58.4 | 4.49 | 6 | 49.2 | 4.71 | 6 | 61.5 |
| Non-aligned measures | 4.56 | 6 | 55.5 | 4.39 | 8 | 50.6 | 4.61 | 5 | 58.4 | 4.66 | 8 | 56.7 |
| Lack willingness to share info. | 4.56 | 6 | 56.1 | 4.56 | 6 | 54.0 | 4.36 | 8 | 49.5 | 4.74 | 5 | 64.5 |
| Organizational boundaries | 4.49 | 8 | 52.4 | 4.42 | 7 | 52.4 | 4.37 | 7 | 48.3 | 4.67 | 7 | 56.1 |
| Measuring SC contribution | 4.32 | 9 | 49.2 | 4.31 | 9 | 50.3 | 4.21 | 10 | 47.0 | 4.44 | 9 | 50.8 |
| Measuring customer demands | 4.26 | 10 | 49.9 | 4.12 | 10 | 43.4 | 4.35 | 9 | 54.8 | 4.30 | 10 | 50.3 |
| Lack employee empowerment | 3.80 | 11 | 34.8 | 4.08 | 11 | 43.8 | 3.60 | 11 | 28.4 | 3.76 | 12 | 33.7 |
| Lack resources for SCM | 3.73 | 12 | 38.5 | 3.76 | 12 | 38.8 | 3.36 | 12 | 31.2 | 4.05 | 11 | 45.3 |

To what extent do the above act as barriers to supply chain integration? (1=Not a Barrier, 7=Serious Barrier)

Systems incompatibility is a major problem in this area. After decades of developing in-house proprietary systems for a variety of functional areas, it is quite common for the different systems to be unable to communicate with each other. The same challenge occurs when information is shared across company boundaries. Disparate information systems require the writing of complex translation code, complicating the task of providing access. Enterprise Resource Planning (ERP) software was supposed to overcome this challenge, but many ERP implementations have been beset by the same problems they were supposed to solve--namely getting separate information systems to share data. Supply chain information requirements dictate that extensive databases must be combined with open-systems data exchange in order to link planning systems from separate companies. When links in the "information chain" are broken or missing, extra inventory or time must be built into the system to compensate for the added variance. Information systems help bridge the gaps in integrated supply chains, creating the building blocks for collaboration and, ultimately, trust-based relationships.

**Relationship Barriers.** The next six impediments to effective supply chain management were evenly split between relationship-oriented and alignment-based issues. Focusing on relational issues, it is evident that shifting from transactional and often win-lose relationships is a significant challenge. Indeed, alliance management concerns are the second and fourth most recognized barriers. Over 60 percent of the respondents noted that their organizations lack clear alliance guidelines (62.4 percent five or above). Alliance relationships are not easy to establish and require not only a change in philosophy but also a change in practice. Guidelines are needed to determine 1) which relationships merit partnership status; 2) the intensity of specific relationships; 3) how key resources like intellectual property are to be developed, shared, and protected; and when an alliance should be modified or even terminated. Proven guidelines would take a lot of the guesswork out of alliance management.

Similarly, two-thirds of the respondents claimed that it is difficult to establish relationships based on shared risks and rewards. In a market that places huge emphasis on P-and-L statements and quarterly reports, companies are naturally inclined to maximize profits and economic rents. Most companies, especially those with market power, therefore find it difficult not to expropriate the economic benefits of alliance relationships. Despite this fact, dominant supply chain members demonstrate a desire to spread the risks of uncertainty with alliance partners. Sharing risks appears to be a much more attractive proposition than sharing rewards. Moreover, even when the decision has been made to apportion risks and rewards equally, identifying and quantifying them can be extremely difficult. The third relationship barrier (identified by 56 percent of the respondents) involves a lack of willingness to share information. Like sharing risks and rewards, the unwillingness to share information is an attitudinal barrier that arises from long-standing tensions that exist among channel members. A lack of trust makes it difficult to share sensitive information. Many managers simply do not feel that they can afford to share proprietary information. Unfortunately, without open information sharing, strategic and tactical supply chain decisions are certain to be sub-optimized and future integration efforts jeopardized.

**Alignment Barriers.** Turning to alignment issues, inconsistent goals and poor measurement practices appear to be substantial barriers to successful supply chain integration. The respondents ranked inconsistent goals third among the 12 barriers explored (mean=4.84, 64 percent rated it a five or higher). Divergent goals lead managers to make self-interested decisions that are frequently in opposition to those made by other supply chain members. Cooperation is therefore impeded. Only when the various members of a supply chain are "pulling in the same direction" or working toward common goals can competitive product/service offerings be developed and managed for long-term success. Closely related is the fact that as an organization pursues different projects based on its own priorities, its supply chain partners are likely to become frustrated. In this scenario, mismatched goals will lead one or more members of the supply chain team to view the other members as only partially committed to the "team." Simply stated, the different value structures make collaboration difficult as each firm may struggle with valuing strategic directions and goals that are different from their own.

Measurement barriers create challenges both in the design and the day-to-day management of supply chains. With a barrier rating of 4.61, the challenge of accurately costing value-added processes was the highest-ranked measurement issue. If a company cannot accurately cost a process, identifying the best supply chain partners is a challenge. It is likewise difficult to define, and therefore to share, cost savings. Further, without accurate costing, managers cannot effectively set correct priorities for continuous improvement projects. A final related issue targets the notion of functional shiftability, which involves the shifting of roles and responsibilities to the supply chain member best positioned to perform them. Accurate costing is critical to making these "role-shifting" decisions. For example, if an upstream firm is asked to carry more inventory to facilitate faster chain-wide response times, how is the impact of this move to be evaluated? How "valuable" is the move? Does it drive additional sales? How much extra cost (and risk) is incurred?

Without accurate costing, these questions cannot be answered, and designing a competitive supply chain is impossible.

The sixth most highly ranked barrier is non-aligned performance measures, with an average score of 4.56 and approximately 56 percent of the managers citing it as a substantial barrier. Poorly aligned measures have the same counterproductive impact as inconsistent goals; that is, managers modify their behavior in an effort to maximize performance in the area that is being measured. Non-aligned measures thus lead to conflicting decision making. Once again, different members of the supply chain team find themselves pulling in divergent directions. Similarly, when a supplier is operating under one set of measures while a customer is using another set of measures, it is almost guaranteed that performance gaps will emerge. The typical result is channel conflict and perhaps even the dissolution of the relationship. Poorly aligned measures can lead to customer dissatisfaction even when the supplier is dedicating tremendous resources to meeting the customer's needs. Unfortunately, the disparate measures lead the supplier to emphasize performance that the customer really does not value. Under this scenario, a company can invest every bit as much effort into achieving mediocrity as it would to become a supplier of choice. The key is to know what is truly valued and then put the right measure in place.

A closely related measurement issue that was viewed as only a moderate barrier is the lack of a systematic approach to measure customer requirements (mean rating=4.26). The fact that half of all respondents rated the failure to systematically measure customer requirements as a five or higher indicates that an opportunity exists to identify and communicate more accurately the real needs of key customers. If a company does not possess accurate customer information, it cannot align its value-added processes to customer desires. Guessing at customer needs is a very ineffective approach to becoming a supplier of choice and building a close long-term relationship. Superior supply chain design decisions rely on knowing what customers truly value. The final measurement issue—difficulty in evaluating the contribution of each supply chain member—was viewed by about 50 percent of the respondents as a serious challenge to integration. The overall score for this item was 4.32, ranking this barrier as number nine out of 12. A fundamental SCM proposition is that companies seek to work with the best customers, suppliers, and service providers possible. This means that companies must be able to evaluate the value-added contribution and capabilities of potential "team members." The survey responses suggest that managers recognize that measuring the contribution of each channel member is a challenge; however, they are not overly preoccupied with this barrier. The interviews actu-

ally revealed that relatively few companies are actively engaged in systematically evaluating value-added contributions up and down the supply chain. As supply chain practices mature, this issue will likely take on a greater role in supply chain design and management.

**Structural and Human Resource Barriers.** To the researchers' surprise, structural and human resource issues generally were not perceived as among the most serious barriers. The belief that "organizational boundaries prevent integration" is the highest-ranked structural barrier. Just over half of the respondents claimed that organizational boundaries represent a serious obstacle to supply chain initiatives (mean score=4.49). Traditional organizational boundaries, both internal and external, endanger collaboration because they promote sub-unit loyalties and a desire to "protect turf." Since people tend to hold tenaciously to their comfort zones, efforts to alter organizational boundaries and redefine roles and responsibilities almost always produce employee resistance. The bottom line is that substantive supply chain restructuring and reengineering initiatives are viewed as a threat and can easily agitate emotions and engender intense feelings. The second structural issue explored the impact of downsizing on the availability of organizational resources needed for effective supply chain integration. Almost 40 percent of the respondents viewed downsizing trends as a barrier. For some firms, recent efforts to streamline have resulted in considerable pressure on scarce managerial resources. Fortunately, this perception is not widespread among the firms included in the sample. Even so, the data do suggest that managers carefully evaluate the human resource requirements of near-term strategic endeavors such as SCM before rightsizing the organization. Finally, although people issues often underlie failures to successfully implement far reaching programs as JIT, TQM, and SCM, only about one-third of the respondents felt that problems with "employee loyalty, motivation, and empowerment" block supply chain integration.

**Functional Perspectives.** Remarkably, the three groups of functional managers were very consistent in their evaluations of the barriers to effective supply chain integration. There were two instances where the rankings varied by three places. Production managers ranked "non-aligned performance measures" as the fifth most serious barrier to integration while both purchasers and logisticians ranked it lower at number eight. Production managers do indeed tend to be frustrated by conflicting measures such as end-of-quarter sales goals that can create havoc on the production floor. Similarly, logisticians ranked "a lack of willingness to share information" as the fifth most critical impediment compared to a ranking of eight for production managers. Given their boundary-spanning position, logistics managers are sensitized to the need to share information. Missing or

incorrect information often creates a demand for expensive expediting.

The overall consistency in the perceptions regarding the magnitude of each barrier is further evidenced by the relative closeness of the functional averages. There were only six barriers for which the average scores differed by .25 across the three functional areas. In the instances of "inadequate information systems," "willingness to share information," "organizational boundaries," and "downsizing has reduced resources" manufacturing provided the lowest ratings while the logistics managers viewed these issues as more serious barriers. Actually, logistics managers placed somewhat more emphasis than either production managers or purchasers on ten of the 12 barriers. The complexity of bridging supply chain relationships among suppliers, service providers, and customers certainly increases logistics managers' sensitivity to the challenges of building tighter relationships and achieving higher levels of supply chain integration. The notion that the "devil is in the details" has always applied to logistics management. This reality led Gus Pagonis, VP of Logistics at Sears to say, "In logistics, if you go an hour without a screw-up, you've had a great day." By contrast, manufacturing tends to be slightly shielded from some of the vagaries inherent in managing supply chain relationships. Interestingly, purchasing managers viewed "poorly aligned performance measures" to be less of a challenge than their manufacturing and logistics counterparts. At the same time, purchasers were the only managers to give "employee loyalty" a score greater than four.

A summary look at the barriers to SCM implementation reveals that respondents from all three materials management areas clearly see some real and substantial roadblocks impeding progress on the SCM journey. While the difficulties are many and varied, the single greatest barrier is the lack of adequate information systems. Materials managers have long desired (for at least the last 20 years) access to the best—most accurate, relevant, and timely—information possible. It might even be said that information is the "life blood" of effective supply chain management. Thus, the emphasis on establishing better information systems is not surprising. Continued investment in information technologies can be expected for the foreseeable future. Perhaps a more interesting question is whether or not materials managers will ever be satisfied with their companies' information capabilities. The other two areas deemed to represent substantial impediments were alignment and relationship barriers. That is, aligning goals and sharing risks and rewards promise to be difficult barriers to overcome. Both of these efforts not only go against traditional practice but they also run counter to human nature—the desire to promote and protect one's own self-interest. Although not insurmountable, overcoming these hurdles requires concerted and dedicated effort over a sustained period of time. SCM implementation does not appear to be a quick remedy to the competitive threats most companies are encountering.

## Bridges to Effective Supply Chain Integration

As already noted, the potential benefits of effective SCM implementation are quite impressive. At the same time, the barriers to effective SCM implementation are considerable. Thus, the decision to move forward with a strategic SCM initiative depends on whether managers believe that they can put in place mechanisms, or bridges, that will overcome the barriers and help the organization achieve the promised benefits. Reviewing the SCM literature together with the implementation literature for other cross-functional and resource-intensive strategic initiatives such as alliance management, just-in-time manufacturing, total quality management, and business process re-engineering helped identify numerous tools and techniques that are believed to facilitate successful implementation. Respondents were asked to indicate the extent to which each of 24 different practices have "facilitated effective supply chain integration and led to increased inter-firm coordination." Understanding the impact of these 24 practices on inter-firm collaboration was the focus of the sixth research question.

**Research Question 6:** What are the principal bridges to effective supply chain integration; that is, mechanisms, tools, and techniques that facilitate supply chain integration? Do different materials functions emphasize different mechanisms?

An initial glance at the "facilitation" score for each of the 24 practices shown in Table 14 suggests that none of the mechanisms examined has had a remarkably positive impact on SCM implementation. Facilitation scores ranged from 3.08 to 4.64. Two possible explanations come to mind. First, none of the practices is truly effective in bridging the barriers to SCM. Second, while there has been a lot of talk regarding SCM implementation, organizations are not as advanced in adopting the practices that make SCM a reality. The interviews provided some valuable context from which to interpret these results, suggesting that companies are somewhat behind in the actual implementation of specific practices. Further, the interviews also highlighted the fact that real supply chain integration is a sufficiently complex undertaking that no single practice, or even group of practices, is capable of closing the cultural, emotional, physical, and strategic gaps that prevent synergistic collaboration.

**Communication as a Bridge.** Amazingly, five of the ten most effective facilitators (based on the aggregate "facilitation" scores) focus on increasing the frequency

Table 14
Bridges to Effective Supply Chain Integration

| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 |
| Frequent communication | 4.64 | 1 | 54.2 | 4.50 | 3 | 55.5 | 4.57 | 1 | 56.1 | 4.82 | 1 | 64.4 |
| A willingness to share info. | 4.59 | 2 | 55.0 | 4.58 | 1 | 57.0 | 4.41 | 2 | 54.8 | 4.77 | 2 | 66.8 |
| Use of cross-functional teams | 4.37 | 3 | 47.2 | 4.34 | 6 | 48.4 | 4.12 | 5 | 45.0 | 4.64 | 3 | 60.6 |
| Shared expertise w/ suppliers | 4.32 | 4 | 46.0 | 4.46 | 4 | 55.8 | 4.35 | 3 | 50.0 | 4.20 | 13 | 45.3 |
| Common goals | 4.31 | 5 | 45.7 | 4.42 | 5 | 53.2 | 4.17 | 4 | 44.5 | 4.35 | 9 | 51.9 |
| Supply base reduction | 4.21 | 6 | 42.8 | 4.50 | 2 | 58.4 | 3.93 | 11 | 37.7 | 4.25 | 11 | 47.3 |
| Senior mgmt interaction | 4.21 | 7 | 46.0 | 4.10 | 10 | 49.3 | 3.94 | 10 | 38.9 | 4.57 | 5 | 61.5 |
| Cross-functional processes | 4.21 | 8 | 43.4 | 4.03 | 14 | 43.0 | 4.03 | 7 | 41.7 | 4.54 | 6 | 56.6 |
| Shared expertise w/ customers | 4.14 | 9 | 41.6 | 4.14 | 7 | 44.6 | 4.12 | 6 | 41.7 | 4.16 | 15 | 49.5 |
| Customer selectivity | 4.11 | 10 | 43.5 | 3.89 | 17 | 38.6 | 4.01 | 9 | 47.1 | 4.39 | 7 | 55.0 |
| Increased SC training | 4.09 | 11 | 39.4 | 3.87 | 18 | 39.8 | 4.01 | 8 | 40.1 | 4.36 | 8 | 48.9 |
| Use of supply chain measures | 4.08 | 12 | 42.3 | 4.03 | 13 | 42.9 | 3.93 | 12 | 40.1 | 4.28 | 10 | 54.8 |
| Use of consistent measures | 4.05 | 13 | 39.8 | 4.06 | 11 | 43.5 | 3.87 | 13 | 37.1 | 4.21 | 12 | 50.1 |
| EDI linkages | 4.02 | 14 | 43.2 | 3.53 | 21 | 35.1 | 3.83 | 14 | 44.5 | 4.62 | 4 | 58.7 |
| Clear selection guidelines | 3.97 | 15 | 38.2 | 4.05 | 12 | 45.5 | 3.69 | 16 | 33.4 | 4.19 | 14 | 47.9 |
| Vendor Managed Inventories | 3.86 | 16 | 36.2 | 4.13 | 9 | 45.2 | 3.78 | 15 | 35.9 | 3.72 | 22 | 38.0 |
| Use of total cost analysis | 3.85 | 17 | 47.5 | 4.14 | 8 | 49.4 | 3.42 | 21 | 27.0 | 4.04 | 16 | 48.9 |
| Sharing risks and rewards | 3.83 | 18 | 35.6 | 3.99 | 15 | 44.0 | 3.63 | 17 | 29.6 | 3.90 | 20 | 43.7 |
| Shared mission statement | 3.80 | 19 | 36.3 | 3.99 | 16 | 45.4 | 3.47 | 19 | 31.0 | 3.97 | 18 | 43.1 |
| Clear alliance mgmt. guidelines | 3.76 | 20 | 32.0 | 3.81 | 19 | 35.9 | 3.43 | 20 | 23.6 | 4.03 | 17 | 45.5 |
| Common operating procedures | 3.74 | 21 | 27.5 | 3.70 | 20 | 28.8 | 3.56 | 18 | 23.1 | 3.94 | 19 | 38.1 |
| Use ERP/SCM software | 3.36 | 22 | 25.3 | 3.03 | 24 | 21.4 | 3.26 | 22 | 26.0 | 3.73 | 21 | 35.3 |
| Use of supply chain teams | 3.31 | 23 | 24.8 | 3.31 | 22 | 27.0 | 3.03 | 23 | 20.6 | 3.59 | 23 | 34.1 |
| Use of activity based costing | 3.08 | 24 | 20.2 | 3.17 | 23 | 22.2 | 2.60 | 24 | 14.9 | 3.47 | 24 | 29.0 |

To what extent have each of the above facilitated increased inter-firm coordination (1=Not a Facilitator, 7=Effective Facilitator)

and quality of inter-firm communication. "Frequent and regular communication" was noted by both logisticians and production managers as the single most effective facilitator (purchasers ranked it third) followed by "a willingness to share information" (purchasers ranked this first). Thus a fairly strong consensus says that better communication is the foundation for SCM. Communication with supply chain members ensures that products and services make their way to customers efficiently and effectively. Frequent communication contributes to faster problem resolution, trust, and relationship building as well as quicker decision-making that results from having access to up-to-date information. Moreover, a willingness to share information enhances the quality and relevance of the information that is shared. For example, sharing actual customer order information combined with rolling forecasts provides an opportunity to improve supply chain decision making. Likewise, a willingness to share future product strategies and technology plans allows more cooperation and integration than simply sharing forecasting data. If two or more supply chain partners cannot or will not communicate, advanced supply chain integration is next to impossible.

The three other communication items ranked in the top ten were "sharing technical expertise with suppliers" at number four, "senior level managerial interaction" at number seven, and "sharing technical expertise with customers" at number nine. The notion that expertise is increasingly shared among supply chain members implies a certain openness and trust is emerging, at least among "key" members of the supply chain team. Experience suggests that this expertise is often shared via training, collaborative teams, and process development efforts. Interesting, except for the "use of cross-functional teams," these other specific mechanisms are not ranked very highly. It is also interesting to note that senior managers appear to be taking on a more significant role in bridging the gaps that have often existed between companies. At some companies, one of the most important senior management responsibilities is to spend time with valued customers and suppliers.

Another interesting point related to communication is the divide that seems to exist between the two dimensions of a firm's communication capability: the willingness to share information and the technological ability to share information. Among the 24 practices evaluated, seven targeted information- sharing issues. Of these, five focused on the soft side of the issue while two focused on the technology side of information sharing. The five so-called soft-side practices were all ranked in the top

ten. The two technology mechanisms—"the use of electronic linkages such as EDI" and "the use of ERP/SCM software"—were ranked 14 and 22 respectively despite the tremendous amounts of money and time that have been invested in them. This reality contrasts sharply with the respondents' rating of serious barriers. The foremost barrier was "inadequate information systems." Yet, information technology systems are rated as only somewhat effective at facilitating supply chain integration. Materials managers appear to be expressing considerable frustration and dissatisfaction with the technology side of information sharing. Even so, it seems evident that the ability and willingness to share information and experience up and downstream is a vital supply chain competency.

**Alliance Management as a Bridge.** A second implementation strategy seems to center on strengthening relationships within a rationalized supply chain. The first step in this process is to simplify the supply chain network. This is done upstream through supply base rationalization (mean=4.21, rank=6) and downstream through customer selectivity (mean=4.11, rank=10). The sheer number of players involved in most traditional supply chains makes integrated SCM not just complex but next to impossible. To reduce the complexity and enhance the organization's ability to more effectively manage the supply chain as a cohesive team requires a reduction in the total number of supply chain participants. It further requires that supplier and customer relationships be evaluated and classified, usually through some form of ABC classification. Close relationships are then formed with a very select group of supply chain partners—the most important of the "A" suppliers and customers. Few companies have the necessary resources to manage alliance relationships without having first rationalized and classified the supply base. Recognizing this, most organizations have undertaken rationalization initiatives. Based on the "facilitation" scores, these initiatives have been at least moderately successful.

Three additional alliance management tools and techniques—"clear partner selection guidelines," "a well-accepted approach to sharing risks and rewards," and "clear guidelines to manage supply chain alliances" were also evaluated. The highest ranked of these was the use of clear guidelines to select the best possible supply chain partners. Even among purchasers, whose primary job is to find and/or develop the best possible suppliers, this practice was ranked in the middle of the pack at number 12 (mean=4.05). Ambiguity persists when it comes to determining who to work with on a collaborative, alliance basis. Indeed, most companies develop synergistic relationships with fewer than 3 to 10 percent of their supply bases. As noted in the previous discussion of barriers, most companies struggle with the ability to share

risks and rewards in a way that promotes trust and unity on both sides of the relationship. Only a little over a third of the respondents gave "shared risks and rewards" a facilitation score of a five or greater. Self-interest and skepticism are hard to overcome. Finally, the use of guidelines to manage evolving alliance relationships has yet to be recognized as an effective facilitator (mean=3.76, rank=20). As difficult as it can be to define and enter into long-term partnerships, such relationships can be even harder to cultivate on a continued basis. Overall, the responses regarding supply chain relationships indicate that simplifying the supply chain is easier than managing supply chain relationships for competitive impact.

**People Empowerment as a Bridge.** The importance of the human resource has long been discussed. Unfortunately, the anecdotal evidence indicates that U.S. companies are in many ways more comfortable focusing time and money on technology resources—especially in the realm of SCM. This has been true despite the fact that some studies have shown that investments in people provide twice the return of investments in technology. Nonetheless, training and teaming have received some degree of attention in the past few years. Respondents noted that the use of cross-functional teams has been one of the more effective approaches to improving inter-firm coordination (mean=4.37, rank=3). Cross-functional teaming broadens horizons, creates understanding of opportunities and challenges, and facilitates relationship building. Each of these outcomes reduces sub-unit loyalties and promotes the collaboration necessary to achieve supply chain integration. Increased employee training in the SCM area was also perceived to have a positive, albeit moderate, impact on a firm's ability to achieve higher levels of inter-firm coordination (mean=4.09, rank=11). Surprisingly, purchasers ranked SCM training 18th out of 24 practices, a result that suggests that relatively few purchasing organizations have devoted substantial attention to supply chain training. The final human resource practice evaluated was the "use of inter-organizational supply chain teams." The mean facilitation score was a low 3.31 (rank=23). Few organizations have achieved a degree of SCM sophistication that allows the effective use of inter-organizational teams. As a coordination mechanism, both inter-organizational teams and the broader area of "people empowerment" have not been fully explored—much work remains to be done before the average organization can leverage its people as a bridge to greater supply chain integration.

**Alignment Mechanisms as a Bridge.** While aligned mission statements, goals, and operating procedures are not a prerequisite to supply chain integration, they certainly reduce inter-organizational conflict and help get the various members of a supply chain team pulling in the

same direction. Responses from the materials managers, however, indicate that relatively little effort has been invested in assuring alignment via these three practices. Only one of the three—common goals—was viewed to be widely useful in facilitating SCM implementation (mean=4.31, rank=5). Approximately half of the respondents rated the establishment of common goals as a highly effective facilitator (score of five or greater). This finding validates good common sense. It is usually best to work closely with other organizations that are working toward similar objectives. The compatibility of goals can be assessed based on past experience as well as in the negotiation process. Without some common buy-in on the basic goals underlying the supply chain relationship, seeking greater collaboration and integration would be somewhat premature, if not a little foolish.

Although common goals were viewed as beneficial, shared mission statements and common operating procedures appear to be quite rare. Both of these techniques were among the five least developed and effective integration practices. Expecting independent organizations to join a supply chain team and immediately adopt a shared mission statement is generally unrealistic. Shared mission statements are viable only for supply chain teams that have achieved a high degree of interdependence, maturity, and stability. As long as supply chain members insist on "playing the field" by participating on multiple supply chains in the same industry, shared mission statements are unlikely to be adopted. Common operating procedures are even less likely, especially for companies that have to keep a diverse group of customers happy. Because each customer expects the supplier to do things according to the customer's book, suppliers' efforts are fragmented. This fragmentation consistently limited the feasibility of electronic data interchange in industries where a common standard was not adopted. It is simply too costly to try to standardize operating procedures to meet the divergent standards of a multitude of customers. If the momentum toward supply chain integration continues, achieving greater alignment should become easier. This is particularly true for industries where unified teams emerge to compete against other global supply chains.

**Performance Measurement as a Bridge.** The strong influence of performance measurement on managerial decision making and human behavior has long been discussed. Tom Peters has summarized the general sentiment in just a few words, "What gets measured, gets done." To the extent that this is true, supply-chain oriented measures as well as measures that promote alignment should greatly facilitate greater inter-firm cooperation. The respondents, however, did not rate any performance measurement initiative among the top ten bridges to supply chain integration. Adoption of supply-

chain-oriented measures was the top-ranked measurement issue. It received a facilitation score of 4.08, which suggests that some organizations have been moderately successful in adopting measures that focus on the supply chain instead of individual functions or firms (rank=12). The fact that only 42 percent of the respondents rated this mechanism at a five or higher indicates that most firms are experiencing difficulty in devising and implementing supply-chain measures. Experience suggests that modifying performance measures can be a sticky proposition, especially when the changes have dramatic impact on organization focus. Certainly, this is part of the challenge in the case of adopting supply chain measures.

Utilizing consistent measures throughout the supply chain received a facilitation score of 4.05 (ranking it at number 13). Again, only about 40 percent of the respondents noted marked success in devising and using consistent measures throughout the supply chain to facilitate integration. Perhaps it should be noted that the interview results provide some context for how managers define "throughout the supply chain." In most instances, "throughout the supply chain" denotes the adoption of consistent measures by the various functions within the firm or by two distinct members of the supply chain (typically a buyer/supplier dyad). More extensive adoption of consistent measures remains fairly rare. Thus, while many organizations have improved their internal measurement capabilities (accuracy, relevance, scope, and timeliness), ample opportunity for improving the consistency of supply chain measurement exists. Looking at the current facilitative role of both supply chain measures and the use of consistent measures suggests that performance measurement is an overlooked arena where dramatic progress could be achieved. The key is to clearly identify and define measures that not only provide an accurate picture of supply chain performance but also highlight opportunities for improvement at both the individual firm and the overall supply chain levels. Only then will companies have the confidence to modify long-standing measurement systems.

A second dimension of measurement capability that has been identified as vital focuses on the use of accurate costing systems. Supply chain design and management greatly rely on accurate costing to answer critical questions regarding how value-added processes should be organized, whether or not an investment in technology should be pursued, and who should perform what activities within the firm and across the supply chain. In fact, a common complaint among materials managers is that they simply do not have access to accurate costs. Two costing issues were explored: the use of total cost analysis and the use of activity-based costing. Neither costing tool has been widely used to facilitate integration.

Total cost analysis was identified by approximately 48 percent of the materials managers as a valued facilitator (mean=3.85, rank=17). Most materials managers openly acknowledge the importance of using total cost analysis to make a myriad of decisions and note that accurate total costing would greatly promote collaborative behavior. They are equally firm in their belief that in most instances, the total costing that is performed is done with a narrowly defined set of costs. Important cost categories, including the cost of backorders, the cost of service failures, and the cost of returned goods, etc,.are not tracked closely and therefore not included in total cost calculations.

Activity-based costing, another tool that has received praise as an aid to better decision making, was viewed by only 20 percent of the respondents as helpful in promoting inter-firm cooperation (mean=3.08, rank=24). Many managers wish that their organizations used a robust form of activity-based costing to help determine not just direct product profitability but also the profitability of certain distribution channels as well as individual customer profitability. Ultimately, despite the talk regarding the value of ABC costing, relatively few firms have implemented activity-based costing as a mechanism to help design and manage supply chains. Tremendous opportunity exists to more widely utilize more precise costing methods such as total cost analysis and activity-based costing.

**Process Change as a Bridge.** Supply chains that fail to develop competitive processes can become irrelevant. This possibility has led supply chain members to be more creative and flexible in defining who does what in key value-added processes, especially in the areas of quality control, new product development, vendor managed inventory, and co-manufacturing. For instance, in the following examples, suppliers are more fully integrated into the buying organization's value-added processes.

- An emphasis on quality has led to supplier certification, shifting the responsibility for quality to the supplier. Working together via the supplier certification process improves quality at the source.

- A desire to shrink concept-to-market cycle times has led to the use of multi-functional product-development processes, which include managers from marketing, research and development, manufacturing, purchasing, and logistics as well as representatives from key suppliers.

- Some companies have placed the responsibility for managing inventory in the supplier's hands. Key suppliers locate their personnel at the buyer's location to monitor inventory levels, place orders, and handle all of the expediting and other issues involved in assuring timely product arrival.

- Some companies are turning production responsibility over to the supplier, relying on supplier personnel to assemble the buyer's finished products.

Respondents were asked to evaluate the effectiveness of two types of process change. First, they identified the implementation of cross-functional processes as a relatively effective supply chain enabler. Cross-functional processes were identified as the eighth most effective facilitator of inter-firm coordination (mean=4.21, rank=8). As was the case with the use of cross-functional teams, integrated processes bring the relevant players together to produce greater understanding and foster better communication. More "touch time" helps mitigate the barriers that inhibit collaboration. Second, the respondents noted that vendor-managed inventory programs have a moderate and positive impact on integration efforts. The facilitation score for supplier-managed inventories was 3.86 with over one-third of the managers rating these efforts at a five or higher (rank=16). The numbers suggest that VMI programs can be used to effectively bridge the gaps that separate members of the supply chain; however, they are far from universally implemented. While not widespread in their use, process change initiatives are a relevant and useful mechanism for achieving greater supply chain integration.

**Functional Perspectives.** Unlike the other areas investigated, in which some degree of consensus existed among the three groups of materials managers, considerable disparity in both mean scores and rankings is visible with regard to which practices best facilitate supply chain integration. Logistics managers viewed 17 of the 24 practices as more effective bridges than either purchasers or production managers. Likewise, purchasers rated 7 of the 24 practices more highly than their counterparts. Production managers consistently evaluated the various practices as less effective enablers than the other two groups. The greatest agreement is found in the view that frequent and open communication is vital to supply chain integration. The three groups of materials managers also tended to agree in their evaluations of the least effective enablers. Shared mission statements, alliance management guidelines, common operating procedures, resource-planning software, supply chain teams, and activity-based costing are not viewed as being used effectively to facilitate collaboration.

Some of the more interesting contrasts are highlighted below. These contrasts are drawn from the relative rankings of the 24 practices. That is, the rankings for 12 of the 24 practices varied by five or more positions. The ranking difference was ten or more for the following practices.

- Purchasing managers rank supply base reduction as a pivotal practice while their counterparts do not even rank supply base reduction in the top ten practices.

- Purchasers and production managers view the sharing of technical expertise with suppliers as a vital issue whereas logisticians see this practice as only moderately effective.

- Purchasers believe that total cost analysis is vital to evaluating inter-firm cooperation opportunities. By contrast, production managers rank total costing as one of the least effective practices.

- Purchasers place greater emphasis on vendor-managed inventory programs than either production or logistics managers. In fact, logistics managers view VMI as one of the least effective facilitators.

- Logisticians rely extensively on senior-level managerial interaction to increase supply chain cohesion while only 39 percent of the production managers view such interaction as truly important.

- Logisticians and production managers agreed that customer selectivity is a relatively important practice whereas purchasers ranked it among the least effective practices.

- Logisticians and production managers agreed that supply-chain related employee training facilitates integration while purchasers ranked it among the least effective practices.

- Logisticians ranked electronic linkages with other supply chain members fourth compared to 14th by production managers and 21st by purchasers.

The clear pattern that emerges is that managers tend to rank practices that they deal with on a frequent basis higher than their counterparts who only hear about them in meetings, through in-house newsletters, and via "lunchroom" conversations. Actual experience with a practice appears to greatly influence how managers perceive its importance. While this finding is not very surprising, it does suggest that a certain amount of fragmentation has occurred among the different functional managers. They tend to have different priorities, which are expressed in their view of the role and importance of the 24 facilitating practices. The divergence in approaches to dealing with integration barriers may in itself be a barrier to greater cooperation. This possibility suggests a need for more extensive communication of program results, more frequent use of cross-functional teams, and more effective training regarding the applicability and impact of different facilitating practices. Taking these actions fosters greater buy-in among the various materials management areas that play a supporting role in the implementation of important integrating mechanisms. Much work remains to be done to support truly integrated chains.

The overarching message portrayed by the facilitator data is that a lot of work needs to be done to better define the role of each integrative practice. The when and how questions need to be more closely examined. Further, well-designed and closely monitored pilot programs should be put in place to quantify the benefits of the various integrative practices. As roles are better defined, implementations documented, and results quantified, implementation guidelines will become evident. A corollary finding emerges as the barrier scores are compared to the facilitator scores. The top five barriers to effective integration all received scores above 4.60. Only one facilitator received a score above 4.60. Matching the barriers to the practices designed to overcome them provides some valuable insight:

| Rank | Score | Barrier | Rank | Score | Facilitator |
|------|-------|---------|------|-------|-------------|
| 1 | 5.19 | Inadequate information systems | 1 | 4.64 | Frequent & regular communication |
| 2 | 4.87 | Lack clear alliance guidelines | 15 | 3.97 | Use of clear guidelines to select allies |
| | | | 20 | 3.76 | Use of clear guidelines to manage allies |
| 3 | 4.84 | Inconsistent operating goals | 5 | 4.31 | Use of common goals |
| 4 | 4.83 | Lack shared risks and rewards | 18 | 3.83 | Defined approach to share risks & rewards |
| 5 | 4.61 | Processes poorly costed | 17 | 3.85 | Use of total cost analysis |
| | | | 24 | 3.08 | Use of activity-based costing |

First, there is relatively little correlation between the issues that managers view as clear impediments to integration and the practices that their companies have instituted to achieve greater integration. Second, the barrier score is at least .5 greater than the relevant facilitator score--even in the two instances when the rankings are similar. Looking at the data in this light suggests that the barriers seem to be winning the integration battle. Companies appear to be struggling in their quest to determine exactly how to facilitate integration. They have yet to define clear strategies for supply chain integration. Perhaps it is not surprising that the interview portion of the study revealed that examples of true supply chain integration are hard to find. Until firms can craft strategies to address the important barriers to integration, the development of cohesive supply-chain teams is a long way off.

## Supply Chain Integration in Practice

A final question of interest is, "How far have companies really progressed down the path of successful supply chain integration?" Experience with other strategic initiatives reminds us that a gap almost always exists between the rhetoric surrounding a phenomenon like SCM and actual practice. Benchmarking the implementation status of integrative mechanisms indicates what materials managers view as truly important. It also provides insight regarding where some of the greatest implementation difficulties are likely to be found. Therefore, the three groups of materials managers were asked to indicate the extent to which they agreed with 41 different statements that assessed the implementation status of key SCM practices. Their answers provide the basis for the discussion of Research Question 7.

**Research Question 7:** To what extent are SCM practices really being implemented? Do perceptions of the level of supply chain activity vary by functional area?

It is important to note that the scale for these questions (1=Strongly Disagree, 7=Strongly Agree) is different from all of the previous scales. In previous questions, responses below four still signified some degree of positive influence as a motivating force, support, benefit, barrier, or bridge. For this question, however, responses greater than four indicate agreement while responses lower than four denote disagreement. Thus, a mean score lower than four indicates that a specific practice is not being pursued as part of the organization's supply chain strategy.

**Status of Information System Mechanisms.** A company's ability to share accurate and relevant information has been identified as critical to supply chain success. At the same time, the respondents have noted that current information capabilities fall short of the requirements created by SCM. The data in Table 15 provide evidence that companies have been aggressively trying to overcome this deficiency and ramp up their information system capabilities via significant investments in enterprise resource systems, application specific systems, and web-based communication platforms. These were the only information initiatives actively engaged in by more than 50 percent of the respondents and the only mechanisms to receive scores greater than four. Despite these investments in advanced information technologies, respondents are fairly emphatic in noting that their companies are still having trouble achieving systems integration within the company and throughout the supply chain. Specifically, upstream and downstream information linkages remain inadequate and current information systems fail to satisfy the requirements for supply chain communication. The clear implication is that while information systems can and must be used to facilitate integrated supply chain decision making, they are not currently bridging the distances that keep supply chains from acting like cohesive teams. Without doubt, the respondents feel that substantial work remains to be done in the area of systems development and integration.

**Status of Alliance Mechanisms.** The fundamental principle driving supply chain integration is that closer, more cooperative relationships can yield mutually beneficial competitive advantage. The data in Table 15 suggest that companies are making significant progress in managing alliance relationships. The progress is most pronounced on the customer side. Three customer-focused practices received scores greater than five. Respondents believe that their firms are more effectively customizing products and services for key customers (mean=5.51), accommodating customers' special requests (mean=5.49), and adopting the key account approach to managing their best customers (mean=5.37). Establishing trust-based relationships with customers was also recognized as a relatively well-established practice (mean=4.86, rank=11). Customers appear to exert the greatest leverage in most dyadic relationships. As a result, respondent companies are particularly anxious to meet customers' needs and achieve greater customer loyalty.

The highest-ranked practice directed toward achieving better supplier relationships was the careful screening and assessment of suppliers prior to selection (mean=4.84, rank=12). Supplier selection is the most basic purchasing practice; thus, this finding reveals that purchasing organizations continue to receive less attention than downstream marketing activities. Even purchasers ranked rigorous supplier selection as less fully implemented than customer management initiatives (mean=5.10, rank=6). Moreover, companies have been

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**Table 15**
**Status of Supply Chain Integration Initiatives—Resource Issues**

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| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 |
| **Info. System Mechanisms** | | | | | | | | | | | | |
| Invest in enterprise systems | 4.90 | 9 | 65.20 | 4.55 | 19 | 53.10 | 4.74 | 11 | 63.40 | 5.33 | 4 | 77.00 |
| Invest in application systems | 4.81 | 13 | 63.70 | 4.58 | 18 | 54.20 | 4.68 | 13 | 61.80 | 5.12 | 8 | 73.50 |
| Internet used to share info. | 4.65 | 16 | 58.40 | 4.55 | 20 | 56.70 | 4.42 | 18 | 53.30 | 4.97 | 12 | 64.70 |
| Integrated info. applications | 3.82 | 30 | 35.20 | 3.85 | 30 | 36.00 | 3.79 | 26 | 34.20 | 3.82 | 31 | 35.70 |
| Adequate IS customer linkages | 3.68 | 34 | 34.60 | 3.83 | 32 | 38.70 | 3.63 | 32 | 33.70 | 3.61 | 36 | 32.00 |
| Adequate IS supplier linkages | 3.56 | 39 | 31.10 | 3.79 | 35 | 37.50 | 3.46 | 39 | 28.70 | 3.45 | 39 | 28.00 |
| Info. systems satisfy SC needs | 3.25 | 41 | 22.80 | 3.31 | 41 | 21.80 | 3.27 | 41 | 24.60 | 3.18 | 41 | 21.70 |
| IS integration through SC | 3.06 | 42 | 17.80 | 3.10 | 42 | 16.20 | 2.96 | 42 | 14.40 | 3.14 | 42 | 22.20 |
| **Alliance Mechanisms** | | | | | | | | | | | | |
| Custom products/services | 5.51 | 1 | 78.00 | 5.50 | 2 | 76.90 | 5.67 | 1 | 81.40 | 5.35 | 2 | 75.80 |
| Accommodate customer needs | 5.49 | 2 | 81.20 | 5.51 | 1 | 82.90 | 5.61 | 2 | 82.50 | 5.35 | 3 | 78.40 |
| Key customer accounts | 5.37 | 3 | 77.60 | 5.36 | 4 | 78.60 | 5.30 | 4 | 76.50 | 5.44 | 1 | 78.20 |
| Trust-based customer alliances | 4.86 | 11 | 66.60 | 4.93 | 10 | 70.20 | 4.92 | 8 | 72.30 | 4.73 | 15 | 57.90 |
| Supplier screened & assessed | 4.84 | 12 | 64.20 | 5.10 | 6 | 71.70 | 4.67 | 14 | 56.90 | 4.80 | 14 | 65.20 |
| Suppliers manage upstream | 4.65 | 17 | 57.70 | 4.98 | 8 | 65.20 | 4.60 | 15 | 64.20 | 4.41 | 19 | 52.00 |
| Trust-based supplier alliances | 4.37 | 20 | 49.60 | 4.72 | 13 | 61.40 | 4.28 | 19 | 49.50 | 4.15 | 22 | 39.80 |
| Written alliance contracts used | 4.08 | 24 | 45.80 | 4.04 | 26 | 43.80 | 3.89 | 24 | 43.10 | 4.30 | 20 | 50.30 |
| Shared rewards/risks upstream | 3.90 | 28 | 35.70 | 4.27 | 22 | 49.40 | 3.63 | 31 | 26.80 | 3.86 | 30 | 32.90 |
| Alliance creation guidelines | 3.69 | 33 | 31.50 | 3.81 | 33 | 33.30 | 3.48 | 38 | 25.10 | 3.79 | 32 | 36.30 |
| Alliance monitoring guidelines | 3.66 | 36 | 30.70 | 3.68 | 37 | 30.00 | 3.53 | 36 | 24.80 | 3.79 | 33 | 37.10 |
| Shared rewards downstream | 3.57 | 38 | 28.30 | 3.79 | 34 | 35.40 | 3.39 | 40 | 24.10 | 3.55 | 37 | 26.40 |
| **Human Resource Mechanisms** | | | | | | | | | | | | |
| Middle manager empowerment | 4.72 | 15 | 64.10 | 4.65 | 16 | 64.10 | 4.81 | 9 | 68.30 | 4.68 | 16 | 60.20 |
| Employee empowerment | 4.12 | 23 | 45.30 | 4.11 | 25 | 45.50 | 4.18 | 22 | 45.10 | 4.06 | 25 | 45.40 |
| Firm loyalty to employees | 3.58 | 37 | 26.80 | 3.57 | 39 | 28.20 | 3.69 | 29 | 29.70 | 3.49 | 38 | 22.80 |
| Employee loyalty to firm | 3.42 | 40 | 22.60 | 3.54 | 40 | 25.60 | 3.49 | 37 | 24.10 | 3.26 | 40 | 18.80 |

Indicate the extent to which you agree with the statements as they relate to your SC. (1=Strongly Disagree, 7=Strongly Agree)

significantly slower in establishing trust-based supplier relationships than they have been in building customer alliances (mean=4.37, rank=20). Another supplier-targeted practice that is widely used is the reliance on first-tier suppliers to manage upstream suppliers (primarily second-tier suppliers). Most efforts to manage second- and lower-tier suppliers go through the most important first-tier suppliers. The one exception is the use of second-tier purchasing contracts.

Finally, each of the practices used to formalize alliance management were viewed with a degree of skepticism. Only the use of written agreements or contracts received a score greater than four; however, fewer than 50 percent rated this practice a five or higher (mean=4.08, rank=24). Likewise, fewer than one in three respondent companies use clear guidelines to create or to manage alliances. This finding re-emphasizes the notion that companies continue to manage alliances on a largely ad hoc basis. They persist in maintaining an inward focus, worrying about their own immediate bottom line performance. The relatively low scores for managing alliances on the basis of

shared risks and rewards further manifest this reality. While a large majority of companies hesitate to share risks and rewards in all instances, they are particularly reticent when it comes to sharing upstream. This finding is not surprising given the power asymmetry that exists in most relationships. The general perception is that customers tend to possess the leverage needed to capture a larger portion of the rewards while pushing the risks back onto their suppliers. This perception makes building relationships based on equal sharing a strenuous effort. In summary, progress is being made in forming supply chain alliances, but the progress is uneven and many companies have yet to make the firm commitment to long-term partnership relationships. They continue to hedge their bets, seeking the benefits of closer relationships without making enduring investments in those relationships.

**Status of Human Resource Mechanisms.** Supply chain integration threatens traditional roles and requires that managers and workers alike step out of long-standing comfort zones. This prerequisite of SCM typically

engenders resistance among an organization's workforce, which can easily undermine the implementation process. By contrast, a motivated workforce that is passionate for the organization and buys into the SCM strategy can overcome most of the challenges presented by SCM implementation. Such motivation and passion comes from empowerment and loyalty. The respondents believe that both middle managers and non-management employees are more empowered to make important operating decisions today than five years ago. Almost two-thirds of the respondents agreed at the five or higher level that empowerment is more prevalent among middle managers (mean=4.72, rank=15). Slightly fewer than half of the respondents felt that employees are more empowered today than in the past (mean=4.12, rank=23). While these findings are positive, they also point out that greater effort needs to be made to turn the organization's human resource into a valued source of competitive advantage. Most companies have yet to figure out how to unleash the creativity and passion of their employees. Part of the problem stems from the lack of loyalty between the company and its employees. The responses underscore a strong feeling that neither side is loyal to the other. Without loyalty, it is difficult to justify investments in training or programs designed to enhance employee well being. Yet, without these investments, it is almost impossible to build a world-class, empowered

workforce. A serious conundrum thus exists—companies must invest in people to achieve success, but they have no assurance that the more capable people will be around long enough to help build the company. Long-term supply chain success will demand a new approach to people management.

**Status of Alignment Mechanisms.** Competing "supply chain versus supply chain" implies that every member of the supply chain views itself as part of a cohesive team—working together and winning or losing the competitive battle together. This requires that each team member understand the overall supply chain's value proposition and accept specific roles and responsibilities that must be performed to deliver real value to customers. As with other aspects of SCM, several mechanisms exist to help the distinct and diverse members of a supply chain become part of the team and establish team "chemistry." The data in Table 16 show that some alignment mechanisms are much more widely employed than others. For example, almost three of four materials managers view big-picture mechanisms such as soliciting customer feedback (mean=5.26, rank=4) and seeking to understand the requirements of second-tier customers (mean=5.25, rank=5) as well established. They tend to feel that the organization does a good job of ascertaining downstream success factors.

**Table 16**
**Status of Supply Chain Integration Initiatives—Coordination Issues**

| Variable | Combined | | | Purchasing | | | Manufacturing | | | Logistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 | Mean | R | % 5-7 |
| **Alignment Mechanisms** | | | | | | | | | | | | |
| Solicits customer input | 5.26 | 4 | 74.40 | 5.41 | 3 | 80.10 | 5.24 | 5 | 74.70 | 5.16 | 6 | 69.20 |
| Customers' customers' needs | 5.25 | 5 | 73.80 | 5.29 | 5 | 72.30 | 5.35 | 3 | 77.70 | 5.12 | 9 | 71.00 |
| Know supply chain imperatives | 4.38 | 19 | 48.30 | 4.64 | 17 | 55.10 | 4.26 | 20 | 65.40 | 4.27 | 21 | 44.60 |
| Consistent internal oper. goals | 4.17 | 22 | 44.10 | 4.30 | 21 | 45.80 | 4.22 | 21 | 46.30 | 4.01 | 28 | 40.50 |
| Aligned strategic objectives | 3.97 | 26 | 38.70 | 4.01 | 27 | 42.70 | 3.78 | 27 | 32.50 | 4.13 | 23 | 41.70 |
| Common SC operating policies | 3.83 | 29 | 36.00 | 3.84 | 31 | 34.20 | 3.63 | 33 | 27.60 | 4.03 | 26 | 45.70 |
| Consistent SC operating goals | 3.73 | 32 | 28.00 | 3.93 | 28 | 33.00 | 3.56 | 35 | 24.80 | 3.71 | 35 | 27.20 |
| | | | | | | | | | | | | |
| **Measurement Mechanisms** | | | | | | | | | | | | |
| Process oriented measures | 5.06 | 6 | 72.80 | 5.04 | 7 | 72.00 | 5.03 | 6 | 70.00 | 5.12 | 7 | 75.80 |
| SC oriented measures | 4.86 | 10 | 66.90 | 4.69 | 15 | 61.70 | 4.78 | 10 | 64.20 | 5.09 | 10 | 74.00 |
| Improved measure capabilities | 4.72 | 14 | 62.70 | 4.71 | 14 | 62.00 | 4.54 | 16 | 57.20 | 4.91 | 13 | 68.90 |
| Measure supplier performance | 4.60 | 18 | 56.90 | 4.94 | 9 | 65.50 | 4.44 | 17 | 53.10 | 4.47 | 18 | 53.50 |
| Measure customer profitability | 4.01 | 25 | 41.90 | 4.25 | 23 | 43.50 | 3.82 | 25 | 35.90 | 4.02 | 27 | 46.50 |
| Consistent internal measures | 3.78 | 31 | 34.10 | 3.66 | 38 | 30.00 | 3.75 | 28 | 33.40 | 3.90 | 29 | 38.20 |
| | | | | | | | | | | | | |
| **Process Change Mechanisms** | | | | | | | | | | | | |
| Inter-functional coordination | 4.93 | 7 | 68.60 | 4.73 | 12 | 61.20 | 5.02 | 7 | 67.90 | 5.02 | 11 | 75.30 |
| Process re-engineering | 4.90 | 8 | 64.80 | 4.74 | 11 | 59.30 | 4.72 | 12 | 59.50 | 5.22 | 5 | 74.90 |
| Shared value-added resources | 3.95 | 27 | 36.00 | 4.11 | 24 | 39.80 | 3.68 | 30 | 29.40 | 4.08 | 24 | 39.60 |
| Supplier development | 3.67 | 35 | 29.60 | 3.69 | 36 | 30.70 | 3.59 | 34 | 25.70 | 3.72 | 34 | 32.60 |

Indicate the extent to which you agree with the statements as they relate to your SC. (1=Strongly Disagree, 7=Strongly Agree)

By contrast, less than half of the managers believe that their companies are adept at discerning competitive imperatives throughout the supply chain (mean=4.38, rank=19). Even fewer materials managers expressed confidence that consistent operating goals are used internally throughout their own organization (mean=4.17, rank=22). When it comes to alignment across organizational boundaries, the respondents generally expressed the opinion that different members of the supply chain team do not share common strategic objectives (mean=3.97, rank=26) or common operating policies (mean=3.83, rank=29). Almost three of four believe that operating goals among supply chain members are inconsistent (mean=3.73, rank=32), leading individual companies to pursue a self-interest that is separate and distinct from the overall supply chain team's. These findings suggest that materials managers believe different functional areas within the firm and different members of the supply chain team operate using different "play books." The bottom line is simple: inter-organizational alignment and cooperation has increased in recent years, but few companies have wagered their success on a specific supply chain team. Individual companies remain very much self-interested, making decisions to further their own strategic and operating objectives.

**Status of Measurement Mechanisms.** Good measurement increases managerial understanding, molds behavior, facilitates alignment as well as role shifting, and ultimately leads to results. Given the importance of measurement, it is good news to see that materials managers feel that supply chain measurement capabilities have improved over the past five years (mean=4.72, rank=14). The greatest improvement in capabilities has come from the increased use of process-oriented measures (mean=5.06, rank=6). Three of four materials managers note that their organizations track more process measures in today's competitive environment. This is important since competitive success increasingly depends on the development of critical capabilities and core competencies, which are by their very nature cross-functional. Unique capabilities cannot be built without measurement support. The respondents also noted that more supply chain oriented performance measures are tracked today than five years ago (mean=4.86, rank=10). Greater use of measures that span the supply chain help decision makers design and re-design the supply chain so that value-added activities are performed by the right organizations. Supply-chain-oriented measures enable managers to effectively respond to today's dynamic marketplace. A third area of improved measurement capability involves supplier performance. More companies are closely monitoring supplier performance and using the supplier information to proactively manage the supply base (mean=4.60, rank=18). This trend bodes well for a supply chain environment where strategic outsourcing plays a core role in determining firm competitiveness.

The responses were not completely positive with respect to current measurement capabilities. For example, while supplier performance is being more closely monitored, almost 45 percent of the respondents indicated that their companies' supplier measurement capabilities are at least partially inadequate. Likewise, over 58 percent noted that their organizations do not evaluate customer relationships on the basis of their profitability. Measuring relationship profitability is a critical capability not only in selecting customers of choice but also in defining value propositions and determining which company should perform each value-added activity. This finding is consistent with the earlier finding that most companies lack sound total costing and activity based costing systems. Also congruent with earlier findings is a belief among materials managers that the measures used in various departments/functions within the firm are inconsistent and sometimes both conflicting and counterproductive. This sentiment was pervasive in the on-site interviews. Fortunately, the predominant challenges all fall within the purview of a single organization. They are therefore issues that can be addressed by strong leaders who understand the measurement demands of a supply-chain world and are willing to champion world-class measurement systems.

**Status of Process Change Mechanisms.** Process change and integration is the heart of competitive supply chain management. Once again, the responses reveal some mixed news: the typical company has been actively engaged in efforts to integrate internal processes but is only beginning to make serious efforts at real supply chain integration. The most serious integration has involved efforts to increase inter-functional coordination (mean=4.90, rank=7), which has been supported by major process re-engineering (mean=4.90, rank=8). Nearly two-thirds of all respondents noted that these internal efforts have been more extensive over the past five years. Previous survey responses suggest that for the most part, these integration efforts have yielded only spotty results. The interviews confirm that most of these efforts to increase inter-functional coordination have yet to radically alter the way most companies interact and make critical supply chain decisions. The other side of the story is that very few companies have learned how to effectively share resources among supply chain members. Only 36 percent of the respondents acknowledged that their companies are engaged in resource sharing (mean=3.95, rank=27). Even fewer firms are aggressively engaged in supplier development (mean=3.67, rank=35). The interviews again confirm that effective supplier development is relatively rare. Only a handful of companies dedicate serious resources to help suppliers improve their process capabilities. The most visible process change has taken place in the areas of supplier quality management and vendor managed inventory. A few companies have undertaken more extensive efforts

involving the co-location of process engineers at suppliers' facilities as well as the inclusion of suppliers in new product development efforts. Truly efficacious process change remains rare, regardless of whether the discussion focuses on internal or inter-organizational process.

To summarize, materials managers are rather optimistic that progress is being made in the implementation of important integrative mechanisms in all six areas investigated. It is interesting to note that all but one of the practices that received a mean score greater than five focus on managing the supply chain downstream. Most companies are focusing key efforts and resources on understanding the needs of customers and then trying to build relationships that help them meet those needs better than the competition. Another area where substantial effort is seen is the drive to move from functions to processes. Process re-engineering and inter-functional collaboration initiatives are widely employed and supported by process- and supply-chain-oriented measures. Two areas of concern also emerged: 1) despite substantial effort and investment, information systems are doing a poor job of supporting supply chain integration and 2) upstream integration activities appear to take on a second-class status and are not found among the top ten most pervasive mechanisms implemented. Another troubling indicator is that just one of the 41 mechanisms examined received a mean score greater than 5.5 and only 18 received mean scores greater than 4.5. Leading-edge, aggressive, and broad-based SCM programs are rare indeed. SCM remains in its infancy.

## Supply Chain Management—A Channel Position Perspective

Supply chain management initiatives seek to integrate value-added activities across traditional organizational boundaries. Purchasers must therefore understand how supply chain practices are defined and at what level they are accepted throughout the entire supply chain. Recognizing how supply chain phenomena influence competitive dynamics and decision making throughout the supply chain is a prerequisite to the success of any initiative that requires commitment from multiple members of the chain. Such knowledge helps managers determine the extent to which common views are held across the supply chain and thereby facilitates integration. Identifying decision areas where little common ground exists likewise helps managers set priorities and work to mitigate potential problems in order to establish momentum early in an integration effort. Ultimately, because true SCM bridges organizational boundaries, purchasing managers must broaden their horizons to develop a holistic view of the supply chain in which they operate.

To shed some light on how channel position impacts SCM thinking, in-depth interviews were conducted at five distinct levels of the supply chain: retailers, finished goods assemblers, first-tier suppliers, lower-tier suppliers, and service providers. The discussion on the following pages looks at each of the study's seven research hypotheses from the perspectives and experiences of supply chain participants at each of these different channel positions. As suggested above, the discussion focuses on identifying points of commonality as well as points of divergence in modern supply chain management. For a holistic view of how each company views critical supply chain management issues, see Appendix D.

### The Status of Supply Chain Management

The terminology "supply chain management" was widely, although not universally, used by managers across the channel positions investigated. However, perceptions regarding the integrative nature of SCM varied somewhat across channel position as well as from firm to firm, and even within most firms. Perhaps one of the most interesting observations was how quickly managers resorted to the common trade press definition of supply chain management. That is, when asked how they define SCM, almost eight of ten managers automatically responded, "managing the flow of materials from the 'suppliers' supplier to the customers' customer.'" When pressed a little bit to share their organizations' operational definitions, very few mangers were prepared to share a well thought out and commonly adopted definition. Rather, most managers described general approaches and philosophies regarding the need for and value of integration.

In fact, only one of the 51 companies interviewed actually had a formal, written definition of supply chain management that was visibly posted and communicated throughout the organization. At the other companies, managers possessed a general feel for the integrative nature of supply chain management, but individual definitions were not necessarily consistent among managers from different areas of the organization. In one instance, eight managers who were sitting around the table each shared somewhat different definitions of what they thought SCM really meant within their organization. The truly interesting point here is that all eight were members of their firm's supply chain integration team. The team leader noted that the interview was the first time that the group had ever sat down together to look at many of the issues discussed. Based on the totality of the responses, it appears that while SCM philosophies have many adherents, definitions are fluid and practices have yet to be routinized. Returning to the initial research question, an effort was made to make sense out of the lack of consistency found in operational definitions of SCM.

**Research Question 1:** What is supply chain management in practice? Do definitions vary by channel position?

**SCM As a Critical Strategy.** As with the functional assessment of SCM, the initial topic of interest was to evaluate the strategic importance of SCM. The interviewed managers were asked to indicate on a ten-point scale whether they view supply chain integration as a management fad (1) or a critical competitive strategy (10). The question was often asked of multiple managers who were seated in the same room. This approach created an interesting opportunity to listen to the discussion (and sometimes debate) as the managers came to some semblance of a consensus. Three answers were quite common:

1) "It's definitely an important strategy, probably a seven or eight, but it will be a nine or ten within a couple of years."

2) "Without doubt, SCM is one of our most important areas of emphasis—it's a nine or a ten."

3) "The answer really depends on who you ask—we think it's an eight or nine, but top management probably puts it at a six or seven. The CEO has yet to be fully convinced."

Two other responses were heard from time to time:

1) "On a scale of one to ten, SCM is an eleven. Its clearly the key to our future success or failure."

2) "What do you mean by supply chain management? We really don't use that terminology here."

Overall, managers at the interviewed companies were quite convinced that SCM is vital to long-term competitive success. Even those managers who were not entirely sure about the meaning of the acronym "SCM" felt strongly that competitive success depends more and more on collaborative relationships. At the same time, for all but a few managers, there were some reservations based on a lack of experience with SCM. Many managers expressed concern that some of their best suppliers also supplied their toughest competitors. Others worried that some of their suppliers in one area of business were simultaneously competitors in another product area. A few even noted that they ship product on their customers' private fleets. Defining the boundaries and intensity of specific relationships in a world where multiple relationships exist between the same two companies is clearly an area of preoccupation for many materials managers and company executives. Similarly, most firms participate in multiple and distinct supply chains based on

product category or geographic location. Each supply chain can bring with it a unique set of opportunities and challenges. Despite these issues, the vast majority of managers expressed the belief that SCM will increase in importance in coming years.

A follow-up question, based on the recent robust economy, was typically asked, "Supply chain management emerged in an unprecedented era of economic prosperity; what will happen in an economic slowdown?" The managers held firm in their belief that SCM will continue to grow in strategic importance. Indeed, the general consensus was that SCM would be even more important during a recession than it is today. It should be noted that there were no discernible differences in opinion regarding the strategic relevance of SCM based on channel position.

**What is SCM in Reality?** Once the strategic importance of SCM was determined, the focus shifted to establishing an operational definition of supply chain management. Despite the rhetoric surrounding the notion of managing the flow of materials from the "suppliers' supplier to customers' customer," based on the companies included in this study, actual SCM practice focuses more on eliminating the silos that exist within the organization. Almost 60 percent of the companies interviewed have as their primary focus the establishment of world-class processes within their own four walls (see Table 17). Thus, at many companies, SCM has taken over the role held by business process re-engineering only a few years ago. Yet, even with all of the emphasis on transitioning from functions to "seamless" value-added processes, tremendous angst persists regarding the lack of clear and consistent communication and cooperation among functional areas. Of course, the goal at these companies is to extend newly integrated, state-of-the-art processes up and down the supply chain as appropriate.

Two other views of SCM were also relatively prevalent (see Figure 5). First, some organizations have housed their SCM initiatives in the purchasing area. These companies tend to define SCM as the establishment of close and cooperative relationships with the immediate supply base. Over 95 percent of the integration effort is focused on first-tier suppliers. More specifically, the vast majority of this effort targets the very most important—"A"—suppliers. Management of value-added activities further upstream tend to be limited to second-tier purchasing agreements, which are employed to take advantage of a company's greater purchasing volume. In fact, the typical statement regarding the management of second-tier suppliers is, "we expect our first-tier suppliers to manage those relationships." Few companies follow-up to verify that their first-tier suppliers are proactively and strategically managing their own suppliers. Even fewer provide training and resources to help their suppliers move

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**Table 17**
**Typical Supply Chain Management Definitions/Philosophies**

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<u>Retailer Perspective</u>:
- Internal & external integration. "Hard to get a definition that truly captures the integration required." Focus on first tier.
- "Integration of product & information processes with product suppliers & service providers." Must build on internal integration.
- Eliminating gaps among SC members to get right product at right price at right time in right condition to consumer.
- "Managing inbound & internal processes to minimize inventory while maximizing customer service." First tier up/downstream.
- "Coordinate design, production, & transit cycles to feed mkt. calendar. Includes reverse logistics." First tier upstream.
- "SCM is managing product & cash flows from first tier to cash register." Focus on internal process integration.
- The goal is total pipeline visibility. Focus is on internal process integration & closer relationships with first tier suppliers.
- Do not talk SCM terminology. Focus on internal integration & "flow of goods & money from supplier to customer."
- Efficiency & speed into & through the firm. Emphasis on building unparalleled processes. Tight first tier supply relationships.
- End-to-end visibility from first-tier supplier to retail store. Internal emphasis on process excellence extending to first tier.
- "Business of delivering value to customers & shareholders." From forecasting to delivery of product. Emphasis on first tier.
- "Coordinated flow of materials utilizing a common info base generated from store level POS data." Extends to second tier.
- "Coordinating 3+ firms involved in manufacturing, sourcing, movement, & processing of product to end customer."

<u>Finished Goods Assembler Perspective</u>:
- "Management of materials & info. flow from suppliers to line-side delivery." Focus is on inbound, especially on first tier.
- Internal process integration, moving to "supplier-to-customer mgmt. of value-added processes." Focus is on order fulfillment.
- Focus on internal integration & "managing the physical flow to the customer's warehouse." SCM=Eng+Mfg+Pur+Log+Fore
- From "dirt to us." Definition does not include downstream entities. Focus on making a set of internal processes world class.
- "End-to-end thinking"—even when organization is not executing that way. Begins internally & extends up/downstream.
- Plan & control the efficient & effective flow of materials & info. from supplier to customer. Focus on first tier backward.
- "Design & coordination of five fulfillment systems." Focus on internal integration with interfaces both up & downstream.
- Focus is internal & downstream to customer; i.e., "doing the right thing to serve the customer at the lowest landed cost."
- Internal integration extended both up/downstream. Focus on internal integration. Customer integration most difficult.
- "Getting the right product to the customer so that we both make money." Internal integration & one tier up/downstream.
- Focus on internal & downstream "processes required to efficiently & effectively satisfy customer requirements."

<u>First-Tier Supplier Perspective</u>:
- Integration of decisions that affect the flow of materials through the firm to the customer. Internal & one tier up/downstream.
- Emphasis is on internal integration & better cooperation one tier up/downstream. Trouble "getting arms around SC concept."
- "SCM is a business process & not an organization" designed to smooth the flow of materials & information.
- Recognize value of "suppliers' supplier to customers' customer" notion, but do not have formal shared definition.
- "Managing the info & value-added processes that occur from order receipt to delivery to customer." One tier backward.
- "A process involving cross-functional teams, supply base, & internal customers." "Aligned customer/supplier expectations."
- "Ability to effectively align internal operations & supplier's operations to meet customer needs." Focus one tier backward.
- Formulating SC position/strategy. Focus on improving communication within & outside firm. One tier up/downstream
- "Manage materials & information from order to receipt of payment from satisfied customer." One tier up/downstream.

<u>Lower-Tier Supplier Perspective</u>:
- Talk definition—"from origin to end consumer"—but are far from it. Focus on supply & distributor relationships.
- "The linking of external demand to external supply & the facilitation of info flow." SCM seldom extends more than one tier.

<u>Service Provider Perspective</u>:
- Managing the "nuts & bolts" to get product to end customer efficiently/effectively. Integrated activities & processes.
- Linkages & collaboration from manufacturer to customer, ranging from transaction to alliances. One tier up/downstream.
- New approach to logistics involving process integration up/downstream to achieve greater efficiency/service.
- No formal definition, but recognize need for cooperation. Internal process integration to support downstream collaboration.
- Management of the entire end-to-end acquisition process from requirement to payment. Focus on first tier upstream.
- "We are a conduit—physically & emotionally—between mfgs & their customers." Seamless & integrated process mgmt.
- "To add value to our customers' products by managing movement." Managing information & relationships rationally.
- SCM is relationship management. 3PLs bridge gaps in the SC. Recognize end-to-end notion, but manage triadic relationship.
- SCM involves elimination of non-value-added activities one tier up/downstream. No shared working definition.

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## The Firm
**Purchasing R&D Production Logistics Marketing**

Most companies are still working to create seamless processes within the four walls of their own organization. For some, this effort constitutes the bulk of their SC efforts.

Many companies house SC efforts in purchasing & focus on achieving integrated processes with first-tier suppliers.

**Key Suppliers** — The Firm

The Firm — **Key Customers**

Many companies house SC efforts in marketing & focus on achieving integrated processes with first-tier suppliers.

Very few companies have systematic efforts to integrate processes both up & downstream.

**Key Suppliers** — The Firm — **Key Customers**

**Key Suppliers** **Key Suppliers** — The Firm — **Key Customers** **Key Customers**

True collaboration from suppliers' supplier to customers' customer is a vision that is not currently being realized.

toward greater upstream coordination of value-added activities. Thus, responsibility for upstream relationships is essentially "handed off" to the first-tier suppliers.

Second, some companies organize their SCM endeavors around their logistics and/or customer service activities. These companies emphasize the development of closer relationships with vital customers. The use of key customer account teams is a common practice at these organizations. Ultimately, their efforts are the mirror image of their supplier-oriented counterparts. They look one tier forward and focus primarily on "A" customers. Interestingly, managers from both types of companies frequently complain that significant chasms exist within their companies that prevent them from collaborating intensely with their marketing or purchasing counterparts. They often find it easier to work closely with other members of the supply chain than with other members of their own companies.

A third SCM reality also exists, but it tends to be quite rare. A few companies have closed the gaps that existed among the various internal functions and are now simultaneously working to extend integration efforts up and downstream. The focus at these companies is on aligning value-added capabilities to better meet the real needs of their most valued customers. In other words, they have

1) identified key customers
2) evaluated these customers' competitive requirements and critical success factors, and
3) are striving to build processes back into first tier suppliers that will deliver quality and responsiveness at the lowest possible total landed cost.

It is vital to note that even at these companies, 95 percent of the analysis and process development takes place among the triad of their company plus one-tier forward and one-tier backward. While these companies are establishing processes, capabilities, and relationships that will give them a sizeable lead in the competitive race, they are far from achieving the "end-to-end" visibility envisioned by the SCM concept. For now, finding a supply chain where seamless value-added processes are managed from the "suppliers' supplier to the customers' customer" remains almost as challenging as photographing the elusive Sasquatch.

Regarding differences in view based on channel position, enough variability in definition exists at each channel level that it is almost impossible to say that real differences exist based on channel position. At every channel position, SCM involves process management and tighter relationships. Perhaps the greatest uniqueness in definition exists among third-party service providers. They

consistently view themselves as a bridge or conduit that facilitates greater inter-organizational process integration. Ultimately, however, regardless of channel position, the concerted focus is on building relationships that can generate greater value creation. A final comment on today's reality of SCM should be made. The word integration is widely used to describe the intensity and nature of supply chain relationships. True integration—where objectives are aligned, communication is open and candid, resources are pooled, and risks and rewards are shared—remains a rarity. The more appropriate descriptors are cooperation and collaboration. Among many leading companies, the notion of true integration is more than a little scary since such integration is tantamount to yielding "sovereignty" and potentially limits the company's ability to respond quickly to major changes in the competitive environment. Many managers fear being hitched to a plow horse when a quarter horse is needed and vice versa. They also worry that a current supplier may become a future competitor or that a current customer will backward integrate into their domain. As a result, they prefer a little fluidity in their supply chain relationships. Today's materials managers appear at relative ease with the notion of enhanced collaboration; by contrast, the prospect of true integration takes them quickly out of their comfort zones.

### Forces Driving Supply Chain Integration

Embarking down the path of supply chain integration is a serious and resource-intensive endeavor not designed for those prone to vacillation. Therefore, compelling reasons must not only exist but must be visible and clearly understood in order to motivate the organizational change required to successfully navigate the SCM journey. Looking back to the survey data, three factors provided clear motivation for SCM: a desire to improve customer satisfaction, a need to improve productivity, and intensifying competition. The interview-based discussion for Research Question 2 provides strong support for these survey-based findings.

**Research Question 2:** What factors motivate firms to engage in supply chain arrangements? Are the motivating forces the same across channel positions?

Perhaps the most compelling reason to make any change in strategic orientation or tactical execution is survival. Several of the interviewed managers noted that their companies' only hope to remain viable in the emerging competitive arena is effective supply chain management (see Table 18). For example, one manager commented, "Supply chain management is THE strategy." Another noted, "If we are not better at managing the supply chain, we have no reason to exist." A third simply said, "It's a matter of survival."

While survival is certainly compelling, it was not the most frequently cited motivation. In fact, regardless of channel position, managers consistently cited two motivating forces: the need to meet the requirements of demanding customers and the need to fend off tough competitors. Customer responsiveness was the most immediate concern for retailers and service providers (followed closely by competitive pressures). Dealing with intensifying competition was the dominant issue for finished goods assemblers and their suppliers (followed by increasingly demanding customers). Two other factors also emerged as strong rationale for adopting a supply chain orientation: the realization that relationships really matter and the need to adapt quickly to a dynamic and uncertain competitive environment.

**Rising Customer Expectations.** The most pervasive theme that emerged from the interviews is the strongly held belief that customers are more demanding today than ever before. In the words of one manager, "Customer expectations today are unprecedented." Customers seem to want it all—innovative, high-quality products; rapid, dependable delivery; outstanding responsiveness; and unique, tailored services. Moreover, they want it all at the lowest possible prices. Some of the interviewed managers suggested today's customers are insatiable and even greedy. Worse yet, based on recent experience as well as expressed customer desires, the performance bar promises to rise unceasingly into the foreseeable future. One manager expressed the sentiment that in the current competitive environment, "you're only as good as your last performance."

The primary reason for the heightened customer expectations is that "so many options exist that customers do not have to tolerate" inferior performance. Power has also tended to shift downstream toward the end customer. Because they control the customer connection, retailers such as Wal-Mart are increasingly the behemoths in the channel. In this hyper-demanding marketplace, some managers note that their firms must improve their overall levels of customer service and satisfaction or risk being "role shifted" right out of the supply chain. Indeed, many companies are actively looking for opportunities to disintemediate the supply chain in order to improve their own competitive position. To deliver the value their customers are seeking, companies are redefining their value propositions and their supply chain roles to deliver not just products but solutions. Greater supply chain collaboration has thus become viewed as a viable approach to "delivering premium customer satisfaction" and gaining at least a measure of customer loyalty. Additionally, at many organizations, managers feel that an emphasis on SCM engenders a customer focus throughout the entire organization.

**Table 18**
**Motivations for Supply Chain Integration**

**Retailer Perspective**:
- Consolidating & competitive industry. High service required to avoid role shift out of SC.
- Need for collaborative solutions & information integration to meet market demands/consolidation.
- SCM is the business strategy. Must deliver premium customer satisfaction cost effectively.
- Must reduce IPD & fulfillment cycle times & compete for best suppliers. "Easy fruit" picked.
- Survival in face of tough competition & industry consolidation. Take time out of system & be more responsive.
- New players at low price point. Cost reduction, shorter cycles, greater variety, & high service.
- Customers demand shorter cycles & low prices. Desire to be fully JIT. E-commerce opportunities/threats.
- Demanding customers. Fierce competition—tremendous merger activity in industry. Low margins.
- Profitably support rapid growth. Better relationships & brand. Optimize total delivered cost.
- Fierce competition & demanding customers. SCM provides customer focus to entire organization.
- Meet customer expectations—"so many options exist & customers will not tolerate stock outs."
- Higher, maintained markups. Better meet customer demand. Better financial performance.
- SCM is needed to meet customers' expectations, drive differentiation, & create vital non-leverage efficiencies.

**Finished Goods Assembler Perspective**:
- Flow time & cost reductions are vital to fend off tough competition. Pressure from Wall Street.
- Global competition & demanding customers. "You have to offer great products built/delivered efficiently."
- Reduce total landed cost. SCM needed to meet customer service expectations.
- Intense competition. Purchased content up from 40% to 70%. Rely on supplier design/technology.
- Survival. Customer responsiveness. Operational excellence
- Must support growth w/out capacity investment. Benchmarked SCM processes.
- "If we are not better at managing the supply chain, we have no reason to exist." Consolidation & competition.
- Consolidation among customers. Time compression & constant cost pressure.
- Global customers demand SCM. Global network design. Desire for revenue growth & cost control.
- Intense global competition. Consolidation among customers. Supply-base reduction.
- Compelling cost pressures. Need for mass customization. More powerful & demanding customers.

**First-Tier Supplier Perspective**:
- Pressure from customers to become full-service supplier of more complex modules. Pressure to expand skills.
- Trying to keep up with dynamic environment: customer demands, consolidation, & globalization.
- Patents set to expire. Global competition & cost pressures. Build customer relationships.
- Increased outsourcing combined with cost & margin pressure. Desire to be best in class.
- Desire market dominance. SCM increases customer access. Short technology cycles & global rivalry.
- Constant cost pressure. Rapid design cycles. Desire to be customer of choice. Mergers.
- Cannot grow business without SCM. Customer responsiveness. Lower inventories & costs. Leverage.
- Unprecedented customer demands for service, flexibility, & new product. Anticipated margin pressure.
- SCM helps leverage global volume. Vital to meet customer demands for lower costs & shorter cycles.

**Lower-Tier Supplier Perspective**:
- Improve strategic alignment & integration. Cost optimization. Build strong customer relationships.
- Cost, quality, & time imperatives require cooperation. Dynamic market & intense competition.

**Service Provider Perspective**:
- Desire to offer tailored services & meet ever-rising customer outsourcing expectations.
- Concentration of leverage with key customers. Need to offer unique services to lock in loyalty.
- SC design needed to change poor processes. Cost pressure & demanding customers.
- Worry about disintermediation. Desire reduced costs & better service. Stronger relationships.
- Increased competition & eroded profits. Consolidated supply base. Need to optimize contract leverage.
- Performance expectations rising: "You're only as good as your last performance." Relationships matter.
- Customers have rising service expectations & need unique solutions. Need critical mass.
- The world is changing, especially in the area of technology. Roles must change to deliver value/solutions.
- End users are more demanding—they do not want to hold inventory. SCM is being forced upon us.

**Intensifying Competitive Pressure.** Managers across the supply chain recognize that their companies operate in "fiercely" competitive arenas. According to the interviewed managers, globalization, technological change, and merger activity have all combined to ratchet up the competitive intensity now found in most industries. Globalization has led to an increase in competitive options as well as to intense global rivalries such as those that exist between Carrefour and Wal-Mart, General Motors and Toyota, and Unilever and Procter and Gamble. Moreover, as noted during the interviews, "new players can emerge from anywhere at anytime and at a lower price point." Technological change has led to tremendous time compression, making sustainable competitive advantage an artifact of former competitive eras. Finally, the quest for scale economies and market access has led to increased merger activity, which has created bigger, more powerful competitors in numerous industries. The fact that these corporate giants often possess global reach and the ability to cross-profit subsidize makes them both aggressive and formidable. The impact of this competition is "constant and compelling cost pressure," "eroded profits," and "anticipated long-term margin pressure." To cope with the competitive challenge, companies are turning to SCM to enhance "operational excellence," create "non-leverage efficiencies," and "reduce total landed costs." For many firms, well-crafted supply chain strategies offer the best hope to leverage a specific capability into a viable market offering.

**Managing in a Dynamic Environment.** Today's business environment can be described as increasingly global, inherently dynamic, and intractably complex. Andrew Grove suggested that two rules dominate in this new environment: "First, everything happens faster; second, anything that can be done will be done, if not by you, then by someone else, somewhere." Grove concluded that the inherent challenges are ominous, saying, "Let there be no misunderstanding: These changes lead to a less kind, less gentle, and less predictable workplace." The interviewed managers concurred with this assessment and suggested that SCM is a vital weapon in their fight to cope with the following issues.

- Globalization dictates that new competitors with inherent advantages such as low-cost labor or government support can come to market at any time. Likewise, capturing global market share can deliver all-important scale economies as well as generate the cash flows needed to support new product development. Building a globally competitive supply chain team helps firms meet the challenges and take advantage of the opportunities of a global marketplace.

- Merger activity in the automobile, packaged food products, pharmaceutical and other industries has

led to significant consolidation and the emergence of the "2,000 pound gorilla"—corporations that possess the size and leverage to dominate both their industry and the supply chains in which they operate. For many companies, aligning themselves with strong supply chain partners provides the leverage needed to compete in a world increasingly dominated by fierce 2,000-pound gorillas.

- Expiring patents, compressed product life cycles, and mass customization all create a need for more rapid product development and more flexible manufacturing and replenishment systems. Involving materials and service providers in the new product development process can dramatically reduce development cycles. Similarly, redefining, and even outsourcing, value-added roles can lead to greater supply chain responsiveness.

- Rapidly emerging and constantly changing technology, especially in the information area, has changed the way companies conduct business. Specific impacts have been felt in the areas of customer empowerment, fulfillment strategies, intra- and inter-firm communication, e-commerce, and channel structures. Emerging technology has made much of the supply chain phenomenon possible. Caught up in a competitive race, many firms invest heavily in the new technologies; yet, not only are state-of-the-art technologies expensive but they are often difficult to implement in a way that yields real advantage. Supply chains that learn how to employ technology to facilitate alignment, enhance cooperation, and create synergies are likely to win the competitive battle.

- Wall Street demands high levels of financial performance, making it necessary for companies to deliver greater value with the same or fewer resources. Maximizing output without adding capacity requires that companies leverage the capabilities of other supply chain members. Supply chain collaboration and synergy represent the key to more efficient and effective value-added processes.

**Recognizing the Value of Relationships.** In the dynamic and immensely challenging business environment described above, managers have begun to recognize that their companies do not have the wherewithal to succeed by themselves. They increasingly realize that they must compete as members of supply chain teams. The interviewed managers pointed to several factors that highlight the immense value inherent in cultivating closer supply chain relationships.

- Well-designed and executed relationships yield opportunities to collaborate more creatively, sharing resources and developing synergies.

- The threat of disintermediation places a premium on developing relationships that create switching costs. Integrated processes and connected technology systems make it difficult for other channel members to "role shift" a company out of a successful supply chain.

- Competitive success demands that companies develop unique, non-imitable competencies. As a firm focuses on its specific value-added competency, non-core activities are typically outsourced. The supporting team of supply chain allies become indispensable.

- To some extent, every company has the opportunity to select its own customers and suppliers. Great companies tend to build relationships with other outstanding companies, leveraging each other's strengths to build unequalled advantage. Companies thus strive to become "customers of choice" and "suppliers of choice." Achieving this status often depends on the quality of relationships established.

To summarize, as customer expectations rise, competition intensifies, and the rate of environmental change quickens, the strength of a supply chain team can make all the difference between unparalleled success and certain failure. Survival is indeed a strong motivating force.

## Managerial Support for Supply Chain Management

Given the compelling rationale for adopting a supply chain orientation, it becomes important to do everything possible to assure the success of selected supply chain initiatives. As discussed earlier, organizational commitment is a prerequisite to SCM success. That is, because SCM strategies require a dramatic shift in both philosophy and practice, they cannot succeed without the highest levels of managerial support. Only senior management can effectively set the direction for the organization. Further, since SCM requires cross-functional and inter-organizational collaboration and is resource intensive at the day-to-day decision-making level, it is imperative that support is garnered throughout the organization. After all, mid-level functional managers have to change the way they view the world as well as how they perform their jobs to make the SCM strategy successful. To more fully understand the nature of the organizational commitment that currently prevails in today's business setting, the third research question addressed two specific issues: 1) overall levels of managerial support and 2) resource dedication in the form of specific efforts to understand the structure and dynamics of the supply chain through SCM mapping.

**Research Question 3:** To what extent does organizational support exist for supply chain initiatives? Do perceptions regarding the level of support vary across the supply chain?

**Managerial Commitment.** Looking at the data in Table 19, it is clear that many materials managers across the supply chain feel strongly about the importance of SCM. They claim that their organizations are firmly committed to greater supply chain integration, noting that SCM "is here to stay," "is critical to survival," and "is surely the future of business." At the same time, many of their counterparts express doubt as they note that SCM "lacks credibility with top management," "has no top-level champion," and "is something you have to constantly sell in-house." In fact, some managers emphasize their personal commitment to SCM while expressing frustration that managers in other areas of the organization are not yet "fully on board." A careful review of the summary statements in Table 19 suggests that most managers feel that four distinct types of commitment are vital to SCM implementation success.

1) Top management commitment is deemed to be a prerequisite to long-term SCM success. The very nature of SCM dictates that without the senior management commitment (including the CEO), the necessary vision will never emerge. As a result, any attempt to move down the path to supply chain integration will be localized, promoted in an ad hoc manner by a few adherents scattered throughout the organization. Ad hoc initiatives neither yield the results nor produce the visibility and clout to demonstrate the power of seamless process management. Likewise, only top management can dedicate the resources needed to make SCM a top organization-wide priority. Again, without this level of support, integrative efforts are almost guaranteed to be superficial and ineffective.

2) Broad-based functional support is viewed as critical. One of the greatest areas of frustration arises when a particular functional area commits itself to making the changes necessary to build a supply chain competency only to be thwarted by "backward-thinking" or "turf-protecting" managers in another area of the organization. Supply chain collaboration is inherently cross functional—the value-added processes capable of delivering a real competitive advantage are almost always comprised of activities that reside across functional boundaries. Also, no single set of managers possesses all of the information needed to

## Table 19
## Managerial Commitment to Supply Chain Integration

<u>Retailer Perspective</u>:
- SCM important. Top mgmt supportive but not driving force. Mixed functional support.
- Greatest commitment from logistics group, where SCM group is housed. Lacks "credibility" with top mgmt.
- Critical—"on a scale of 1-10, its an 11." Top mgmt promotes vision. Lack complete functional buy-in.
- SCM is critical. New VP of SC operations. Still lack complete buy-in throughout organization.
- Collaboration essential to survival. Lack top mgmt commitment. Varying levels of functional managerial buy-in.
- High level of commitment to integration. Top mgmt investing to create team-oriented culture.
- SC team in place, but lacks complete commitment from top mgmt & some functional managers.
- High level of idealism regarding organizational & SCM capability. Lack complete commitment.
- VP of supply chain operations. General buy-in but still evolving. SCM critical & continual focus
- Absolutely critical. Top mgmt committed. SC team leader reports to VP. Lack lower level buy-in.
- Absolutely critical—SCM is here to stay; its irreversible. Top mgmt fully committed at least to first tier.
- Strong commitment among SC group. Lack top mgmt. support & divisional cooperation.
- Strong senior mgmt commitment. Belief that the organization is in reality a SC company.

<u>Finished Goods Assembler Perspective</u>:
- SCM is viewed as critical at the senior mgmt level. Lack complete functional buy-in.
- Strong commitment to concept of integration. Top management & senior functional management partially on board.
- Absolutely committed to SCM. Supply Chain Vision Statement. Top management & functional management support.
- SCM organization in place with Ex. VP of SCM. SCM is vital strategy, but lacks total buy in.
- Top mgmt. is fully committed. SCM is vital strategic thrust. Lack divisional and factory support.
- Strong support from SCM group. Lack top management buy-in. All functions not on board.
- SCM is vital & SC organization in place, but SC is "something you have to constantly sell in-house."
- SCM viewed as "critical to survival." Top mgmt fully committed. Division & functional managers not fully on board.
- Sr VP of Purchasing, Quality, & Logistics. Critical to business success. Lack complete buy-in.
- Strong strategic issue for 10 years. Complete buy-in among materials managers. Lacks total visibility.
- "SCM is not a fad, it's a reality" Materials managers committed. Top mgmt beginning to buy in.

<u>First-Tier Supplier Perspective</u>:
- Committed to better integration & strong relationships, but "don't fully relate to concept." No champion.
- Materials group is fully committed to SCM. Top mgmt still uncertain; i.e., is SCM a fad. No top-level champion.
- Strong support from SC teams. Lack top mgmt. commitment. Lack total functional buy-in.
- SCM is critical strategy. Strong functional buy-in. Lack top management commitment & centralized support.
- Materials views SCM as vital, "we've exhausted what we can do within our stovepipe." Lack total buy-in.
- 10 years experience with SCM. Strong support—"dedicating resources to make it happen."
- Vital—VP SCM. Struggle with gaps within organization; i.e., lack total functional buy in. No champion.
- SCM is vital to strategy formulation & execution. "It is surely the future" has top management commitment.
- Strong commitment by senior purchasing & materials mgr. Lack top mgmt commitment.

<u>Lower-Tier Supplier Perspective</u>:
- Strong support for team efforts, especially for joint engineering. Lack complete SC vision.
- View SCM as an important strategy, but lack clear vision & commitment. Many entrenched practices.

<u>Service Provider Perspective</u>:
- Strong commitment to managing "A" suppliers & "A" customers. Equate VMI with SCM.
- Commitment to provide one-stop, headache-free service. Lack champion & SC vision.
- SCM viewed as very important. Lack complete top-level support. Lack lower level buy-in.
- SCM is a natural progression of good practice. Top mgmt emphasis. Lack complete functional buy-in.
- Strong commitment without complete understanding. Lack top mgmt follow through.
- SCM is a vital strategy. Strong commitment; however, initiatives don't focus on end-to-end visibility.
- SCM is the organizational strategy. Strong top management support. Some divisional rivalry.
- SCM is what we do—"If you do not find a niche, you fold your tent." Strong top mgmt commit.
- Relatively low internal commitment. Ad hoc support based on market demands. No SC champion.

make great "system-wide" decisions. They are absolutely dependent on other functional managers within the firm. As was pointed out in the discussion of SCM definitions, many firms find it more difficult to collaborate within their own four walls than they do with outside channel members. Functional managers across the board need to buy off on the concept of integration to close this exasperating internal chasm that inhibits successful SCM.

3) An organizational or structural commitment must also be made to facilitate supply chain integration and provide the visibility and momentum to achieve true collaboration. For many organizations, this change has taken place through the establishment of a senior-level supply chain position. Perhaps the two titles most frequently seen are Vice President of Supply Chain Operations and Executive Vice President of Supply Chain Management. Other companies have established supply chain groups or divisions. Unfortunately, these are often housed within one particular area of the firm such as purchasing or logistics. They therefore fail to achieve real cross-functional integration. Still other companies have put in place permanent (or, at times, ad hoc) cross-functional supply chain teams composed of managers whose primary responsibilities still reside in a specific functional area. The most successful of these teams are the ones whose members have successful track records and high levels of credibility within their functional domain. Few firms have figured out how to structure their supply chain groups to effectively bridge the gaps that persist in modern organizational structures. The answer probably lies in a combination of all three approaches highlighted above.

4) The final dimension of commitment needed falls outside the organization—both suppliers and customers must agree to collaborate in meaningful ways. Achieving success in this arena requires that senior-level managers aggressively and honestly sell specific supply chain initiatives. Good personal relationships, high-impact pilot programs, and trust are the foundation of inter-organizational commitment.

Although commitment levels vary from one company to another, it seems that no super-consistent pattern emerges with respect to channel position, with one exception—smaller, resource constrained companies demonstrate a lower level of commitment to SCM. The reality is that small companies exist at every channel position; however, lower-tier suppliers tend to be smaller than their counterparts further downstream. Thus, while it might be argued that lower-tier suppliers are not fully committed to SCM, a more accurate statement would be

that smaller, resource-constrained firms find it more challenging to commit to SCM. Finally, managers paint a consistent picture regarding the difficulty of obtaining all four aspects of commitment simultaneously. It seems as if one piece of the commitment puzzle is consistently missing. Interestingly, each company appears to be looking for a slightly different piece. Everyone recognizes the need to either fine tune or overhaul their organizational structures to support real supply chain integration. Yet, only a couple of the interviewed companies believe that they are close to 1) having everyone on board and 2) having the needed resource dedicated and directed to the right SCM initiatives. The good news is that many companies are pointed in the right direction and are lengthening their stride as they strive for supply chain excellence.

**Supply Chain Mapping.** Managers find it relatively easy to express support for SCM; however, the findings in Table 20 clearly show that relatively few firms have invested the time and effort necessary to fully understand the supply chains in which their firms operate. Only a couple of the interviewed companies have made a point of mapping their supply chains either physically or via computer modeling. These rare companies tend to have a good idea of how their primary supply chains function and who the key participants are at least two tiers up and down the supply chain. One company actually took its supply chain map to the third-tier level. Unfortunately, these companies have yet to fully exploit their mapping efforts to comprehend and communicate the dynamics of the supply chain. Analysis of channel costs, value propositions, critical success factors, profitability, and channel power is still in its infancy. These companies are, however, more actively investigating opportunities to role shift with immediate channel partners. They also tend to employ second-tier purchasing agreements where leverage advantages exist. Thus, they are beginning to leverage their greater supply chain understanding to gain competitive momentum.

For the remainder of the companies, two points stand out—they have no formal supply chain map and they lack knowledge at the second-tier level. When asked about their supply chain structure, managers at these companies expressed a certain confidence in discussing the number and type of customers or suppliers at the first-tier level (although they generally needed to check with a counterpart to get information about the other side of the organization). The important point here is that someone somewhere in the organization has access to this information. However, when asked to provide information about the extended supply chain, the standard response included words like, "Nobody around here has that information," and, "I could only guess." The vital point here is that a definite knowledge gulf separates the first and second tiers.

Table 20
SCM Commitment--Mapping the Supply Chain

**Retailer Perspective**:
- No formal SC map. Struggle a little with total costing. Lack second-tier knowledge.
- No formal SC map. Still have not fully adopted process maps. Lack second-tier knowledge.
- Overall network computer modeled. Macro version posted on wall. Management focus is on first tier & 3PLs.
- No formal SC map. Map key processes to first tier to drive role-shifting. Limited second-tier knowledge.
- No formal SC map. Many internal processes lack transparency. Lack second-tier knowledge.
- No formal SC map. Working to increase process transparency. Limited second-tier knowledge.
- No formal SC map. Working on process transparency & business rules. Limited second-tier knowledge.
- No formal SC map. Time spent looking at policies, procedures & processes. Lack second-tier knowledge.
- No formal map of entire SC. Some process mapping to first tier. Lack second-tier knowledge.
- No formal map of entire SC. Internal processes being mapped & roles redefined. Lack second-tier knowledge.
- No formal SC map. Key processes mapped & managed carefully. Lack second-tier knowledge.
- No formal SC map. Well-defined internal map of value-added process. Lack second-tier knowledge.
- No formal SC map; processes are mapped & process owners identified. Lack second-tier knowledge.

**Finished Goods Assembler Perspective**:
- Formal map goes to third tier. Have not taken much advantage of knowledge gained from mapping.
- No SC map. Process map all major value-added processes. Functional gaps. Meager second-tier knowledge.
- No SC map. Lack second-tier knowledge except for one commodity.
- No SC map. Lack second-tier knowledge. Some processes mapped.
- No SC map. Internal processes mapped. Employ "As is" & "Should be" maps. Lack second-tier knowledge.
- No formal SC map. Lack second-tier knowledge. Mapped material flows to guide consolidation/milk runs etc. . .
- No SC map. General map of process, but does not include all players or specify roles. Lack second-tier knowledge.
- Very general SC maps, but do not include all players or specify roles. Lack second-tier knowledge.
- No formal SC map. Internal SC intricately mapped. Track 400 first-tier suppliers. Lack second-tier knowledge.
- Greatly reduced supply & customer base has increased visibility. Some second-tier knowledge. "Simple Chain"
- Downstream channels mapped. First tier upstream has been mapped. Lack second-tier knowledge.

**First-Tier Supplier Perspective**:
- No formal SC map. Only starting to evaluate role-shifting opportunities. No real second-tier knowledge.
- No formal SC map. Have a good grasp of one tier up/downstream. Very limited second-tier knowledge.
- No formal SC map. Many processes mapped. Gaps between supply & marketing. Lack second-tier knowledge.
- No formal SC map at corporate. Visibility by commodity. Lack second-tier knowledge.
- No formal SC map. Mapping focused on internal processes. Limited second-tier knowledge.
- No formal SC map. Lack view of processes & interdependencies Lack second-tier knowledge
- No formal SC map. Good view one tier up/downstream. Lack second-tier knowledge.
- No true SC map. Purchasing maps define leverage points & aggregation opportunities. Lack second-tier visibility.
- No formal SC map. No resources for process mapping. Lack second-tier knowledge. "ABC" classification.

**Lower-Tier Supplier Perspective**:
- No formal SC map; however, do evaluate role shifting one tier each way. Lack second-tier knowledge.
- No formal SC map. Processes are loosely coupled. No formal role shifting. Lack second-tier knowledge.

**Service Provider Perspective**:
- No formal SC map. Good view one tier up/downstream, especially with "A" firms. Lack second-tier knowledge.
- No SC map. Value-added processes mapped. Lack total SC view. Limited role shifting.
- No formal SC map. Too complex & huge variety of acquired items. Focus only on first tier.
- No formal SC map. Have a good grasp of first-tier customer needs Lack second-tier knowledge.
- No formal SC map. Have good grasp of one tier each way. Lack second-tier knowledge.
- No formal SC map. The view for 3PLs really focuses on one tier each way. Lack second-tier knowledge.
- No formal end-to-end SC map. Extensive mapping of customers' processes. Lack second-tier knowledge.
- No formal end-to-end SC map. Map delivery process from mfg. to customer. Lack second-tier view.
- No formal SC map. Limited process mapping. Lack total & ABC costing capabilities. Lack second-tier knowledge.

The predominant focus at these companies is on modeling internal processes and establishing policies and procedures to help them manage key relationships with first-tier customers and suppliers. In many instances, the principal hope is to use process mapping to enhance process transparency and help close the gaps that impede coordination of internal activities. Efforts also target the identification of process ownership as well as defining the most appropriate roles for each functional area of the firm to perform in order to support specific processes. Some of the more aggressive efforts at enhancing process and supply chain visibility are designed to identify leverage points and aggregation opportunities, both for purchasing and logistics operations. Managers also hope that improved process visibility will enable them to more accurately evaluate tradeoffs via "ABC" and total costing. Better tradeoff analysis is leading to a more clear and certain definition of roles and ultimately to more efficient and effective processes. Most of these companies are more actively utilizing "ABC" classification to better manage scarce resources. By identifying "A," "B," and "C" channel participants, managers are able to determine the nature and intensity of supply chain relationships to build. Of course, 90 percent of the effort is then directed to building strong relationships with important supply chain members.

Without doubt, today's companies are more aggressively working to make processes and relationships transparent in order to bring reason to a chaotic environment. Even so, considerable distance separates the reality from the rhetoric when it comes to understanding true supply chain dynamics. Managers find it far easier to talk about supply chain management than they do to actually dedicate the time and other resources needed to create a clear picture of their most important supply chains. Managers seem comfortable and content to manage within traditional one-tier relationships. They thus limit their understanding and thereby some of their ability to get out of the box and create unique value-added opportunities that span the supply chain. In this respect, supply chains are competing more as groups or clusters of companies than as cohesive teams.

### Benefits of Supply Chain Integration

One of the points raised in interview after interview was the notion that to be viable, SCM initiatives had to have an identifiable and quantifiable impact on the "P-and-L" statement. Managers consistently noted that in today's business climate, measurable results are what matter most. At one of the companies interviewed, a common saying is, "If you don't have the numbers, it's just your opinion." Despite the emphasis on the hard numbers, the trade press is replete with "soft" anecdotal evidence that SCM can reduce inventory, improve productivity, enhance quality, and reduce both product development and

fulfillment cycles. The so-called hard numbers are hard to come by. In fact, as more than one manager asserted, the "hard" numbers can be incredibly difficult to track and quantify. Many companies are working diligently to develop better supply-chain-oriented performance measures to help them both justify and evaluate vital SCM initiatives. To better determine how the benefits of supply chain integration are currently viewed, the interviewed managers were asked to provide information about the expected and the realized benefits from their SCM efforts. The managers were universally willing to discuss the expected benefits, but were more reticent to share specific numbers relating to actual performance improvements. Their responses provide the basis for the discussion of Research Question 4:

**Research Question 4:** What benefits/outcomes are expected from supply chain integration? How do they compare with real life results? Are the benefits/outcomes the same regardless of channel position?

As noted, most managers are hesitant to share the real numbers; however, a few companies were pleased to promote the progress they have made. For these companies, the quantifiable benefits of better supply chain coordination and stronger supply chain relationships have been quite impressive.

- doubled inventory turns
- 50 percent improvement in on-time delivery
- 25-50 percent decrease in reorder lead times
- 50 percent increase in sales supported by 35 percent lower inventory
- 5 percent per year decrease in bill of materials acquisition costs over a ten-year time period

As can be seen, the primary area of quantification has been in inventory levels and turns, delivery performance, and materials acquisition costs. In a sense, this is fitting since the single most frequently expected and sought after benefit of SCM is cost reduction through productivity improvements. The softer side of supply chain performance improvement—enhanced customer service and stronger relationships—tends to be much more difficult to measure. Nonetheless, the vast majority of the participant companies aggressively target enhanced customer satisfaction as a principal goal of SCM.

**Productivity Benefits.** Without doubt, the foremost supply chain benefit cited by the participating companies was cost reduction. This fact corresponds closely with the feeling held by most managers that today's business world is intensely competitive and highly unpredictable (few managers see any respite from these forces). As a

## Table 21
## Benefits of Supply Chain Integration

**Retailer Perspective**:
- Cost savings through better trade relations & innovative practices. Closer to customer. Simplification of operations/network.
- Better profitability via efficiency, optimized organization, & leveraged volumes. Better product flow. Preferred customer status.
- Customer satisfaction & loyalty. Increased velocity of materials & money. Network optimization & bottleneck elimination.
- Lower end-to-end costs. Reduced stockouts & mark downs. Shorter cycles & better forecasts. Customer of choice.
- Improved in-stock position. Improved inventory turn & ROI. Improved customer service. Right product at right time.
- Cost reductions & strengthened margins. Higher in-stock level of a broader range of high-quality, desirable products.
- Get everyone on the same page. Better forecast accuracy. Shorter cycles, faster turns, fewer stockouts, & lower costs.
- 25-50% decrease in reorder lead time. 50% increase in on-time delivery. Better cross-functional communication. Cost control.
- Better in-stock performance. Lower product costs & faster turns. Improved planning/better communication with SC members.
- Improved inventory productivity. Enhanced customer service—better in-stock to promotion. Greater customer loyalty.
- Enhanced profitability. Deliver customer/shareholder value. Reduced delivered costs. Better inventory management.
- Value-added coordination. Consolidation & reduced transaction costs. Logistical efficiencies & customer satisfaction.
- Shorter cycles from suppliers. The right product on the shelf. Higher margins & reduced markdowns. Higher stock price.

**Finished Goods Assembler Perspective**:
- Cost reductions accompanied by reduced materials delivery lead times. Achieve the Spirit of the "7-rights" statement.
- Better service—shorter cycles & complete orders. Reduced inventory. Better global resource mgmt. Better SC info. sharing.
- Greater customer responsiveness. Doubled inventory turns. Better fill rates/knowledge. A common template across divisions.
- Cost reduction. Lead time reduction (goal is 60%). Leveraged commonality & better communication with suppliers.
- Improved inventory turns. More rationalized distribution. Quicker delivery to customers. Tailored services/greater trust.
- Better inventory management; e.g., 50% increase in sales with 35% less inventory. Lower costs. Better customer service.
- Better delivery: on-time & complete. Shorter cycles & faster inv. turns, better planning, & more collaboration across depts.
- Doubled inventory turns. Reduced expediting/air freight Better quality & enhanced assembly efficiencies.
- Reduced incoming cycle time & better inventory mgmt while assuring product availability & customer responsiveness.
- Preparing for a new way to do global business. New ideas. Feel that costs are down & service up, but haven't documented.
- Greater inventory productivity. Higher customer service & customization. Compressed cycles & better responsiveness.

**First-Tier Supplier Perspective**:
- Cost reduction & faster inventory turns. Global leverage & better information. Quicker innovation. Customer of choice status.
- Cost reduction & shorter new product launch times. Higher quality. Influence on overall SC/reduce role shifting threat.
- Expanded SC market share at higher margins. Quicker decisions & enhanced efficiency. Better collaboration/relationships.
- Enhanced service & revenue growth. Improved cost structure. Support business units' performance targets/budgets.
- Reduced costs coupled with better delivery & higher levels of customer service. Higher levels of customer loyalty.
- Reduce costs while increasing customer responsiveness. Build "unconstrained" supply team. Enhanced proactiveness.
- 5% per yr. decrease in bill of materials acquisition costs for past decade. Enhanced quality & shorter development times.
- Leverage global volumes. Lower costs, shorter cycles, greater flexibility, & higher customer satisfaction. Process visibility.
- Better communication, lower costs, reduced inv., customer responsiveness, shorter cycles, & faster new product entry.

**Lower-Tier Supplier Perspective**:
- Good relationships & responsive suppliers. Shared info leads to faster cycles. Lower cost, better quality, & more innovation.
- Consolidate buying. Lower total inventory. Consistent on-time deliveries. Development of trust & greater team orientation.

**Service Provider Perspective**:
- Increased switching costs for customers. Better positions self-manufactured products. Tighter relations with "partners."
- Lower costs, greater flexibility, better service, faster cycles, focused investments, learning, & more committed customers.
- Cost reduction: both in unit price & administrative costs. Better global aggregation of volume. More strategic use of time.
- Expanded SC role as service integrator. Higher switching costs. Reduced administrative costs. Trust leads to new business.
- Specialization provides 3PL with reason to exist. Shorter cycles, faster turns, lower cost, superior service. Lower price.
- Greater efficiency & lower costs. Closer relationships & greater cooperation lead to new services & value-added processes.
- Expand services & increase growth/profitability. Higher customer service at lower costs. Better systems visibility.
- Better utilization of assets via closer, more intense relations. Lower cost & better product availability at higher service.
- Cost reduction. Greater information sharing & responsiveness. Elimination of waste increases profits. Better process focus.

result, all but one of the interviewed companies emphasized cost savings as an expected and realized benefit of enhanced supply chain cooperation (see Table 21). The primary source of savings is found in better inventory management—lower overall inventory levels made possible by increased inventory velocity. Companies are achieving the inventory reductions primarily through better forecasting, enhanced information sharing with channel partners, shorter fulfillment cycle times, better logistical support, and, in some cases, through selective SKU rationalization.

Several other areas emerged as ideal opportunities for cost reduction.

- Better commodity planning based on stronger supply relationships
- Better product designs that cost less (in both materials and assembly)
- Better trade relations and lower transactions costs
- Enhanced asset utilization via shared resources and more open information exchange
- Increased purchase volume via consolidating common purchases across organizational units
- Optimized organizational designs achieved through rationalized production and distribution networks
- Reduced administrative costs
- Reduced expediting and the use of lower-cost transportation options
- Reduced stockouts and fewer markdowns
- Transportation system rationalization (reduced empty backhauls, consolidated shiptments, milk runs)

Information, logistics, and closer relationships are proving to be more than just adequate substitutes for inventory. They are making it possible to design more efficient value-added processes and optimized manufacturing and logistical networks. At the same time, more of the day-to-day work of making and moving the right product to the right place is done according to plan instead of responding to crisis. Closer relationships also foster greater creativity, innovative practices, sharing of assets, and "good" risk taking. The net result is lower overall supply chain costs.

**Customer Service Benefits.** The second most frequently cited SCM benefit is enhanced customer service that leads to higher levels of customer satisfaction and loyalty. Enhanced customer service was almost always tied to delivery performance. Managers appear to equate better SCM with shorter fulfillment lead times, consistent on-time delivery, high fill rates, and complete orders. The goal is to be simultaneously lean while having everything on-hand when it is needed. This desire was reflected strongly in the inventory productivity emphasis discussed above—having exact quantities when needed increases

turns, reduces stock outs, eliminates markdowns, and meets customers' needs. A closely related aspect of improved customer service is the ability to respond quickly to customers' requests. Since perfect anticipation is out of the question, and forecasts are often wrong, a premium is placed on the ability of supply chain members to be flexible and willing to meet unique or special requests. In addition to requiring a customer-focused mindset, supply chain responsiveness demands outstanding manufacturing and logistical flexibility. An extension of responsiveness is the desire for tailored services. Today's customers want to purchase solutions, not just products and services.

Three other dimensions of customer service emerged from the interviews. Managers noted that products and services must be of the highest quality to satisfy customers' needs. Damaged or poorly performing products do not yield long-term satisfaction. Equally important was the need for more rapid product design and introduction. Constant and real innovation are requirements in today's information-driven marketplace. Coordinated promotions and other value-added activities are a final expected benefit of SCM. The key to delivering on these three benefits is the development of closer, more open and trusting relationships coupled with the establishment of integrated systems and processes. When implemented appropriately, SCM enables different channel members to know one another's needs and processes better, creating opportunities to generate new ideas, share information, and redefine roles and responsibilities. For example, supplier certification and development lead to higher quality products produced more efficiently and purchased at lower transactions costs. Likewise, bringing suppliers into the new-product development process at the concept stage reduces communications problems and generates ideas faster than non-collaborative design efforts. Quite simply, better supply chain relationships create understanding and trust that allow the channel partners to take time out of the value-added system while injecting creativity and innovation. The result is to have the right product available at the right time and right place at a lower cost than the competition. For most companies, this performance is the essence of customer service.

It is interesting to note that among retailers and finished goods assemblers, customer service improvements were cited just as frequently and with equal or greater emphasis as were productivity improvements. However, customer service benefits were cited less frequently by managers at first- and lower-tier suppliers as well as by service providers. This finding reflects the tremendous cost and margin pressure currently being experienced among suppliers of both goods and services. As already highlighted, this cost pressure is likely to continue unabated for some time.

**Positioning Benefits.** Most managers tend to believe that loyalty naturally derives from service and satisfaction. While most of the interviewed managers expressed this general sentiment, they also exuded some degree of doubt about the validity of this satisfaction-to-loyalty relationship. Probably the strongest refutation of the idea that loyalty comes from better service is expressed by the comment, "You are only as good as your last performance." Most managers were more subtle in their comments, alluding to the need to establish switching costs or create a relationship or service package that would be viewed as indispensable. Another way managers phrased their desire to change the nature of channel relationships and lock in loyalty is seen in the statements, "We want to become the 'Customer of Choice'," and "We need to achieve preferred customer status." Perhaps this preferred status is the most intangible of all the benefits of supply chain management. It stems from integrated processes and systems as well as from knowledge gained over the life of the relationship. Only about one in five of the interviewed companies are seeking to exploit their supply chain strategies to become indispensable in their respective supply chains.

Overall, most companies that have adopted SCM have done so to simultaneously pursue the dual benefits of reduced costs and increased customer service and loyalty. Gaining intimate customer knowledge, building trust-based relationships, linking information systems, and establishing interdependent manufacturing and logistics processes are the supply chain initiatives that managers are relying on to deliver these benefits.

## Barriers to Effective Supply Chain Integration

As attractive as the potential benefits of supply chain management appear; the barriers to achieving them appear equally ominous. Indeed, a powerful theme among the interviewed managers is that overcoming the barriers to effective SCM is no task for the complacent company. Long-standing policies and traditional practices do not support the supply chain paradigm; yet they are firmly entrenched through organizational cultures and structures. As realists, the interviewed managers recognized that organizational change can be exasperatingly slow. Even so, they conveyed a sense of frustration that some seemingly manageable issues persisted as barriers to greater supply chain collaboration. To more clearly delineate the challenges that impede supply chain integration, the managers were asked to discuss the barriers or roadblocks that they have encountered in their SCM implementation efforts.

**Research Question 5:** What barriers must be overcome to achieve effective supply chain integration? Do perceptions of the barriers vary across channel position?

An overarching barrier to supply chain integration is human nature. More specifically, most people do not like change and seek to avoid it, especially when a change is perceived as threatening. The degree of resistance increases further when the need for change is not readily apparent. Managers noted repeatedly that people throughout their organizations were suspicious of the types of change intimated by SCM and would avoid such changes whenever possible. Much of this resistance is grounded in either misunderstanding or a lack of understanding. That is, most individuals do not have a clear perception of what SCM means to them and their specific jobs. According to several key informants, top management either lacks a clear SCM vision or has failed to articulate one in a way that the rest of the organization understands and relates to. Based on many of the comments, the SCM vision remains fuzzy at best at all levels of the organization. The absence of a clear SCM vision often leads to a poor understanding of what SCM really is in practice, which means that expectations are uncertain. The natural result is resistance to change, and even efforts to forestall any meaningful adoption of supply chain practices. Quite simply, SCM requires big-picture and out-of-the-box thinking coupled with clear, concise, and compelling communication of both the vision and the competitive benefits. Without this, most companies will find it difficult to change individual attitudes, much less change organizational structures and cultures. Numerous substantive barriers to SCM were highlighted throughout the interviews, beginning with the challenge of existing organizations (see Table 22).

**Organizational Culture and Structure.** Every organization that has existed for any length of time has developed an organizational structure with an accompanying culture. This embedded structure and culture becomes either an asset or an anchor when substantive change is attempted. Over one-third of the interviewed managers identified the existing organization as a primary impediment to SCM. A couple of broad issues became apparent: most organizations create distance between decision makers who need to work together to make SCM work and they engender a silo mentality that prevents a holistic vision of the organization. Structural distance coupled with a focus on one's "own little world" make integrative decision making difficult. Managers likewise highlighted several specific organizational challenges. First, many companies have a long history of operating independently and have yet to recognize their dependence on other supply chain members. The culture of independence makes SCM not only appear foreign but also menacing. A sense of vulnerability comes with the thought that the company may not be able to compete as a single entity in tomorrow's marketplace. Second, numerous companies have operated on a decentralized basis with each division or factory acting independently. Bringing

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**Table 22**
**Barriers to Supply Chain Integration**

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**Retailer Perspective:**
- Expanding SCM vision. Lack understanding. Info availability & analysis. Functional conflicts. Network complexity.
- Conflicting functional objectives. Lack mgmt support. Inconsistent measures. Lack "big- picture/out-of-the-box" thinking.
- Resist change; lack of trust. Lack info systems & consistent measures. Conflicting views & experience. SC silos.
- Silo mentality—turf issues. Lack vision—internal/external. Challenge of tradeoff analysis. Metrics, trust, & info. sharing.
- Organizational structure. Counterproductive measures. Inconsistent policies & objectives. Accuracy of forecasts & inv. info.
- Functional conflicts—no single individual controls internal processes. No entity controls entire SC. Tradeoffs. Measures.
- Notion that SCM is inventory mgmt. Lack top mgmt commitment. Turf protection. Design global network. Resources.
- Lack process transparency. Conflicting goals/measures. Turf & tradeoffs. Lack follow through. Employee turnover.
- Lack training; also, need better information systems & data accuracy. Do not deal well with exceptions. Organization.
- Organizational structure & culture. Data integrity. Resistance to change—"gaming the system." Measurement.
- Keeping up with HR needs. Lack skills/experience. Metrics. Disparate info systems. Too many SKUs. Change mindset.
- Inertia. Lack world-class systems. Metrics promote local optimums. Silos. Lack of people & infrastructure in global markets.
- Organizational structure. Functional conflicts. Set procedures. Resist change. Lack SC understanding. Poor measures.

**Finished Goods Assembler Perspective:**
- Organization—group conflict & sub-optimal decisions. Complexity. Where to focus? Conflicting goals & measures.
- Disconnected processes; sub-optimization. Lack supplier trust. Personalities. Tie-in to P&L. Measures. Fear role shifting.
- Too cost focused—failure to focus on customer. Getting buy-in at all levels. Poorly aligned measures. Infrastructure.
- Internal resistance to dramatic change. Incompatible info systems/connectivity. Finding committed suppliers.
- Fiercely decentralized. Turf protection/functional conflicts Non-aligned performance measures. PMs lack of critical SCM skills
- Organization is main barrier. Also, functional conflicts, getting people to see need for change, measurement, & accountability.
- Lack of measurement alignment. Organizational culture. Role definition & process complexity. Lack of information systems.
- Resistance to change. Culture of independence. Organization. Trusting the "black box" of new IT. Conflicting measures.
- Resistance to change—mindset. Lack internal integration. Resource constraints. Poor systems & uncooperative SC members.
- Defining what should be done. Resist change. Lack SCM knowledge. Required IT & relationship investment. Measures.
- Lack IS capabilities. Lack total SC knowledge. Need for process change. Need for common, global performance measures.

**First-Tier Supplier Perspective:**
- Organizational culture & structure. Flavor-of-the-day. Turf protection & conflicting measures. Poor info sharing. NIH mindset.
- Changing culture & organization. Employee buy-in. Poor forecast accuracy; unwilling to share info. Poor systems/measures.
- Lack organizational awareness No imminent need to integrate. Inconsistent measures. Lack of clear roles/responsibilities.
- Decentralized organization. Metrics. Magnitude of change. Top mgmt commitment. Obtaining general buy-in (turf).
- Internal: no shared vision, measures & conflicts, P&L view, & scarce resources. External: mindset, systems, & leverage.
- Alter mindsets. "Chasm between purchasing & mkt." Lack alignment/common goal. Inconsistent metrics. Too busy
- Supplier skepticism—"Do you really walk the walk." Poor communication & lack of trust. Metrics & time constraints.
- Resist change. Lack SC skills. Lack trust. Role definition/shifting. Tradeoff analysis. Complexity. Cash velocity. Policies.
- Lack top mgmt support. Scarce resources/past success. Lack systems, metrics, & discipline. Don't trust suppliers. Turf wars.

**Lower-Tier Supplier Perspective:**
- Counterproductive measures & incentives. Transfer pricing. Organization/turf protection & adversarial view. Channel conflict.
- Changing mindsets, especially engineers. Establishing channel trust. Poor information systems. Time/resource constraints.

**Service Provider Perspective:**
- "Customers want it all" & make "huge" promises 3PLs have to live up to. Employee turnover, changing technology, & turf.
- Effective costing & selling services. Unequal channel power—"customer always has upper hand." Mindset/trust.
- Scarce managerial time. Too many teams. Lack full understanding of costs. Non-supportive metrics. Incompatible IS.
- Resist changed roles. Old practices, processes, & relationships. Challenge to convince customers. Documenting benefits.
- Risks/rewards not shared. Poor SC metrics—lack total SC cost & tradeoffs invisible. Show P&L impact. Poor SC info sharing.
- Counterproductive measures—too much cost emphasis. Lack trust—don't/won't share the right info. SC turf & visibility.
- Entrenched mindsets & resist role shifting. Lack holistic vision & tradeoff ability. Scarce human resources. IT systems.
- Changing mindsets & building trust. Lack holistic view. Focus on own "world." Information sharing, metrics, & leadership.
- Turf protection. P&L focus. Metrics & mgmt support. Lack desire & connectivity to share info. Resource constraints.

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the individual units together to adopt a supply chain perspective is a monumental hurdle. Finally, some organizations have developed very strong functional mindsets. Such an organization might be known as a marketing company or an engineering organization. All key decisions are made from that singular reference point. Once again, the collaborative thinking required by SCM threatens the traditional power of the dominant function. Changing mindsets in this type of organization requires patience and persistence (and perhaps a crisis).

Most organizational structures are firmly entrenched via policy as well as tradition. Change therefore occurs very slowly, when and if it occurs. The challenge is exacerbated when the organization has an established and successful track record (General Motors and Xerox provide prime examples of companies struggling in this area). The bureaucracy that has grown over the years stifles the entrepreneurial spirit, and the "deep pockets" that come with success make it possible for the company to postpone meaningful change. Establishing a supply chain vision supported by a proactive and collaborative organizational structure goes against the grain for many companies. Making the task more difficult is that there really are no clear models for what an agile and efficient supply chain structure should look like. Progressive supply chain companies are therefore likely to continue to experiment with supply-chain champions, task forces, teams, and divisions until one or more successful models emerge.

**Functional Conflicts.** Over 50 percent of the managers specifically emphasized the challenge of conflicting functional objectives. For these managers, functional conflict and its companion, "turf protection," is a fundamental barrier to successful SCM. Functional conflicts are artifacts of traditional organizational structures. Most companies are organized along functional lines. Accounting, finance, logistics, marketing, operations, and purchasing are all housed independently within the firm. The organizational boundaries are often complemented by physical boundaries with each function located on a different floor in a separate building. The problem arises because managers in each function begin to view the firm, and every decision they make, from their own functional perspective to the exclusion of other viewpoints. Decisions are made to achieve the local optimum regardless of their impact on other organizational units. The unfortunate outcome is that the overall system—the firm or the supply chain--is sub-optimized. A figurative tug of war breaks out within the company as each group pulls the firm in the direction that it perceives as best. Overall costs are inflated and customer service is diminished even as each operating unit strives diligently to excel. When problems arise, someone else in the organization is always to blame for making unrealistic promises or imposing undue constraints. The mindset is often so

pervasive that managers from different areas of the company not only fail to recognize the value added in other areas but they often seem to be speaking entirely different languages.

Almost all of the interviewed managers noted that this functional "silo" or "smokestack" phenomenon is widely recognized within their organizations, and has been for a number of years; yet, management has not been able to eradicate it. Managers were quick to suggest several factors that continue to propagate functional conflicts:

1) the absence of a holistic view of the firm
2) disparate operating goals
3) the lack of process transparency
4) poorly defined roles and responsibilities
5) conflicting and counterproductive metrics
6) functionally oriented training and sub-unit loyalty
7) poor communication systems and structures

The combination of these factors creates a rather intractable problem, suggesting that concerted effort and out-of-the-box thinking are going to be needed to make the transition from a functional mindset to a value-added process mentality. Only the highest levels of management are positioned to really tackle the dilemma of functional conflicts.

**Lack of Managerial Commitment.** The lack of managerial commitment was previously discussed in some detail (see Research Question 3); however, numerous managers felt strongly enough about the lack of commitment to reiterate its importance. We, therefore, follow their example. The real challenge here is twofold. First, only top management can address such issues as a lack of vision, reticence to change, organizational structure, functional conflicts, resource allocation, and performance measurement. Without top management support, supply chain initiatives are likely to be relegated to the realm of cosmetic change and/or lip service. Substantive, permanent change including the repositioning of the firm's competencies as well as its supply chain position is nearly impossible. Second, because SCM is inherently cross-functional and integrative, across-the-board buy-in is a necessity. Managers from all areas of the organization have to agree to share information and work together to make SCM a success. Bringing top-level and broad-based commitment together is indeed a tough challenge.

**Processes, Policies, and Procedures.** About a quarter of the managers noted that non-transparent processes, inconsistent policies, and rigid procedures hinder supply chain integration. An organization's processes, policies, and procedures go a long way toward defining the operating and decision-making environments. Poorly designed processes or processes that are not transparent

are difficult to manage for several reasons. There is often no single process owner and specific roles and responsibilities are often inadequately defined. The result is that too many opportunities exist for important "things" to drop through the cracks or for the ball to be dropped during a handoff. Also, there is usually someone else to blame for any mistake. Equally important, when parts of the process are invisible, an accurate and timely tradeoff analysis cannot be reasonably performed. Counterproductive decisions are frequently made at different points in the overall process. Further, without transparent processes and sound tradeoff analysis, processes cannot be efficiently and effectively managed or improved. Integrative decisions are seldom made. Inconsistent policies and rigid procedures also confuse and confound decision making. Managers can easily make counterproductive decisions when guided by inconsistent policies and procedures that relate to and define specific domains. Because companies frequently have policies and procedures that are contradictory or ambiguous, individuals who believe they are acting in accordance with company policy or following established procedure often make poor decisions that add cost or reduce service levels. It is important to remember that policies and procedures in one area of the firm impact performance in other areas of the firm. For example, at one of the interviewed companies, the purchasing policy allowed suppliers to make substitutions when requested items were out of stock. When such shipments arrived at the distribution center for sorting, re-packing, and shipment to individual stores, the discrepancies between the purchase order and the invoice required manual sorting. The increased cost of the manual handling counted against the distribution center's performance. To improve his own performance, the DC manager instituted a policy requiring that orders that do not conform to the PO are sent back to the supplier at the supplier's expense (an additional charge back is also assessed). Senior management failed to evaluate the overall fulfillment process and analyze the total cost of each policy before agreeing to enforce the distribution manager's policy. Unfortunately, the DC policy not only created tension between purchasing and distribution, but potentially alienated suppliers and could lead to stockouts at the retail level. The fact that the suppliers operate with constrained capacity, which they must allocate among competing customers, is an issue that was largely overlooked in resolving the purchasing/distribution dispute. While this example is somewhat extreme, there is little doubt that conflicting, ambiguous, or rigid policies and procedures exist at most companies, reducing decision-making effectiveness.

**Performance Measurement.** According to the interviewed managers, the most prevalent barrier to effective supply chain integration is poor or counterproductive performance measurement. Two distinct aspects of current measurement practice were highlighted as impediments to enhanced collaboration. First, most of the interviewed managers lamented the fact that current measures do not provide the understanding and visibility needed to design and manage cross-functional and inter-organizational processes. Particularly distressing is the inability to accurately cost complex processes. Total costing and activity-based costing are more actively employed, but not at the levels needed to assess the many tradeoffs that arise in process integration. Without better costing, it is difficult to re-engineer business processes in the most efficacious manner. Likewise, evaluating role-shifting opportunities—who should perform which value-added activities along the supply chain—is next to impossible without accurate costing. Managing processes for maximum value-added impact requires better measurement capabilities.

Second, almost four of five managers are at least somewhat discouraged by what they call "inconsistent," "counterproductive," "non-aligned," "non-supportive," or "conflicting" performance measures. The concern among the interviewed managers is that measurement not only influences but drives behavior. Therefore, inconsistent or conflicting measures promote conflictive, and at times combative, behavior. Further, trust cannot exist when two different entities are working from a different script. Poorly aligned measures encourage the silo mentality that so frequently impedes collaboration. Without aligned measures, turf protection abounds and innovative practices are besieged before they have an opportunity to build momentum. Combining poor process visibility with uncooperative behavior can rapidly undermine the best-intended and most sincere integrative efforts.

**Information Sharing.** In the minds of supply chain managers, information deficiencies rank second only to performance measurement as a serious hindrance to supply chain integration. Many managers credit the new information technologies that have emerged in the past 20 years for propelling SCM to the forefront of management strategies. Certainly, information is the conduit that facilitates better relationships and fosters process redesign. Information sharing is vital to integration at all levels. Neither cross-functional process integration nor inter-organizational supply chain integration could proceed very far without shared information. Recognizing this fact, most companies have invested substantial sums of money to build formidable information systems capable of collecting, analyzing, and disseminating accurate, real-time information regarding forecasts, inventory, delivery, quality, and just about anything else a manager could ask for. Unfortunately, most of these companies have found that time and money spent on hardware and software do not necessarily resolve the need for better information sharing.

Many companies have had tremendous difficulty installing new enterprise resource planning systems, which are designed to provide accurate, relevant, and timely information to mangers throughout the organization. Implementation budgets are often exceeded by 100 percent or more. Worse yet, the systems often fail to deliver as promised (or as managers looking for a panacea had hoped). Getting "best-of-breed" systems to communicate with each other can be an equal challenge. Inter-organizational connectivity represents another hurdle. Companies often compete with rivals to get their best suppliers and customers to adopt compatible information technologies. When industry standards do not exist, or are not used, expensive systems cannot connect seamlessly with each other. In some instance, cash poor suppliers opt out of the new technologies (EDI for example) because their customers use different systems. Web-based systems promise to be more user-friendly, but lack the bandwidth needed in many industries. The threat of viruses and hackers also complicates the adoption of internet-driven systems. The simple truth, for now at least, is that current information systems do not provide the connectivity that managers throughout the supply chain want.

Another problem in the area of information exchange is that many managers are simply unwilling to share valuable information. Since some managers view information as power, they hoard needed information. This is particularly true in settings where trust does not abound. Several of the interviewed managers emphasized the point that a lack of willingness to share information is actually a greater barrier to supply chain integration than is poor connectivity. These managers note that it is generally easier to manage technical barriers than it is to manage behavioral issues. A few of the interviewed managers quietly suggested that their greatest problem in implementing some of their new information systems were rooted in people, not technical impasses. For the moment, the dual challenge of connectivity and willingness represents a tangible barrier to supply chain collaboration.

**Lack of Trust.** One word that comes up frequently in discussions of supply chain relationships is trust. Trust is considered a prerequisite to effective supply chain integration. Unfortunately, about one in four managers noted that trust is a rare commodity. Trust is often missing not only between supply chain partners but also within a single organization. The lack of trust is one reason that people are not willing to openly share information. They are inherently worried that the information will be used against them at some future point in time. Two interesting points were highlighted during the interviews. First, suppliers and service providers cited the lack of trust as a critical barrier twice as often as retailers and finished goods assemblers. The pivotal issue here is size and channel power. A typical comment is that "customers

always have the upper hand." Most suppliers feel certain that their customers are more than willing to use leverage to extract lower prices or other performance concessions. Second, several dyadic relationships were included among the interview companies. In each instance, the buying organization expressed the opinion that a highly trusting relationship had been established where risks and rewards were shared on an equal basis. The supplying organization, by contrast, consistently noted that they were at the mercy of the buying company. These managers suggested that trust is best defined by behavior rather than vain promises and hollow slogans. The reality is that trust is very hard to build when the power relationship is asymmetrical.

**Resource Constraints.** Resource constraints represent a serious hurdle in supply chain integration efforts. A frequent refrain was that there simply is not enough time, especially among key managers. The managers who are best positioned to champion supply chain initiatives because of their experience, work ethic, creativity, technical knowledge, and personal credibility are always in high demand. They are often the best managers to champion other high-profile initiatives such as ERP implementation or CPFR program development. More than one manager commented that there are "too many teams" in today's work setting. Another manager noted that downsizing has led to a persistent nightmare—always trying to do more with less. An ancillary threat in this hectic and harried world is that the best people are inclined to burn out, often seeking a change of venue in order to recapture some of their enthusiasm. Another related challenge is the perceived lack of loyalty that permeates the modern work environment. Neither workers nor companies perceive each other as loyal. Even as companies struggle to best utilize the people resources that they have, managers lament that there just are not enough purchasing managers with top-notch skills or that good IS people are hard to find. Of course, the interviewed managers identified other critical resources constraints including capital and technology, but the most prevalent challenge appears to be in managing people—the knowledge asset.

As might be expected, concerns regarding resource constraints were most frequently voiced among suppliers and service providers. Many of these companies are somewhat smaller and suffer more acutely from resource constraints than do their larger counterparts elsewhere in the supply chain. A little more surprising was the fact that almost one-third of the retailers complained about scarce human resources. While turnover among front-line personnel was a major worry, even greater concern was directed at competing for the best managerial and technical talent available. It seems that many retailers lack the glamour and panache to compete with high-tech stars and dynamic web start ups.

**Complexity.** A final barrier to the successful implementation of supply chain strategies is the sheer complexity of most supply chain networks. For any given company, there are several sources of complexity, beginning with the firm's own manufacturing and distribution networks. Designing an effective value-added network that leverages global resources and provides extensive global market coverage is a challenge for most organizations that do business worldwide. The number of stock-keeping units is another source of complexity and confusion. Market pressures produce the tendency to expand product lines to meet the broadest possible range of customer needs. Such product proliferation has led some companies to try to manage over 100,000 different SKUs. From a manufacturing and logistics perspective, SKU proliferation creates innumerable headaches.

A third source of complexity arises as companies attempt to manage the supply base. Most companies have embarked on some form of supply-base reduction program in an effort to simplify this portion of the overall supply chain network. In some cases, companies have reduced their active and approved supply base by 90 percent. However, even as they have reduced their immediate supply base, they have begun to look at second-tier purchasing agreements and other relationships with upstream suppliers, dramatically increasing the potential complexity of managing the supply function. A similar story could be told regarding the customer base. Many companies have begun to classify customers on the basis of volume and profitability, designating some customers as "customers of choice." Few companies have advanced their customer-base rationalization programs as far they have their supply-base reduction efforts. Finally, the typical company is just now beginning to seriously consider rationalizing its transportation and service provider network. Several managers acknowledged that the transportation system represented "a pot of gold," but they quickly noted that they were too busy dealing with the other sources of complexity. Transportation rationalization was consistently a lower priority (managers also noted that they really were not very anxious to tackle what they often described as tangled webs). One final comment—the intricacies of supply chain management are magnified by the fact that multiple relationships can easily exist among any two supply chain partners.

When all of the barriers are surveyed in a single glance, the absolute magnitude of the challenge of supply chain integration can be practically overwhelming. This fact may indeed represent one of the greatest threats to the long-term sustainability of SCM. Intimidated by the number and potency of the barriers, it is likely that more than one company will simply adopt the "supply chain" terminology without any serious attempt at changing core philosophies and practices. Such lip service to the supply chain concept could speed SCM to the acronym junkyard inhabited by many management fads from recent years. Other companies will be tempted to take short cuts in their quest to improve collaboration. The probability that short cuts will lead to the "pot of gold" at the end of supply chain rainbow is minuscule. The managers who were most serious about their companies' supply chain endeavors appear to recognize that a serious price must be paid to surmount the many obstacles to SCM success. Changing mindsets and creating a new organizational infrastructure cannot happen overnight. They also seem encouraged by the belief that the central theme running through most of the barriers—getting people all on the same page—is going to be a launching point for survival and success in the not too distant future.

## Bridges to Effective Supply Chain Integration

As emphasized in the discussion of the survey data, the decision to move forward with a strategic SCM initiative depends on whether managers believe they can put in place mechanisms to bridge the barriers to supply chain collaboration. The interviewed managers were quite optimistic that the tools and practices are available to help companies progress down the path toward supply chain success. In fact, the majority of the identified bridges are the mirror image of the most prevalent barriers (e.g., poorly aligned metrics is the barrier; carefully aligned metrics is the bridge). This reality indicates that managers are cognizant of the barriers and are taking a somewhat targeted and systematic approach to mitigating them. It also suggests that patience and persistence are two critical ingredients to long-term success. Three additional, relatively unique core bridges stand out and merit individual discussion: 1) the need for expansive supply chain education and training, 2) the need to establish credibility and momentum early in the integration process, and 3) the value of formalized coordination and feedback councils. The managers' insight and experience provide the foundation for the discussion related to the sixth research question (see Table 23).

**Research Question 6:** What are the principal bridges to effective supply chain integration; that is, mechanisms, tools, and techniques that facilitate supply chain integration? Are the same mechanisms used throughout the supply chain?

**Education and Training as a Bridge.** Managers across the supply chain point to education and training as vital. Almost half of the managers identified training as one of the singular requirements for long-term SCM implementation success. The need for training extends throughout the company and reaches up and downstream. Senior managers require education on the benefits and potential

**Table 23**
**Bridges to Successful Supply Chain Integration**

**Retailer Perspective**:
• Document processes. Track inv. velocity. "Sell" concepts. IS integration with suppliers. Coordinating sessions w/suppliers.
• ABC/total costing to show value. Upward market groups that sacrifice for overall organization. Aligned measures & trust.
• Evaluate/modify processes. Hire SC mgrs. Align metrics & invest in IT. Show customers benefits of cooperation. Vision.
• Identify priorities & educate managers. Invest in & integrate systems to provide real-time inv. data. Standardize policies.
• VP-level integration sessions. Education. Trust. SC metrics & decision tools. Rigorous supplier selection/certification.
• Educate regarding total costs. Align measures. Create process owners. Increase discipline "to do things right the first time."
• Create a vision of what SCM is & what it can do. Metrics that show progress. Training & education. Defining key processes.
• Build a culture & structure capable of working across functions. Training. Process analysis. Aligned metrics
• Training that shows down-line impact of decisions. Process analysis. Open communication & clear measures.
• Top mgmt commitment. Clearly defined objectives. Metrics/scorecards to track progress & show impact.
• Cross-experienced managers. Co-located managers. Info system investment (migrate to web). Better education/training.
• Education & participation. Invest in infrastructure. Document facts. Process redesign & ownership. Information platforms.
• Credible & high-profile SC champion. Targeted pilot projects. Early successes & personal relationships to change mindsets.

**Finished Goods Assembler Perspective**:
• Creation of Order Mgmt Group. CI training & enhanced/integrated IT systems. Credible SC champion. Clear vision.
• X-functional advisory council & supplier councils. Proactive info. sharing/measurement. Best practices drive learning.
• Creation of Integrated SC Dept. Best-in-class processes. Link measures to objectives. SCM visibility & top mgmt support.
• Create hybrid organization & enterprise-wide commodity teams. Create supply mgmt council. In-house training/university.
• Create clear vision. Implement fair & simple measures. Create dedicated cross-functional account mgmt teams. Trust.
• Formal SC organization with top mgmt support. Common vision supported by training & measures. Make process visible.
• Organizational support—from top down. Integrative measures & better SC assessment. Team processes & success stories.
• Document SCM value-added. Supplier reduction/development. Process standardization. Sr. VP. Logistics. Rationalization.
• Eliminate uncooperative suppliers. Reduce SKUs. Train second-tier suppliers. Common info & better forecasts. SCM teams.
• Education regarding SCM potential & processes—SCM certification. Massive investment in IT systems, including SAP.
• Committed & motivated people. Communicate need for change & what needs to be done. Common vision. Global Measures

**First-Tier Supplier Perspective**:
• Team mindset via training & work conditions. Cross-functional teams. Tie measures to objectives. Build web IT systems.
• Purchasing has greater visibility. Mgmt by objectives has improved goal consensus. Cross-functional supplier selection team.
• Extensive pilot testing. Document results. Use intra/extranets to share info. SC-wide metrics. Join benchmarking groups.
• Document success stories. Benchmark metrics & performance. Global commodity teams. Document procedures.
• Cross-functional teams. Info-sharing/coordination meetings. Key customer account teams. Building trust-based relations.
• SC initiative to increase visibility. Cross-functional teams. Quantify impact. Common vision. Benchmark best practice.
• LT contracts that emphasize continuous improvement. Supplier development teams. SC training & success stories.
• Rationalized logistics. Redesigned organization. Process ownership. Face-to-face communication. Supplier development.
• Supplier process development. Education to sell the need. Early successes and metrics to build credibility. SC champion.

**Lower-Tier Supplier Perspective**:
• Build trust—"do what you say you are going to do." "Yellow Pages" to share supplier performance. Upgrade IT systems.
• Increase communication, especially face to face. Align goals across organization. Early team success. New IT system.

**Service Provider Perspective**:
• ABC costing. Better info systems, including SAP & EDI. LT contracts, VMI up/downstream. Emphasize relationships.
• Open communication—daily & weekly coordination meetings. Employee empowerment. Accurate costing/metrics. Trust.
• Create SC vision, build & share success stories. Leadership & follow through. Validate value-added. SC metrics.
• Viable plan. Early successes. Cross-functional cooperation. Clear communication to build trust. Know customer needs.
• Education & skill building. Performance plans that set goals & link compensation. Provide SC tools, data, & metrics.
• Focus on LT & mutual value added (de-emphasize cost). Emphasis on solutions. Training, metrics, & communication.
• Strong culture that helps people succeed. Careful hiring & extensive training. Aligned partners & technology development.
• Pilot studies to quantify benefit. Development of unique service. Improve IT systems & metrics. Invest in national capacity.
• Need better education within firm & SC. Need a champion with credibility & clout. Need more resources. Better metrics.

competitive impact of SCM. The goal of the education effort at this level is to generate support for SCM proposals and provide the context from which senior management will establish priorities and allocate resources. Middle management is also targeted for education regarding SCM with the goal of diminishing the reticence (and hostility) that is frequently directed toward integrative efforts. The interviewed managers also noted that middle managers need to broaden their horizons through increased participation on cross-functional teams and other activities that provide exposure to the value-added activities that take place outside their own domain. The manager who possesses strong expertise in a chosen field, yet speaks the language of colleagues in other functional areas and recognizes their roles and challenges, is in many respects the ideal middle manager. Because they are rare, such cross-experienced managers are increasingly valued by leading companies. The oft-stated goal for entry level managers is to bring them into a rotation program designed to help them assimilate the skills and mindset of the cross-experienced manager. It is hoped that entry via a rotation program will help acculturate young managers in a way that will help them tear down functional silos. The desire is to develop a cross-functional or process mindset while maintaining strong functional expertise.

Additional training targeting negotiation, team building, process mapping, and total costing is also deemed as useful in helping managers cope with the demands of a supply chain environment. Several participant companies have established in-house universities to both provide educational opportunities and inculcate a culture of lifelong education. Some companies are even augmenting their in-house universities through alliances with accredited state and private universities. Helping people adopt mindsets and build skills for success is viewed as a critical step in achieving supply chain leadership.

The need for education and training extends both up and downstream. For several years, leading companies have been providing some training to valued suppliers, especially in the areas of quality and just-in-time practices. The emphasis on helping selected suppliers build key skills has increased at participant companies. Greater resources are now dedicated to supplier development efforts. The objective is to teach suppliers how to re-engineer processes through a pilot project and then motivate the supplier to utilize the improvement process in other areas of the organization. Suppliers are often inspired to work in a similar fashion with their own suppliers. Such hands-on training is increasingly being supported through formal classroom training. One of the interviewed companies not only invites its suppliers' personnel to participate in the training it provides to its own employees, but is now encouraging key suppliers to

invite some of their most valued suppliers' people to join them in the classroom. This training effort creates new skills while fostering better relationships and is an example of win-win thinking.

Customer education is somewhat more rare and typically much less formal than process re-engineering or classroom education. Nonetheless, some leading companies have discovered that they have resources and knowledge their customers lack. By sharing their expertise, they not only promote friendlier relationships but also help their customers achieve higher levels of competitiveness. At times, such customer education creates switching costs and locks in loyalty. Developing successful and loyal customers is a solid payback for customer education initiatives. True supply chain leaders realize that sometimes they can best use their own resources to help other members of the supply chain team build the skills needed to prosper in today's fast-paced world.

**Pilot Projects and Success Stories as a Bridge.** Most of the interviewed managers are thoroughly convinced that SCM programs will not sell and implement themselves. Enough organizational inertia exists to require intensive marketing of good supply chain ideas. Targeted pilot programs that can be used to document the value of SCM must then follow the marketing effort. Effective SCM champions recognize the value of using pilot projects to achieve early successes that can be documented and communicated throughout the organization. These success stories are needed to generate momentum and to justify further investment in supply chain efforts. Managers charged with making a pilot project work therefore select pilot projects carefully and do everything they can to assure project success. Assuring success in a supply chain pilot program requires that one or two receptive and trustworthy supply chain "partners" be identified. Strong historical working relationships can make all the difference to the success of a pilot program. One of the participant companies selected a local customer with whom previous innovation and success had been attained for an important pilot of a new forecasting and promotion strategy. By working cooperatively to carefully structure the pilot, impressive results were obtained—dramatically increased sales were supported with a third less inventory. Such results made it relatively easy to sell the program in house and to other customers.

When using pilot programs to establish credibility, it is imperative to document baseline performance so that the value added can be validated. In today's market, a very strong "show me the numbers" mentality exists. Credibility is founded on documented performance. When used appropriately, pilot projects and success stories do two things invaluable to the success of most supply chain initiatives. First, they yield positive results that

can be used to change mindsets, garner broad-based support, and establish momentum. Second, they help establish parameters for what can and should be done. Indeed, well-designed pilot programs are like a laboratory in that they provide valuable insight into new opportunities while revealing likely pitfalls that should be avoided in the future. The combination of success stories and the lessons learned makes judiciously crafted pilot programs a vital bridge to supply chain accomplishment.

**Formal Advisory Councils As a Bridge.** One practice increasingly used to mitigate resistance and facilitate collaboration is the adoption of advisory councils. Leading companies establish senior-level supply chain steering committees to increase cross-functional interaction and establish buy-in for specific initiatives within their own company. At one participant company, the steering committee meets weekly to fulfill the following roles:

- Serve as champion and mentor
- Establish rules of engagement
- Acquire resources
- Provide encouragement and motivation
- Perpetuate rewards and recognition
- Facilitate communication
- Facilitate goal alignment
- Inculcate a customer satisfaction mindset

While the specific roles and responsibilities of steering committees can vary substantially, the members of the committee typically meet in integration sessions to consider and evaluate proposals. Pros and cons are openly discussed as are potential impacts and possible problem areas so that viable proposals can be completely understood, refined, and subsequently promoted. Political battles and resource issues should be addressed by the steering committee. When the steering committee does its job well, implementation cycles for key supply chain initiatives are hastened.

The use of advisory councils is not confined to in-house use. Active supply chain companies establish supplier councils for specific commodities or technologies and use them as sounding boards for new ideas as well as for the dissemination of best practice. At some companies ad hoc and formal coordination meetings with suppliers complement the more structured supplier councils. One company has established a supplier alliance advisory council, which is composed of a dozen senior level company managers and 16 senior executives from highly valued suppliers. The advisory council meets quarterly and acts as a board of directors for the supply-base management process. The council engages and involves the supply base to actively critique and continuously improve the supply acquisition process. One objective is to help the company become a "favored customer with the supply

base." The council also facilitates the sharing of technology and best practices among the supply team. Finally, the council helps plan and participates in the annual supplier conference. In recent years, feedback from the supplier advisory council has led to

- earlier supplier involvement in product and process design, especially among the engineering teams
- better corporate-to-corporate communication and a policy of using preferred suppliers first
- enhanced relationships via ERP/EDI/Internet as well as forecast sharing

Customer advisory boards are used in a similar fashion. Representatives from key customers are asked to participate as members of a board that meets together at least annually to provide insight into how the company can better meet vital customer needs. Products, services, and resource-sharing or role-shifting opportunities are the primary focus of these boards. Fewer companies engage their customers in such an advisory role than use supplier councils. It is true that customers can be more difficult to enlist in such activities. None of the interviewed companies have instituted advisory councils comprised of senior-level managers from all three entities—the company, its customers, and its suppliers. Finally, some of the participant companies aggressively pursue opportunities to participate as members of industry-wide benchmarking initiatives for many of the same reasons they employ advisory councils.

**Mirror-Image Bridges.** As the introductory paragraph to this section noted, the majority of the integrative mechanisms or facilitators identified by the interviewed managers are simply the mirror images of specific SCM barriers. Given that each of the barriers was previously discussed in some detail, the related facilitator will only be touched upon briefly in bullet-point format below. The objective is to highlight specific aspects of each bridge that have not been adequately covered in earlier discussions.

- Enhanced performance measurement was the most commonly cited bridge to effective SCM. Because measurement provides understanding and drives behavior, it is absolutely critical to utilize appropriate metrics. Managers' greatest desires in this area are to have metrics that are aligned with corporate and supply chain objectives. They want metrics that are easily understood by everyone and that are both process and supply-chain oriented (e.g., perfect orders, supply chain inventory day's supply, churn factors, cash-to-cash cycle times, etc.). They desperately desire metrics that will capture and document the progress that is being made and that drive learning. In addition, they want metrics that make

tradeoffs visible and processes transparent. They also believe that benchmarking best practice is a vital component of a comprehensive measurement system. With this type of measurement in place, most managers are confident that they can move SCM forward with many fewer headaches.

- Alignment mechanisms are also on the most-wanted list of many supply chain managers. A common supply chain vision that is clearly and forcefully articulated is the starting point. Clearly defined and common objectives that support the vision are likewise called for. Managers also desire standardized policies and consistent operating procedures. With the vision, objectives, policies, and procedures all aligned within the company and to a lessor degree across organizational boundaries, greater consensus would emerge that would facilitate harmonious and synergistic action.

- Organizational redesign is also seen as a prerequisite to creating high-impact supply chains. Many of the interviewed managers favor the creation of an overarching "Integrated Supply Chain Department" or "Order Management Organization" to eliminate the cultural and structural distances that separate the inbound and outbound sides of the organization. Several of the managers commented that the organization structure must reflect the need for cross-functional collaboration. An increased use of cross-functional teams to tackle a myriad of issues from commodity management to supplier selection and development to key account management was also recommended by multiple managers. In essence, managers would like to see the permanency of an end-to-end supply chain department supported by flexible and responsive cross-functional teams.

- Open information sharing and real communication is another highly valued bridge to supply chain success. The interviewed mangers rely heavily on modern information technologies and believe that more investment in information technology will ultimately enhance communication effectiveness, helping to close the gaps that exist in current supply chains. Among the most sought-after information tools are the intra- and extranets that facilitate rapid information exchange. Accurate forecasts and actual production schedules are among the types of information that managers desire most. Also, databases and data mining packages are in high demand to help design optimized networks. Even as more emphasis is placed on technology, several managers expressed a desire for more face-to-face communication. One-on-one interaction and personal relationships are viewed as essential to establishing trust and close working

relationships. Strong relationships are often viewed as the foundation on which the willingness to share sensitive information is built. Joint problem solving, brainstorming, and other continuous improvement communication also depends greatly on people working in close proximity. Managers are working diligently to bring technology, willingness, and relationships together to make better decisions and solve tough problems.

- Process documentation and analysis are needed to make cross-functional processes transparent. Most processes capable of delivering a unique competitive advantage involve many value-added activities that span multiple functions and even cross company boundaries. As a result, no single manager understands, let alone controls, the entire process. This lack of visibility often leads to sub-optimal process performance. The resolution to this problem is simple—make the process visible by mapping it out and documenting key performance requirements and parameters. The information that comes from the mapping and documentation effort can then be used in rigorous process analysis and redesign. Interfaces and tradeoffs are better understood and can be managed proactively. Managers note that three distinct aspects of each value-added process need to be mapped: the materials flow, the information flow, and the financial flow.

- Trust must be established to achieve synergistic relationships and results. As already noted, definitions of trust vary dramatically, depending on which side of the "leverage/power" fence a manager is located. Based on the managers' comments, most companies pay lip service to the ideal of trust without backing up the talk with behavior. To the interviewed managers, trust consists of 1) open information sharing (putting all of the cards on the table), 2) treating the other party as a valued team member all the time, not just selectively, and 3) doing what you say you are going to do every time. Anything short of this is seen as pretense and eventually comes to be viewed as manipulation. Cynicism results.

- Managerial commitment is another requirement for true SCM. All of the interviewed managers believe that active and expressed support at the CEO level would make their jobs easier. Many believe that the establishment of an executive-level position with a supply chain title occupied by a credible supply chain champion is also essential to solidifying SCM as a viable competitive strategy. A receptive ear at the highest levels in the organization is viewed as necessary to overcome the many obstacles to more collaborative working relationships.

- Simplification is the final SCM implementation bridge. Many managers are simply overwhelmed by the mountain that is SCM. Indeed, the average company faces a combinatorial nightmare as it tries to make sense out of its supply chain network. Even the sophisticated computer algorithms operating on the latest and faster computers aggregate or toss out huge quantities of data in order to "optimize" supply chain networks. Thus, many managers argue that the best approach to efficacious supply chain integration is to simplify the network. The elimination of slow-moving SKUs, uncooperative suppliers, unprofitable customers, and redundant facilities offers the promise of manageability to many managers.

The fact that so many of the most mentioned supply chain facilitators are simply the mirror image of the implementation barriers emphasizes the fact that managers have long recognized what needs to be done to achieve integration success. Despite this understanding, the needed bridges are not yet in place and most organizations are struggling to leverage supply chain design and management to achieve sustainable competitive advantage. One of the lessons learned throughout the interviews is that marshaling resources, changing mindsets, and transforming organizations is like moving mountains—it must be done one shovel load at a time. The good news is that most companies have begun the lengthy process of putting in place several of the much-needed SCM implementation bridges that will eventually pave the way to effective collaboration and true supply-chain-based advantage.

## Supply Chain Integration in Practice

It has been said that the three questions of strategy are: "Where are we?" "Where do we want to be?" and "How do we get there?" Because the SCM implementation race more closely resembles a marathon than a 100-meter sprint, it is imperative to periodically evaluate how much progress has been made in "getting to the desired destination." Benchmarking the current state and role of key integrative mechanisms provides the best measuring stick with which to evaluate the status of supply chain strategies. Understanding the emphasis companies place on specific integrative mechanisms together with how they are using resources to build integrative competencies sheds light on the current impact and future potential of SCM strategies. Stated another way, Charles Fine has called supply chain design the ultimate competency (Fine, 1999). However, based on the comments of over 200 managers who are aggressively trying to win the supply chain race, supply chain design is just the first part of the ultimate competency. Design and execution must go together to really utilize SCM as a competitive weapon. The interviewed managers were asked to discuss the direction and development of four resources/mechanisms

that underpin both the design and the execution of supply chain strategies. The four issues examined were 1) performance measurement, 2) information sharing, 3) alliance management, and 4) people management. Their experience in trying to develop and use these resources as effective integrative mechanisms sets the stage for the discussion of the final research question.

Research Question 7: To what extent are supply chain practices really being implemented? Do perceptions of the level of commitment vary by channel position?

**The Status of Performance Measurement.** Inadequate and poorly aligned performance measurement is widely viewed as a critical impediment to synergistic supply chain performance. At the same time, enhanced measurement systems offer support for key initiatives and provide hope for better internal and supply-chain-wide alignment. Performance measurement practice, in many respects, stands at a crossroads—managers know they need to change and improve their companies' measurement systems, but they are not sure exactly how to make the needed changes happen. Despite the uncertainty and hesitancy, several very positive steps are being made (see Table 24).

- Supplier scorecards have become the norm among leading companies. Scorecards are intuitively appealing and yield a much more balanced view of overall supplier performance. That is, for most of our lives we have been receiving "report cards" that let us know just where we stand with respect to established standards. We also have developed a knack for using these report cards to help us balance our performance efforts as well as to make performance comparisons. Scorecards thus provide a mechanism not just to evaluate supplier performance but also communicate to suppliers exactly where they stand with regard to critical performance dimensions. The proactive use of scorecards can help focus resource use to drive improvements in performance. A few companies have begun to use customer scorecards to measure relationships performance and to help guide customers' efforts to become "customers of choice."

- Posting scorecards to the internet has reduced the paper trail and provided a low-cost opportunity for companies to more frequently communicate performance levels and expectations to suppliers. Well-designed Web pages also provide an opportunity for suppliers to benchmark their performance to other suppliers in the same product area as well as to best-in-class suppliers across all product areas. The use of the Web provides much greater analysis flexibility

Table 24
The Status of Performance Measurement in SCM

**Retailer Perspective**:
- On-time and fill rate dominate. Also measure success of joint promotions. Would like to increase total costing ability.
- Scorecard uses on-time, fill rate, cycle time, inv levels, & "adaptability." Adaptability drives partner choice. Total landed costs.
- Emphasize supplier compliance. Focus on delivery reliability & fulfillment on line item basis. Internal emphasis on flow times.
- Supplier scorecard updated quarterly & measures gross margin, turn, on-time, & markdown percent. Internal focus on ROI.
- Customer: on-time & damage. Internal: margins & fulfillment. Suppliers: on-time & complete orders. Tradeoff analysis.
- Use supplier scorecard to force rank all major suppliers & drive continuous improvement. 138 item best practice roadmap.
- Supplier scorecards use fill rate, quality, & on-time delivery. Responsive to forecast flexibility. Internally—inv. turns & in-stock.
- On-time complete delivery is critical issue. Measuring SKU rationalization. Would like true landed cost after allowances.
- Supplier measures focus on conformance quality, cost, adaptability, & delivery speed. SC metrics evolving slowly.
- Measures must be tied to goals & show impact of SCM. Scorecard uses on-time & complete shipments. Vendor compliance.
- Web-based, real-time scorecards. Emphasis on cash-to-cash & on-time delivery. Measures must promote behavioral goals.
- Measures focus forward, not back to suppliers. Emphasize consumer fulfillment via store-level in-stock. Lack SC metrics.
- Measure fill rates, on-time, lead time, responsiveness. Use ABC to define total landed cost by product, supplier, & channel.

**Finished Goods Assembler Perspective**:
- Increased measurement emphasis. Keys are quality, cost, on-time delivery, & satisfaction. Lack effective total costing.
- Outbound: schedule attainment by mix & volume. Inbound: scorecard uses quality, cost, & on-time. Measures drive learning.
- Customer measures—on-time & order fill. Evaluate plant mgrs on their customer impact. Continuous cost reduction.
- Scorecard shares status & promotes improvement. Quality, cost, delivery, attitude & technical support. Updated quarterly.
- Replenishment Cycle Time is key. "Metrics are critical! We don't know what the new ones should be, but we need them."
- Use metrics to select suppliers & achieve conformance. Quality (PPM), on-time delivery, eng. support, & SCM commitment.
- Emphasis is on quality & delivery (on-time & complete). No scorecard. "To-be" processes designed for accountability.
- Case fill is all important measure. No use of balanced scorecard. Consistency of metrics vary—SC measures lacking.
- "Perfect order." System to track "total" customer performance. No real satisfaction measure. Inbound: on-time/complete.
- Quality, changeover flexibility, delivery, mgmt infrastructure & human rights. Rankings shared with all suppliers.
- Global measures critical to benchmark & share best practice. EVA based measures throughout organization. "Churn Factor"

**First-Tier Supplier Perspective**:
- Cost, quality, & delivery are focus. Developing comprehensive supplier scorecard. Align internal measures to reduce conflict.
- Quarterly supplier scorecard: cost, quality, delivery, & supplier "support." Response to customer request. Life cycle costing.
- Focused on cost & delivery dependability. Recognition program. Use continuous improvement clauses.
- Lack common supplier metrics--quality, development times & cost. Use marketing scorecard, internal surveys, & CI clauses.
- Quality, cost, delivery, & cutting-edge technology. Comparative performance data is on web. Rigorous target costing.
- Scorecard updated monthly. Quality, on-time, cost reduction & responsive (CT & design). Threshold rising constantly.
- Supplier scorecard drives CIP. Weighted rating of quality, cost, delivery, service, & technology. Quarterly business review.
- Transitioning to process-oriented & SC-oriented measures. Still emphasize traditional cost, quality, & delivery measures.
- Emphasize traditional cost, quality, & delivery measures. Scorecard used to help manage alliances.

**Lower-Tier Supplier Perspective**:
- Emphasize cost & profits. Trying to decrease conflicting measures with distributors. Do not used measures to change culture.
- Quarterly supplier scorecard: cost, fill rate, quality, & on-time delivery. Day-long business reviews. Certify "Dock-to-stock."

**Service Provider Perspective**:
- Fanatical about measurement & accountability. Document all processes. Use ABC costing. Tailor measures to customers.
- Traditional focus on fill rate, inv. turns, & cost. "ABC" costing to evaluate customer profitability. Must demonstrate value.
- Fanatic internal measurement, but not always tied to customer value. Quarterly supplier report card. Monthly business review.
- Standards are fill rates of complete orders, inv. turns, & customer retention. Weekly customer contact. Tailored measures.
- Developing SC supportive metrics. Current focus is on contract performance & contract leakage. Variance performance.
- Critical issues are total cost savings & delivery—on-time, complete orders. Use business reviews & scorecards.
- Cost, variability reduction, flexibility, cycle time, capacity, tracking, & trust. Adopting a TC approach. Business reviews.
- Emphasis on cost & delivery. Focus on internal operations & on meeting customer expectations. No SC-wide measures.
- Experimenting with scorecard: on-time delivery, quality, cost, and ease of doing business. Lack alignment & vision.

and gives suppliers an opportunity to take initiative in identifying performance gaps and in seeking to drive continuous improvement. Providing the same benchmarking information via traditional written reports or face-to-face meetings greatly increases the analysis burden for the buying organization.

- While traditional measures still dominate, most companies are placing much greater emphasis on Total Order Performance (TOP). Companies are taking a balanced approach to measuring performance along five critical dimensions—cost, quality, delivery, responsiveness, and innovation. Failure in any of the areas leads to an unacceptable overall rating. Suppliers know that they must meet the minimum performance level in every area while excelling in one or more areas if they want to be a preferred supplier. This broad-based measurement emphasis is facilitated by the greater use of scorecards.

- Companies are taking a much more proactive approach to the use of measurement. That is, they are using measurement more to drive learning and improvement and less to punish poor performers. The more proactive use of measurement is evident in several areas including 1) selecting world-class and responsive suppliers, 2) supporting recognition programs, 3) benchmarking leading-edge practices, 4) sharing best practice, 5) identifying deficiencies to drive improvement, 6) achieving better internal and inter-organizational alignment, and 7) focusing the organization forward (e.g., via the use of shared technology plans). Advanced companies have even begun to tailor measures to individual supplier and customer needs in order to promote better communication and build stronger relationships. One vital caveat remains. In spite of the change in measurement orientation, many individuals and suppliers still look askance at the measures used to evaluate them. Their skepticism comes from years of experience that has led them to believe that measures are used primarily to "beat" them into submission. They therefore have a tendency to look at changes in measurement with some degree of distrust. Therefore, the use of measurement to promote improvement is a role that will need to be sustained over the long term to change the mindsets of those who are being measured.

- Quarterly business reviews are widely used by companies to more effectively discuss current performance levels and share expectations. These reviews also help refine existing measures and coordinate continuous improvement efforts. At some companies, these business reviews last an entire day and represent a "no holds barred" approach to "putting all of the cards on the table." Real feedback is shared in both directions. Some of the discussions are described as "blunt, even brutal" and real improvement is expected. Such open communication becomes the basis for strong and dynamic relationships that are capable of pushing traditional boundaries and coming up with new ideas and unique products and services.

The downside regarding the current status of performance measurement is that few companies have fully learned how to use measurement to facilitate supply chain understanding and promote aligned value-added behaviors. Most managers continue to report inconsistency among internal measures. The absence of aligned metrics leads to internal squabbling, inefficient resource utilization, and ultimately lower levels of company-wide performance. The same behaviors and outcomes result on a wider scale because of poorly aligned metrics throughout the supply chain. Managers also point out that the development of supply-chain-wide performance measures is progressing slowly. Indeed, supply-chain-wide measures are almost never employed in actual day-to-day practice. Most managers remain unsure which broader measures are appropriate and how to implement them. Some of the measures that have been suggested are defined in Table 25.

Another measurement deficiency arises in the area of costing. Managers want and need better costing methods to help them design processes and manage relationships. Accurate, real-time total costing and activity-based costing methodologies are highly sought after. It was noted that the implementation of ABC costing actually led one company to discover that its "best" preferred customers were actually unprofitable. Tradeoff analysis, role shifting, and supply chain design all rely on accurate costing. Finally, few managers are content with the metrics their company uses to measure customer satisfaction. The increased use of performance scorecards by key customers has helped managers understand what they are being evaluated on and how those evaluations are being conducted. Likewise, the quarterly business reviews provide an opportunity for discerning overall satisfaction levels. Even so, many managers remain somewhat uninformed regarding actual customer satisfaction. This point is illustrated by one company that was visited during the course of the study. The company had won a key customer's supplier-of-the-year award only to be dropped from the preferred supplier list less than a year later. Such occurrences are disconcerting and lead managers to want better access to the minds of their customers.

The decisions individual companies make at the performance measurement crossroads will determine their ability to effectively use measurement as a driver of supply

**Table 25**
**Supply Chain Performance Measures**

| | |
|---|---|
| **Cash-to-Cash Cycle Time:** | The time required to convert a dollar spent to acquire raw materials into a dollar collected for finished product. (Total Inventory Days of Supply + Days Sales Outstanding – Days Payables Outstanding). |
| **Customer Inquiry Resolution Time:** | The average elapsed time required to completely resolve a customer inquiry. |
| **Customer Inquiry Response Time:** | The average elapsed time between receipt of a customer call and connection with the appropriate company representative. |
| **Order Fulfillment Cycle Time:** | The average actual lead times consistently achieved, in calendar days, from customer order to customer delivery. |
| **Perfect Order Fulfillment:** | A perfect order is an order that is delivered complete, on time, in perfect condition, and with accurate and complete documentation. Fulfillment is the percent of orders that are perfect (Perfect orders/Total orders). |
| **SC Inventory Days of Supply:** | Total number of days of inventory required to support the supply chain—from raw materials to the final customer acquisition. |
| **Source/Make Cycle Time:** | The cumulative time to build a shippable product from scratch—if you start with no inventory on hand or on order. Consists of total sourcing lead time, release-to-start build, total build cycle time, and complete build-to-ship time. |
| **Supply-Chain Response Time:** | The number of days required to recognize a major shift in market demand and increase production by 20 percent. |
| **Total Cost:** | The sum of all the costs incurred in planning, designing, sourcing, making, and delivering a product broken down for each member of the supply chain. |
| **Value-Added Productivity:** | Total company revenues generated less the value of externally sourced materials expressed as a ratio of total company headcount. |

chain integration. Many companies will continue to emphasize traditional measures and focus on cost, efficiencies, and measures that derive from financial statements. Other companies will become fanatical about measurement and will work assiduously to design measurement systems that capture the information needed to design and manage world-class supply chains. A couple of the participant companies already describe themselves as measurement fanatics. These companies have caught the vision and recognize the power of measurement to create understanding, guide behavior, and generate outstanding results. They realize that in a world where the performance bar is rising incessantly, measurement practice must improve at an equal pace. Such companies are relatively rare. At the present time, most companies have yet to select the measurement path they will pursue. Their position is summed up by the comments of one manager: "Metrics are critical! We don't know what the new ones should be, but we need them."

**The Status of Information Sharing.** If the question were asked, "What strategic capability receives the greatest managerial attention, and in what area is the greatest financial investment taking place?" the likely answer would be the firm's information capabilities. Fantastic advances in information technologies, both hardware and software, have made information technology an enabler of great change in the way companies organize and conduct business. As a result, information capabilities have become a top priority. The interview findings support the idea that companies are intently focused on upgrading their information-sharing capabilities (see Table 26). While the most visible efforts are certainly in the area of information systems, the interviewed managers made it very clear that the human side of information sharing is perhaps of equal or greater importance. That is, the new technologies allow information to be gathered, manipulated, and disseminated more quickly and in larger quantities than ever before. They thus enable a new level of

communication and decision making that facilitates the re-engineering of many value-added processes. By contrast, the human or personal-contact side of information exchange enhances understanding of supply chain needs, builds trust among decision makers, and creates the willingness that is needed for managers to feel comfortable sharing sensitive information. Only when the technology and human sides of information sharing come together can companies achieve the dramatic benefits that attract the managerial attention and financial investment in the first place.

On the technology side, companies are investing heavily in a variety of software. Most of the investment is targeted at one of the following applications: enterprise resource planning (ERP) systems, warehouse management systems (WMS), transportation management systems, advanced planning and scheduling (APS) systems, satellite tracking systems, computer-assisted ordering systems, database management and mining, electronic data interchange (EDI), intranets and extranets, point of sales tracking systems, and web-based catalogues. These new information applications have impacted every aspect of the order fulfillment process. From tracking inventory status to ordering to picking and packing to shipping to receiving to storing, information systems are used to eliminate uncertainty, reduce inventory, and increase responsiveness to customer requests. In fact, the interviewed managers specifically emphasized the following roles of the new information technologies:

- automated order placement
- electronic funds transfer (payment)
- facility location
- SKU management
- shipment consolidation
- point of sales data capture
- shipment tracking
- customer profiling
- share best practices
- supplier performance monitoring
- computer aided design
- advanced shipment notices
- facility design
- inventory control
- transportation routing
- warehouse management
- automatic replenishment
- product flow-through analysis
- on-line bidding/auctions
- purchasing compliance to policy
- creation of global consortiums/exchanges
- share strategic information (e.g., technology plans)

The more advanced and more optimistic information technology companies have established policies designed to sunset non-electronic orders (from customers and to suppliers). Most of these companies have been heavily invested in EDI for several years and are transitioning as quickly as possible to web-based systems. In fact, proponents of the web forecast that EDI and other electronic systems will be obviated within five years. Of course, some managers are more skeptical and suggest that existing investments combined with limited bandwidth and security concerns will limit the web's attractiveness. Three of the information technology best practices encountered in the interviews include the following:

- The development of web catalogues for all standard buys that occur within a company. Purchasing's role is to select the best suppliers, negotiate beneficial relationships, and then work with the systems people to help design the web catalogue. Once the relationships and the catalogue are in place, purchasing gets out of the way and focuses its time on strategic purchasing issues. Individual end users access the catalogue and make purchases with a simple point and click. Web catalogues have improved service, reduced cost, empowered end users, and increased compliance with respect to the use of preferred suppliers.

- The development of web-based systems that enable suppliers to obtain the latest sales data and up-to-date rolling forecasts. One of the participants has created a "web-pull" system, which has essentially placed the data found in an MRP system on the web for suppliers to use as needed. Suppliers can see real-time inventory levels as well as the timing of expected demand. They can use this information to plan their own production schedules. Another company shares three years of sales history with its suppliers together with an 18-month rolling forecast of demand. Again, this information helps suppliers better utilize their own production capacities while providing higher levels of service to the buying company.

- The establishment of proactive supplier selection policies regarding technology adoption. One manager emphasized that even to be considered as a source, a supplier had to be connected electronically. To achieve preferred status, a supplier had to implement EDI at least one tier backward. As a result of this policy, EDI linkages cascade backwards two tiers for almost 100 percent of the strategic purchases made by the company. This type of policy helps close the gaps that often develop between the first- and second-tier suppliers and facilitates greater chain-wide connectivity.

Despite the huge investments in advanced information systems, a tremendous amount of communication still takes place the old fashioned way; that is, via fax and telephone.

**Table 26**
**The Status of Information Sharing in SCM**

**Retailer Perspective**:
- EDI and WMS provide info back to first-tier suppliers. Significant face-to-face, fax, and phone. Collaborative promotions.
- 95% POs sent via EDI. Some EFT and ASN. Minimal CAO. Considered web, but waiting and watching. A little adversarial.
- IS systems focus on "seamless transitions and handoffs." Supplier orders via phone, fax, and EDI. Customer orders via web.
- Share forecast data with key suppliers. Demand data sketchy at best. System visibility "not there yet."
- Extensive POS feeds automated inv. mgmt. system. 100% EDI connection with suppliers. Web in infancy. Constant phone.
- Use in-house EDI system to share production data. Moving to web. Know where product is at all times. 99.9% accuracy.
- EDI cascades back two tiers. Web interface for customers. Cross-functional teams coordinate internally. SAP in progress.
- 90%+ EDI communication with first tier. Web conversations. Limited CAO. Integrating merged systems.
- IT is decision making and learning enabler. Best-of-breed mindset. Share forecasts/production plans. Moving to web.
- EDI with 5-yr "dream" of web. Member of net exchange. Vendor advisory council as sounding board & meets vendors.
- EDI systems combined with web connects all retail stores, DCs, and key suppliers. Information is the lifeblood of SCM.
- "All the IT needed"—daily POS by item and store (do not share with suppliers). POs via EDI, but do not share strategic info.
- EDI and extranet to share 3-yr history and 18-month forecast. CPFAR pilot test. A lot of face-to-face time with key partners.

**Finished Goods Assembler Perspective**:
- Implementing ERP and engineering systems. Moving to web linkage with suppliers. Lack willingness to share complete info.
- EDI up/downstream. Goal is web catalogue in place within 18 months. Shared forecasts. Joint promotion planning. SAP.
- Belief that all info sharing will be web-based. Working on web-based VMI. Some web sales directly to end customers.
- 75% of suppliers are EDI connected. Production plans shared on 3-month rolling horizon. Intra and extranets are being used.
- Replicated systems led to an emphasis on IT cost reduction. 80%+ of suppliers are EDI or web capable. SAP adoption.
- 85% orders via EDI. Building web capability using AIAG XML standard. Share quarterly forecasts with key suppliers.
- Orders—80% inbound EDI vs. 15% outbound EDI (fax, phone). Web not immediate solution. ASN and EFT. Software enables.
- EDI, fax, phone, and web are all used. Rely on best-of-breed. SAP experimentation. Extranet and CPFAR are new vehicles.
- Total SAP adoption tied to Oracle database for better customer analysis. EDI used and web is envisioned to connect the SC.
- Industry standards have made EDI preferred info-sharing mechanism up/downstream customers. Some fax and telephone.
- SAP too inflexible/difficult to install. Adding APS software. Internet buying exchange. Some web; mostly EDI.

**First-Tier Supplier Perspective:**
- Orders received/placed via fax and some EDI. Some VMI and ESI in NPD projects. On-site info sharing. New ERP.
- Mix of EDI and autofax. Do not like EDI because lack standards. Half IT staff building intra/extranet. Key is personal contact.
- Limited EDI; mostly phone and fax. Experimenting with web. Annual SC top mgmt meetings. Account mgrs know customers.
- 80% of orders via EDI. Migrate to web with new ERP and database technologies. Share forecasts but not actual sales data.
- EDI and web connect up/downstream. Annual supplier conference. Supplier brainstorming. Quarterly business reviews. SAP.
- Annual supplier conference emphasizes shared learning. Phone, fax, EDI, web, and face to face. Web-pull MRP info.
- Face-to-face, phone, fax and EDI. Rolling schedule shared with top suppliers. Moving to web in next year. Electronic catalog
- Phone, fax, and EDI. Executives meet with key customers and suppliers. Feedback to drives CIP. Systems are limiting factor.
- Installing SAP. Forecasts shared on rolling monthly basis. Best practice sharing across organization via quarterly meetings.

**Lower-Tier Supplier Perspective**:
- Acquisitions have led to disparate systems. Adopting SAP. Orders come/go by phone and fax. Partnership review meetings.
- Personal, face-to-face and phone to build trust. Extranet to share production & customer plans. Weekly technical exchange.

**Service Provider Perspective**:
- EDI, linked computer systems, and tailored WMS metrics. Key account mgmt and personal relationships. IT investments.
- Orders—95% customer EDI; 90% supplier EDI. Sunsetting non-electronic orders. Link IS with "key" partners. SAP.
- Fax, phone, web coupled with face-to-face business reviews. Use customer surveys. Willingness is a challenge.
- Quarterly reviews with customers. Proprietary system documents savings. Fax and phone. Web catalogue for 15% of orders.
- Info sharing vital to volume aggregation. Use web catalog. Web system impeded by culture/processes/policies/people.
- Customer visits are critical to knowing customers real needs. Day-to-day via phone, fax, and WMS system. Web in future.
- Phone, fax, EDI, and web. Constant personal communication/frequent performance reviews. Willingness and systems needed.
- Phone, fax, EDI, and face-to-face. Developing a web strategy. IT is key to 3PL success. Satellite tracking and ASNs.
- Phone, EDI, and autofax. Implementing web-based catalogue for customers. Face-to-face very important. Lack willingness.

Several managers noted that they are constantly on the phone with colleagues, customers, or suppliers. For many companies, over half of all communication occurs using these older technologies. At other companies, an interesting technology divergence has occurred—they receive 100 percent of their orders electronically (web or EDI) and transmit 80 percent or more of their orders to suppliers using fax or phone. The emphasis on traditional communication back to suppliers is often a result of the supplier's lack of technology. Many suppliers simply have not had the resources needed to invest in EDI and web systems. Further, they are often faced with the challenge of selecting among multiple standards used by different customers. Rather than make the tough choice, they forgo the investment altogether. Interestingly, several of the interviewed companies that receive customer orders through EDI end up retyping the information into their own computer systems. This reality highlights the challenge of system incompatibility. The lack of compatibility not only deters many supply chain integrative initiatives but confounds companies that have been involved in the recent spate of mergers and acquisitions. Bringing diverse information systems together can be difficult from both technological and political standpoints. For example, one of the interviewed companies decided to phase out the use of an acquired company's superior costing system in favor of its own in-house, weaker system.

On the human side, astute managers recognize that all of the technology in the world does not build solid and synergistic relationships where information is shared frequently and openly. For example, at one retailer, the POS system captures all relevant sales data on a real time basis. However, the retailer does not share any of this data with its suppliers. More bewildering is the fact that this same retailer shares complete shipping data with its third-party logistics providers to help them more efficiently plan their vehicle utilization. Other companies are more than happy to share forecasts with suppliers but hold tenaciously onto actual production plans and strategic information. The willingness to share information is based largely on trust and expected mutual benefit. Achieving trust is something best done face-to-face. Indeed, several managers emphasized the need to increase one-on-one time even though they were in the midst of significant technology investments. Common approaches to relationship building are multifaceted. First, senior-level executives are charged with spending a significant amount of their time—often in excess of 20 percent—meeting with counterparts at key customers and suppliers. Customer and supplier visits made by cross-functional account management and supplier management teams respectively support the high-level contact. These visits do more than help achieve harmonious relationships; they provide key insights into real needs and real opportunities to work together in innovative ways.

Teaming is another common approach to enhancing information sharing. Cross-functional teams are widely used for internal coordination while advisory councils are increasingly used to assure more cohesive and meaningful information exchange up and down the supply chain. Along the same lines, more leading companies are adopting dedicated account management teams to provide a consistent and comfortable interface with their best customers. Looking upstream, supplier conferences are bringing companies together on a more frequent basis to improve relationships, share expectations, and disseminate best practices. The best of the best companies realize that the human aspect of information sharing is every bit as important as implementing advanced technologies and achieving high levels of connectivity. The key word here is sharing—sharing happens only when managers are comfortable with relationships and confident that any shared information will be used appropriately.

At least three caveats regarding modern information sharing should be mentioned. First, ERP systems have become extremely popular in the past several years. Most of the interviewed companies have experienced some difficulty in installing these systems. Time and money budgets are often exceeded by 50 to 100 percent. Several managers commented on the endless nightmare they had endured during the implementation process. Other managers questioned the value of the ERP systems while a few spoke highly of the benefits their companies had attained. Perhaps the most positive report came from a company that had left its existing systems in place, running them in parallel with the newly installed ERP system until all of the bugs had been worked out. A feeling shared by several managers who have been through the process is that while the implementation is painful, they believe there is no realistic option. There were, however, a couple of managers who feel that the best-of-breed philosophy is superior to the integrated ERP approach. Their challenge is getting all of the disparate, functional systems to talk to each other. Thus, the best-of-breed approach is not without problems. Most of the managers hope that web-based systems will emerge in the not too distant future to relegate current, complicated systems to the annals of history. Ultimately, a valid concern voiced on occasion is that these expensive, hard-to-implement systems are not the silver-bullet or panacea to the companies' information dilemma. Too many companies seem to be caught in either a shiny-hardware syndrome or a follow-the-competition mentality. Either philosophy hampers the successful implementation of a capable information system.

Second, global net exchanges such as the ones instituted by Ford, General Motors, and DaimlerChrysler as well as Carrefours and Sears are often perceived as the wave of the future. Net exchanges have now appeared in

numerous industries. Several of the interviewed companies are active participants in these exchanges. Two concerns are that 1) the mechanics (technical and philosophical) are much more complicated that they initially appear and 2) the shared leverage will eliminate cross-profit subsidization, threatening the lead company's overall competitive advantage. Perhaps the second issue is the one least often considered in the trade press. The bottom line is that large companies often are able to utilize their market positions to extract lower prices from their suppliers. In order to maintain some semblance of a profit margin, the suppliers invariably charge other customers slightly higher prices. When all of the key finished goods assemblers and their best suppliers are pooling their purchases to achieve maximum buying leverage, there is no one left to charge the higher prices. The supplier either has to live on an incredibly thin margin or go out of business. At the same time, all of the members of the exchange end up paying the same basic price for components, eliminating any competitive advantage that comes from superior purchasing practice. One fewer weapon is left available for use in tomorrow's competitive battle. These realities increase the political rhetoric and jockeying for position that is taking place as these net exchanges are being developed. Companies with adequate market power and efficient technological and purchasing practices are likely to continue to opt out of the net exchanges.

Third, the advent of the world wide web has created opportunities to alter the dynamics of channel power. Power has consistently shifted downstream toward the end consumer over the past 20 years. Whereas Procter & Gamble once dominated its supply chain, Wal-Mart is the new channel captain. However, with the web, finished goods assemblers and packaged goods producers can take their products directly to the end users of their products. This ability creates the opportunity to develop alternative, parallel channels. Of course, this option comes with plenty of risk. Few companies are willing to alienate current channel partners to experiment with an unproven technology. Home Depot was betting on this inherent fear when it sent out letters to its suppliers warning them not to use the web to take their products directly to consumers. Home Depot's threat was straightforward—if you use the web to bypass us, we will stop carrying your product; therefore, make a careful choice as to which channel you want to sell through. One of the participant companies was emphatic in its response to the potential for its suppliers to bypass it and go directly to the consumer. The manager stated, "We hold the hammer and will use it if necessary. We will not tolerate our suppliers using the web to bypass us." Another risk encountered by a participant company involves alienating internal sales people who are likely to lose commissions if products are sold directly to customers via the web.

Despite these inherent risks, several managers commented that their companies are exploring role shifting and complete disintermediation strategies.

All of the interviewed companies look forward to a future where seamless information exchange is possible. Each is pursuing its own unique course in its quest to obtain this goal ahead of the competition. One key to success is to carefully evaluate and adopt new technologies based on their own merits and their implicit fit with the company's specific needs and situation. "Me-too" technology strategies tend to be expensive and seldom deliver as hoped for or as promised by the software providers and the installation consultants. In fact, a consistent disappointment expressed by the interviewed managers was the challenge of truly gauging a system's installed performance since the consultants constantly "oversold and under delivered." A second key to success is to find and/or cultivate receptive managers who are comfortable with the new technologies and are disposed to sharing information openly. People's willingness to communicate openly and honestly is either the bridge or the barrier to seamless information sharing. In short, connectivity and willingness must come together for information to bridge the gaps that currently exist in modern supply chains.

**The Status of Alliance Management.** One point regarding the present status of alliance management in today's supply chain world is clear—truly synergistic relationships are very rare (see Table 27). When interviewees were asked to indicate the percent of their supply chain relationships that are true alliances, two responses were commonly heard. First, several managers quickly asked, "What do you mean by alliance?" This response revealed the fact that the word alliance is used to signify a wide range of relationship types. Second, many managers indicated a rather large percentage of relationships operate on an alliance basis. The interviewer then followed-up by defining an alliance as a collaborative or synergistic relationship that adds value above and beyond what is achievable through simple long-term contracts. When the definition of alliance was clarified and the emphasis was on "cooperatively working together" or "symbiotic relationships," the managers inevitably adjusted their percentage dramatically downward. The end result was that the vast majority of the participants suggest that "synergistic working relationships" represent only a very small fraction of all supply chain relationships—typically 5 percent or less. The reality is that many managers use the word alliance to signify the existence of a long-term contract or the establishment of a technology linkage. Likewise, the word "partner" is often used to describe a certified or preferred supplier or customer.

Managers generally concurred that the distance between "preferred" and "synergistic" is quite large. Building on

strong relationships to establish true alliances is resource intensive and requires the use of a variety of tools and techniques that help evaluate and manage alliances. A dozen alliance management tools and techniques emerged as somewhat important to absolutely essential to the development of synergistic relationships. While most companies ascribe to one or more of the following alliance management techniques, none of the interviewed firms have every one in place.

1) A formal mechanism is used to identify potential alliance partners. "ABC" classification is a tool commonly used by participant companies to define relationship intensity. A continuum that ranges from occasional transactional relationship to synergistic alliance is used to characterize relationship strength. A companion approach is to establish formal guidelines to select alliance partners.

2) Formal guidelines are used to manage established alliances. Once an alliance is initiated, a set of policies and procedures is needed to guide everything from who key contacts will be to how resources will be shared and when investments will take place. The established guidelines should touch on all major aspects of alliance management.

3) Clear roles and responsibilities are defined and communicated. Both sides of an effective alliance must explicitly understand what is expected from them. Defining and stating roles and responsibilities help to make sure that important issues do not "fall between the cracks" and reduces the frequency and magnitude of alliance conflict.

4) Risks and rewards are shared on a mutually acceptable basis. Synergy demands that both sides of an alliance benefit from the relationship—real alliances cannot be one-sided relationships. The need to establish a mechanism for jointly sharing risks and rewards was the second most frequently cited key to alliance success. Managers consistently expressed concern that the company with greatest channel power benefits disproportionately from most supply chain relationships.

5) A problem resolution methodology must be in place. Even in the best of relationships, occasional misunderstandings or breakdowns occur. Successful alliances have an established and agreed-to approach to evaluate and resolve any problems that arise.

6) Clear and concise long-term contracts govern most successful alliances. Long-term contracts often run one to five years (a few contractual relationships of up to 10 years were found). One manager called a

clear contract "the key" to alliance success. Long-term contracts that guarantee a certain amount of business are used more than any other tool to foster strong supply chain relationships.

7) Technology linkages can be used to routinize information exchange. As suggested in previous discussions regarding information sharing, the connective technology must be supported by a policy promoting frequent, honest, and open information sharing. Establishing a formal information-sharing policy helps promote the efficient and willing exchange of accurate and relevant information between alliance partners. Information sharing facilitates trust-based relationships and is the third most frequently cited key to alliance success.

8) Confidentiality agreements are used to protect proprietary technologies and processes. Excellent companies like to partner with excellent companies. Further, most companies that have achieved a reputation for excellence have developed unique technologies or competencies that they are anxious to protect. Therefore, confidentiality agreements are considered a requirement for collaborative relationships. The agreements should specify how any jointly developed technology will be used in the future.

9) A rigorous measurement alignment methodology helps keep alliance partners "on the same page." Partners need to know how they are being evaluated as well as how they are actually performing. When both sides of an alliance use consistent measures to evaluate their own and each other's performance, problems can be identified before they become crises. Fewer misunderstandings arise and lower-cost corrective action can often be initiated.

10) Continuous improvement clauses have become standard in most supply alliances. Companies want a commitment from their partners that assures continued superior performance over the duration of relationship. Improvement clauses target cost, quality, delivery, and innovation performance and specify both rewards and penalties. For example, increased volumes are often tied to improvement.

11) Dedicated alliance relations teams are increasingly used to foster "personal" relationships and establish continuity between alliance partners. Knowing the people on the other side of the relationship facilitates communication while reducing the time needed for problem solving and brainstorming activities. Dedicating resources to a relationship also demonstrates commitment and helps establish trust.

**Table 27**
**The Status of Alliance Management in SCM**

**Retailer Perspective**:
- 1% synergistic supply alliances. Higher percent with customers—provide training and programs. Clear roles & responsibilities.
- 1% "high-quality" alliances—collaborate on continuous improvement. Formal guidelines to select allies. Share risks/rewards.
- Velocity strategies require tight interfaces. Information intensive. Most important alliance capability is perseverance.
- Limited synergistic activities. Some role shifting; i.e., inspect product on-site at suppliers. Share info and trust building.
- Very small percent synergistic. Rely on size to motivate— "They need us." Issue resolution and better info. sharing are key.
- 10%+ close relationships. Do not enter into LT contracts or volume promises. First right of refusal. "We know each other."
- Few synergistic alliances. Many VMI relationships. Keys are trust, IT linkage, shared vision, and understand "our business."
- 10% at some stage of alliance development. Trust, recognizing mutual objectives, & info sharing are key. "Walk the talk."
- 7 true alliances among 50 "A" suppliers. Trust and cooperative problem solving. Share rewards. Protect supplier technologies.
- Small percent; i.e., 1%. "ABC" classification. Dedicated vendor relations team. Provide third-party consulting. EDI linkage.
- Focus on 3PLs and "A" first-tier suppliers. Share real-time performance status. Coordinate plans and products.
- No synergistic alliances. Largest customer for most suppliers—use leverage. Do not share info. Use LT contracts with 3PLs.
- 5% synergistic alliances. Key word to describe alliances is "jointly." Jointly share info, set goals, measure, take costs out.

**Finished Goods Assembler Perspective**:
- Only 3 synergistic alliances among 1,000+ relationships. ABC classify. Need more trust & info sharing. Good contract is key.
- Know "capacities, capabilities, & constraints of 'A' suppliers." Limited synergies. Dedicated teams for key customers.
- Do not build supplier alliances; focus is on customer alliances. Use 3-5 year supplier contracts with improvement clauses.
- 3% suppliers are "Partners" —1% synergistic. Joint cost, quality, & design efforts. Continuous supplier improvement & trust.
- "Business Partners" on customer side. Building closer supply relationships. True alliances small percent of relationships.
- No synergistic alliances. Use LT contracts for 40% of major buys. Supplier commitment key. Deploy 6-sigma training.
- 5%—only partner with ultrahigh performing suppliers. Communication, shared expertise, & process development are critical.
- Few synergistic. Use alliances to experiment. Trust & open communication critical. Share investments in IT & new practices.
- Strong dealer alliances (global customers want to bypass dealers). 5% of suppliers are "partners." Forming 3PL alliances.
- Close working relationships with top suppliers—not symbiotic. Communication & cooperation are key. EDI=partner.
- Alliances cultivated up/downstream & with 3PLs. Steady schedules, info sharing, & creativity are critical. Small percent.

**First-Tier Supplier Perspective**:
- 2% spend with JVs, 75% via LT contracts. 50/50 shared benefits for joint CI projects. 2-4% CI clauses Process development.
- Few synergistic alliances--closer supply relations with top 10%. Supplier development & shared savings. 95% sole source.
- 90% suppliers on LT contracts. Most advanced are "partners." Ad hoc suggestion program. Some shared rewards & risks.
- No development guidelines. Case-by-case analysis at commodity level. Shared savings. Active supplier development.
- Avoid sole sourcing. Tight relations with<3% of suppliers--80% buy & 95% improvement needs. Audit & CI initiative.
- Limited synergistic alliances. Emphasis on dock-to-stock. Supplier alliance council. ESI, shared resources, & joint CIP.
- Limited collaborative alliances. Close relationships with top 60 suppliers (<1%). Defined process, leadership, & trust key.
- Shifting power has reduced trust—customers don't share rewards. Training for second tier customers to pull product into SC.
- Few synergistic alliances. Supplier development. Honesty is key. Share technology roadmaps. Exit criteria set up front.

**Lower-Tier Supplier Perspective**:
- Synergistic alliances rare. One instance of joint research. Keys are trust, cultural fit, mutual dependence, & innovation/ideas.
- <3% up/downstream. Communication/seamless IT link. 95% "A" items LT (3-6 year) contract. Step-down NPD teams.

**Service Provider Perspective**:
- Trust, open info. sharing, clear expectations, tailored services, focus on joint success, & metrics key. Few real alliances.
- Few close allies up/downstream. Interdependence & integrated systems. Tailored services. "Push" key suppliers products.
- No real alliances. Customers "beat us up." Key is to know customers & their customers. Limited supplier development.
- Focus on LT contracts—2/3/5 yr. Value-added key, yet cost reduction dominates. Problem resolution & key account teams.
- Only 3 partnerships (6,000+ suppliers). Supply base divided into four groups. Supply base reduction. Collaboration & trust.
- Small percent (5%). Trust & open communication are key. Excellent performance & tailored services also needed.
- Very few (<1% customers & <3% service suppliers). Keys are cultural fit, mutual gain, LT view, integrative vision, & patience.
- Small percent. Focus on national accounts. Web alliance with competitors. Service alliance to offer one-stop shopping.
- Very limited (<2%). Keys are interdependence, trust, personal relationships, & info sharing, LT contracts & shared expertise.

Alliance councils provide many similar benefits on a larger, less resource-intensive scale.

12) Exit criteria should be spelled out at the very beginning of the relationship. A strong consensus emerged throughout the interviews that even the best of relationships can eventually become one-sided or cease to be mutually beneficial. In the minds of most of the interviewed managers, the long-term seldom means forever. As a rule, managers possess a strong desire to maintain some flexibility through exit clauses.

In addition to the tools and techniques identified by the interviewed managers, numerous less-tangible attributes and philosophies need to be cultivated to support effective alliances. Foremost among these vital "keys" to alliance success is trust. No single word was mentioned more frequently than trust; yet, no concept remained more vaguely defined. Managers seemed to struggle with exact definitions of trust largely because trust has many different connotations. Further, many managers believe the word is overused and misused. In some respects, trust fits the old description of "I'm not sure exactly how to define it, but I know it when I see it." One of the challenges to building trust-based relationships is that trust has numerous antecedents including open and honest information sharing, commitment, clear expectations, and follow through. The passage of time, high levels of actual performance, and the fulfillment of promises also precede trust. Finally, real trust exists only when both sides agree that it does. Relationships that one party describes as trust-based are often viewed as less friendly and less mutually advantageous by the other side.

The attributes listed below were all described as fundamental elements of outstanding alliance relationships. The difficulty in measuring the extent to which each attribute is actually present combined with the lack of a precise formula for developing each attribute creates the air of intangibility. For some of the attributes, the most difficult aspect to measure is the "shared" or "collaborative" nature of the activity. When one partner consistently puts forth 70 percent of the effort and resources while the other contributes only 30 percent, tension is certain to develop. Perhaps the underlying characteristic of all the following attributes is an emphasis on bringing the two parties together to help each achieve greater success than they could alone.

- Collaborative/joint efforts
- Collaborative continuous improvement
- Creativity, innovation, and idea generation
- Cultural fit
- Mutual commitment to the relationship
- Mutual dependence
- Patience and perseverance

- Personal relationships
- Shared vision and objectives
- Trust
- Understanding of each other's businesses
- Willingness to be flexible and tailor services

Efforts to build and leverage effective alliances focus on a variety of collaborative activities. The most frequently used approach to building strong supply-chain relationships is to provide quality and technical assistance. At a couple of the participant companies, channel partners have access to every class or seminar that is offered to internal employees. Leading supply chain companies recognize the need to do everything they can to help build the skills of the entire supply-chain team. An extension on the training motif is the increased use of process development teams to help supply partners dramatically improve their own capabilities. Several companies have dedicated a large portion of their process engineering staffs to assist key suppliers in process redesign efforts. A typical model involves lending a process development team to a supplier for a period of up to three months to work on a specific project. The current process is mapped and actual performance is documented. The process development team then actively engages the supplier's personnel to identify improvement opportunities. As ideas emerge, they are posted and prioritized. Action plans are brainstormed and implemented. Finally, results are quantified. Each person who contributes an idea is acknowledged and rewarded. By the end of the project, not only is the specific process improved but the supplier's employees understand the methodology and are ready and excited to test it out on other processes. Several other collaborative initiatives were described in the course of the interview process.

1) Continuous improvement suggestion programs. At one participant company, suppliers are encouraged to make suggestions for how the buying company can improve its process costs. Every suggestion is reviewed and feedback provided to the supplier within 20 days. When a suggestion is approved, the two companies collaborate to make "it" happen. The first year's savings are shared 50/50. Continuous improvement programs often go beyond cost and quality to target cycle time reduction, tailored services, and new product development.

2) Joint problem solving. Closer relationships facilitate collaborative problem solving. When a problem is discovered, a problem-solving team comprised of buyer and supplier personnel comes together to identify the root cause, brainstorm a resolution, and take action. Joint problem solving also can mitigate the impact of an unexpected disaster. For example, when one of Toyota's suppliers suffered a catastrophic fire

that burned a key facility to the ground, a joint problem solving team was quickly mobilized to get a critical valve back in production. The factory had been the only source of the valve and Toyota only kept four hours worth of inventory on hand. As a result of this joint problem solving, Toyota's auto assembly plants were back on line within a week.

3) Collaborative pilot projects. Alliance relationships often provide the ideal setting to test new programs and validate innovative supply chain ideas. For example, when one participant company began to consider the adoption of Collaborative Planning, Forecasting, and Replenishment (CPFR), it looked to a channel partner that had proven to be a close ally in previous innovative ventures. The two worked closely to pilot test CPFR. The close working relationship removed many of the challenges inherent in the implementation process. The successful pilot test yielded outstanding results that were used to sell CPFR to other customers.

4) Shared resources. Many supply chain initiatives are too costly for a single member of the supply chain to afford to undertake them. On other occasions, a capital constrained supplier cannot make needed investments without assistance from a better funded ally. Under these, and other, circumstances, the sharing of resources between two alliance partners can greatly increase joint competitiveness. Participant companies frequently share technical expertise, financial assistance, personnel, and even third-party consulting services with partners in order to build unique and unsurpassed capabilities.

A natural outcome of supply-chain collaboration is the blurring or redefinition of organizational boundaries. Roles and responsibilities are shifted from one member of the supply chain to another based on who is best positioned to most efficiently and effectively achieve results. A critical caveat for any given company is to make sure that other supply chain members do not develop all of the competencies they possess. When this happens, that company becomes dispensable and can be role-shifted out of the supply chain. Such disintermediation is becoming a real threat and is altering the dynamics of many supply chains. Nevertheless, role shifting in the supply chain has become quite common, especially in the areas of quality control, new product development, and vendor managed replenishment. A fourth area—supplier integrated manufacturing—is much less common, but its potential has captured the imagination of several of the participant managers.

1) Quality Certification. An emphasis on total quality has led to increased supplier certification, shifting the responsibility for quality to the supplier. Qualified suppliers assure acceptable quality performance, eliminating the need for incoming inspection and making dock-to-stock practices possible. Suppliers that cannot meet this quality expectation are eliminated from the supply base. Most of the participant companies employ quality certification programs.

2) Integrated Product Development. A desire to shrink concept-to-market cycle times has led to the use of multi-functional product-development teams, consisting of managers from marketing, research and development, manufacturing, purchasing, and logistics as well as representatives from key suppliers. The inclusion of suppliers on the team is a dramatic shift from traditional buyer/supplier roles. Instead of reacting to the buyer's new product needs after the product design has been set, suppliers bring both process and product technology expertise to the team from the very beginning of the design process. The payoff of changing roles and relationships is higher quality products that are brought to market with dramatically shorter development lead times. While not as popular as supplier certification, leading manufacturers are aggressively pursuing collaborative product development opportunities. At one participant company, a step-down product development approach is used to coordinate entire systems development across three or more tiers of the supply chain.

3) Vendor Managed Replenishment. Key suppliers increasingly locate their personnel on site at their customer's operations to obtain better forecast information. They also monitor inventory levels for their products, place orders, and handle all of the expediting and other issues involved in assuring timely product arrival. In many soft-goods retail settings, suppliers take responsibility for inventory as well as the floor display and promotion of their product. One participant company has developed an automated approach, involving specialized racks fitted with computerized sensors. These racks are located at the customer's facility. As product is withdrawn from the rack, the sensors measure inventory levels and automatically place an order when the reorder point is reached.

4) Supplier Integrated Manufacturing. Turning responsibility for assembly over to the supplier represents the most aggressive effort yet to shift roles in order to reduce costs and shorten cycle times. Dell's use of contract manufacturers and Volkswagen's truck assembly facility in Brazil that relies almost exclusively on suppliers for the assembly of the entire vehicle are the most publicized examples of this type of collaboration.

Alliances are the core building blocks of supply chains. Indeed, they are a microcosm of SCM, embodying and exemplifying many of the principles of channel integration. They not only show what might be possible through effective channel collaboration but they highlight some of the challenges that supply chain proponents can expect to encounter. Insight gained during the interviews offers the following cautions.

1) Too many companies rely on size or channel power to motivate supplier cooperation and, in the minds of suppliers, to extract concessions. One of the participant companies used to have placards over the conference rooms where buyer/supplier negotiations were carried out identifying the rooms as the "Hammer" and "Anvil" conference rooms. The connotations conveyed by these titles were not lost on suppliers' personnel. Two comments were commonly heard throughout the interviews. Customers tended to say, "They need us," when talking about suppliers. By contrast, suppliers often lamented, "They constantly beat us up," when referring to customers. Adversarial buyer/supplier relationships are still plentiful.

2) The power asymmetry that generally prevails in supply chain relationships manifests itself in the manner that companies do (or do not) share risks and rewards. At one participant company, suppliers are expected to hold four weeks of inventory at their production facility. Shared demand forecasts combined with supplier-held inventory assures greater flexibility in meeting unexpected demand surges. In return, the retailer promises to buy up to four weeks of inventory should sales fail to materialize. When a sales forecast proves overly optimistic, the retailer assumes the risk of the inaccurate forecast. At the same time, this company is always positioned to meet surges in demand. This type of risk sharing, unfortunately, is not the norm. Companies that possess greater channel power tend to hold on to a greater proportion of mutually generated benefits. When asked how his company shares rewards, one manager simply said, "We don't do that." A manager at a first-tier supplier shared the same general perception, but from the other side of the "power" fence. He expressed his opinion that a key customer was "very good at sharing risks and rewards. The buyer keeps all of the rewards and passes all of the risks on to us."

3) A company's position within the supply chain often determines how it sees the world as well as how it views role-shifting possibilities. For example, during one interview, a manager suggested that a key com-

pany goal is to increase the percent of product that it essentially holds "on consignment." The goal is to take possession of product at its distribution center and manage it until it is sold, at which time it pays the supplier. This type of "pay at scan" strategy greatly improves the cash-to-cash cycle and asset utilization of the buyer while placing a greater financial burden on the supplier. The manager who shared this objective felt that this new role definition made perfect sense. When the topic of suppliers establishing alternative distribution channels via the internet, the manager reacted passionately, saying, "We would never tolerate that." Fairness is still defined locally and usually in a company's own best interest.

4) Many companies still do not have the supply side in full view; rather, they are focused expressly on the customer. Several managers noted that while their companies aggressively pursue partnerships with valued customers, they do not build supplier alliances. This unbalanced view of the supply chain suggests that supplier capabilities will occasionally be overlooked as companies seek sustainable competitive advantage. For many companies, the supply side is still the lesser of two equals.

5) When it comes to alliance relationships, institutional memories are still very short. Consistently excellent performance is expected. Unfortunately, the notion that a supplier is only as good as its last performance pervades many mindsets. Certainly, commitment to supply chain varies from company to company; however, the general rule is that supply chain relationships are transitory. One company walked away from a relationship that had taken seven years to develop simply because it decided that other suppliers offered lower prices.

6) Most managers are focusing on the notion of appropriateness. Partnering is appropriate in only a very small percentage of relationships. All other relationships are to be managed at much lower levels of resource intensity. The key is to identify the best supply chain "partner" to fulfill a specific need and then establish the appropriate relationship with that company. Appropriateness ranges from adversarial to synergistic.

Companies today are much more aware of opportunities to improve organizational competitiveness through closer, partnership relationships and have moved away from the adversarial model that dominated buyer/supplier relations for much of the 1900s. However, few managers have completely abandoned the notion that channel power can and should be used to advance their companies' positions. The result is that more collaboration is taking place

in modern supply chain relationships, but it is taking place on a selective basis. Managers are willing to pursue tighter buyer/supplier relationships when they perceive that it is in their best interests. Moreover, they are becoming more proficient in utilizing the tools and techniques that foster synergistic relationships. Their companies are also making some progress in assimilating the attributes that will enable more collaborative ventures, but they remain somewhat opportunistic.

**The Status of People Management Practices.** Almost universally, without regard to channel position, managers acknowledged that people are the key to successful supply chain integration (see Table 28). At one company, the Director of Supply Chain Management's slogan is, "People are the bridge or the barrier." Unfortunately, actual practice in the areas of hiring, training, motivating, empowering, measuring, and rewarding people does not support the rhetoric. Leveraging the human resource is often not a priority at companies pursuing supply chain strategies. They are much more focused on implementing the latest technology and teaming with the best channel partners. Indeed, while many organizations embrace technology, efforts to develop human resources are often meager by comparison and poorly structured. Peter Senge has noted, "We know how to invest in technology and machinery, but we're at a loss when it comes to investing in people." (Sherman, 1995) Few training budgets equal those designated for technology despite estimates that systematic and structured investments in training can provide up to twice the return as investments in technology. (Stewart, 1995)

The fact that passionate people creatively engaged in making supply chain integration work are a competitive weapon that is largely overlooked is the fault of top management. Jack Welch, General Electric's chief executive, has consistently noted that one of the most vital jobs of senior management is to develop the people within the organization. Only senior management can create the vision, allocate the resources needed for training, and establish the measurement and reward systems that are critical to injecting passion into the workplace. Senior management has the responsibility to cultivate a work environment where participation is not just encouraged but highly valued; where people are empowered to experiment, take risks, and solve problems; and where constant, life-long learning and the sharing of knowledge is the expectation. As one manager commented, "Changing the culture is the key to leveraging people." Another noted that, "You can't have hierarchical control if you want to be in a SC environment." Inculcating the "right" culture and designing a conducive organizational structure are the responsibility of senior management.

Beyond the need for more proactive leadership, the managers targeted their comments regarding people-management practices on their companies' education and training efforts. Education is needed to create a vision and understanding of SCM as well as to empower people at all levels to become actively engaged in integration and improvement initiatives. A final key issue involved the inherent challenges that thwart even the best efforts to make people the bridge to effective SCM. Focusing initially on the training theme, both methods and topical coverage were considered important. Efforts to build people skills ranged widely from no formal corporate involvement in SCM training to the establishment of corporate universities. The most impressive participant companies have developed extensive training programs that offer 50 to 100 different SCM-related courses. One company works actively with three state governments to jointly sponsor training programs. This company makes its classes available to its employees while encouraging supplier personnel to participate. The invitation has been extended for first-tier suppliers to invite a limited number of second-tier suppliers' personnel to join in a variety of classes. An amazing transition takes place when managers from three tiers of the supply chain find themselves cooperating in a classroom setting. Friendships and understanding emerge that enrich the longer-term business relationships. In addition to providing the actual training, many companies link employee pay to education. As employees build skills and demonstrate new competencies, their compensation is increased. One company even offers stock options for the completion of training. Other training approaches that were highlighted during the interviews included the following:

1)  Rotation programs. Many companies now hire bright young people who have just completed their undergraduate or MBA training and bring them into a cross-functional rotation program. The typical program lasts 18 months to two years and involves four to six different assignments in the areas of purchasing, production, logistics, research and development, marketing, and finance. Some of the programs require that the manager spend one of the rotations on the production or retail floor. All of this training takes place before the manager arrives in the position for which he or she was hired.

2)  Workshops and seminars. Many companies augment their in-house training through week-long seminars offered by universities, consulting companies, and professional associations. These workshops present cutting-edge experience and give the managers an opportunity to benchmark their companies' practices with those of other managers in attendance.

**Table 28**
**The Status of People Management in SCM**

**Retailer Perspective**:
- People success begins with leadership. Extensive senior mgmt education. Tie rewards to results. 360 degree feedback
- Integration training focuses on 3 areas: supplier evaluation, relational mgmt, & use of 3PLs. Lack common vision & passion.
- Active effort to hire SCM mgmt skills externally. Skill building & people development viewed as key, but training not in place.
- In-house university provides training on systems view, process improvement & brand management.
- People are key, but "have been taken out of picture more than they should have been." Working to educate on collaboration.
- Changing culture is key to leveraging people. Training all senior managers in team building. Cross-functional rotations.
- Weekly meeting to coordinate activities & resolve problems. SCM education across senior management.
- People must be educated about the nature of SCM. Customer service training. Some cross-functional teams. Stock options.
- Hire good people, empower them, & hold them accountable. Emphasize individual learning & sharing. Matrix organization.
- People are key—training & trust. Emphasize culture of trust through clear objectives, aligned measures & reliable systems.
- People are key—every individual must be passionate. Daily meetings to review results & coordinate plans/programs.
- Extensive education via workshops, seminars & training rotations. Constant learning via experimentation. Stock options.
- People are a critical barrier. Having trouble changing the mindset, traditional practices, & roles/responsibilities.

**Finished Goods Assembler Perspective**:
- Extensive learning—100s of courses available. Stock options offered for completion of training. Annual development plans.
- Human resource is vital. Need expanded training & empowerment. Making SC visible so people understand tradeoffs.
- People viewed as one of 3 pillars of successful SCM. Training is critical; also, open communication & trust.
- SCM requires competent, secure people. 50+ SCM classes taught in-house & to first-tier suppliers. Expanding to second tier.
- SCM is human resource issue. Everyone must be on same page. Vision, training, & measurement are critical to passion.
- People are viewed as key & recognized as barrier. Few formalized efforts in place to leverage people.
- Must bring right people together on SC teams. Team members must have expertise & credibility. Best practice training.
- People are key; technology is enabler. New SC training program. Cross-experienced managers. Use cross-functional teams.
- People are vital to SCM; therefore, major effort in education, development, & hiring. Cross-functional teams are used.
- Training & motivation are critical. Also, very important to maintain stable (longevity) mgmt team which is cross-experienced.
- People have to "believe it is the right thing to do." "Book club" provides common forum. Computerized training & simulation.

**First-Tier Supplier Perspective**:
- People are bridge/barrier. Training & consistent measures to change mindset/overcome NIH. Cross-functional teaming.
- Training, teaming, shared rewards & work environment key to participation. Use workforce to sell to customers.
- People are source of expertise & provide means for staying in touch with SM members. Strong emphasis on teams.
- Training in area of leading-edge procurement. Provide overall SC visibility. Personal development plans to guide training.
- People are key—must have same vision, receive training, & be held accountable. Cross-functional & commodity teams used.
- Buyers trained to lead supplier development teams. Cross-functional commodity teams. Emphasize shared learning.
- People are bridge or barrier. Teams used to build relationships. In-house university. Training offered to first-tier suppliers.
- Lip service to people as critical. Materials mgr pushing for mentor program. Scarce resources hinder people development.
- Training required to understand process integration & tradeoff analysis. Provide process eng. training to key suppliers.

**Lower-Tier Supplier Perspective**:
- Employee commitment is key. Trust means doing what you say you will do. Reward input; use teams; training.
- "Empower people to do the right thing." "You can't have hierarchical control if you want to be in a SC environment."

**Service Provider Perspective**:
- "People key to 3PL success." Careful hiring & training to build skills & loyalty. Workers are rewarded to share ideas.
- People are critical to tailored services & key account mgmt. Information access & centralized purchasing support field staff.
- People are key. Operate in-house university for training & leadership education. Lack of follow up has led to "cynicism."
- Emphasis on internal collaboration. Better cooperation between sales & operations. Joint problem solving. Mutual respect.
- Project mgmt., problem solving, & teaming skills must improve. Developing training. Promote NAPM/APICS certifications.
- People, especially mgmt talent, are vital to creation of new value-added services. Empowerment & openness/honesty vital.
- Invest in people & passion. Cross train employees. Share knowledge. Life-long training in quality, customers, & technology.
- SC & 3PL service are people driven. High turnover raises costs & reduces training effectiveness. Competition for people.
- People are important, but with 30% annual growth it is difficult to provide training. Key managers are stretched very thin.

3) Computerized training and simulations. Computerized training modules have become popular because they offer a level of flexibility that cannot be matched through more traditional approaches. Whenever managers have 30 minutes to an hour, they can work through a training module at their own pace. Computer simulations also have gained in popularity in recent years. Simulations help make complex tradeoffs more visible, providing a holistic vision of the supply chain that cannot be easily gained otherwise. Many simulations involve competition among teams of managers, creating an opportunity to develop camaraderie and to practice team management skills.

4) Learning through experimentation. A few companies have cultivated a work environment that allows managers to experiment with new approaches to traditional business situations. One company has built some slack time into its production lines specifically so that workers can use that part of the line as a laboratory—testing new assembly techniques to see if the existing system can be improved. This particular company already is recognized as one of the world's most productive and highest-quality manufacturers. Another company actually encourages its employees to fail. That is, people are expected to try things that have never been done before. If the new approach works, then it is documented and shared throughout the organization. If it fails, then the employee is expected to learn enough not to repeat the same mistake.

5) Knowledge sharing. Getting people to share what they know best can help instill a quest for learning throughout the organization. Simple efforts to promote knowledge sharing involve publishing a directory that contains telephone/fax numbers and e-mail addresses so that people can contact each other without wasting time trying to track down a number. Some organizations have set up a web-based directory that contains names and contact data along with information about areas of expertise and current "pet projects." Leading organizations make it a part of each person's job to act as a consultant to other areas of the firm when the need arises. This consulting role helps specialists share their knowledge and promotes a learning organization. Knowledge sharing helps people get to know one another and establish relationships that reduce the transaction costs of collaboration.

6) Professional certifications. Several professional organizations such as the National Association of Purchasing Management, the American Production and Inventory Control Society, and the American Society for Transportation and Logistics maintain certification programs in areas that are very relevant to SCM. Numerous companies pay for membership in these associations and make resources available to help employees prepare for and pass the certification exams. A manager from one of the participant companies actually noted that his company places greater value on being certified than it does on a person having an MBA. Certification develops skills and brings credibility.

Turning to a discussion of training content reveals a great deal about how companies view SCM. Some companies are very focused on building skills for day-to-day decision making in targeted domains such as inventory management, production control, or supplier evaluation. Others take a more expansive view of training and strive to create an overall SCM perspective. The best companies blend the two approaches to instill a sense of purpose and vision while providing a set of skills that can add immediate value. Some of the skill sets that are viewed as most important are listed below.

- Supplier evaluation and selection
- Negotiation
- Systems thinking and analysis
- Team building and management
- Tradeoff analysis
- Quality control
- Benchmarking
- Problem solving
- Computer (basic programs to web design)
- New product development
- Relationship management
- Process improvement and integration
- Brand management
- Customer service
- Costing—ABC, target, and total
- Six Sigma
- Outsourcing and the use of 3PLs
- Process integration
- Cycle time reduction
- Value analysis/value engineering

Of course, a comprehensive list would include hundreds of topics. However, the wish list of skills most often sought after implies that companies are looking for people who have the depth of knowledge to perform as specialists while at the same time understanding the big picture and being able to make decisions that support corporate rather than functional objectives. Supply chain managers need to understand the nature of processes, be able to work in teams, maintain a customer focus, and have the capacity and desire to learn constantly. They need to be proficient analysts and great communicators. And they need to be flexible, willing and able to adopt

new technologies or step out of the box to solve customer problems. One company's education philosophy nearly captures the overall thrust of supply chain skills desired in only a few words—"Lifelong training in customers, quality, and technology."

The objective of corporate supply chain education appears to be to create the "cross-experienced" management team. The intent is to provide managers with an understanding of the roles and challenges inherent to managing diverse value-added activities throughout the organization. A cross-experienced management team facilitates integration, making it possible to build broad-based core competencies. The effort to develop cross-experienced managers begins in the hiring process. A number of companies have developed web-based application processes that help profile potential hires to see if they have the demeanor, aptitude, and skills needed to "fit" the company's needs and culture. Once hired, the manager enters into a cross-functional rotation program like the ones previously described. To continue to inculcate the attitude and skills needed to be a cross-experienced manager, life-long learning is promoted through professional development and periodic assignments to cross-functional task forces and project teams. A truly cross-experienced manager has

1) developed an appreciation for the needs and wants of customers

2) become intimately familiar with the product and the value-added process

3) gained a better perspective of what goes on in the different functional areas and how the functional areas work (or don't work) together to meet organizational goals

4) learned the "language" spoken in each area (in preparation for future intra-organizational communication)

5) established relationships with other managers that will be useful in future decision-making responsibilities

6) developed an appreciation for the workers who make the product or, in the case of service industries, who interface with customers

7) gained an understanding of the role that outside suppliers (both product and service) play in product development, production, and distribution.

As managers become cross-experienced, their ability to make process-oriented decisions as well as work on

supply chain teams improves dramatically. Unfortunately, cross-experienced managers are highly valued and marketable. Cost justifying programs to cultivate cross-experienced managers is difficult when managers change jobs every three to five years. Scare resources compound the problem. One company with a reputation for developing outstanding cross-experienced managers was forced to scale back its training program after competitors made a practice of hiring away newly "minted" managers. Competitors had found that it was easier and less expensive to "headhunt" bright and capable managers than to establish their own training programs.

Effective SCM requires competent, secure people. Finding and/or developing these people is a huge challenge, especially in a world where employment mobility dominates. High turnover rates greatly inflate training costs and reduce training effectiveness. The lack of loyalty (that runs both directions) is perhaps the most prominent impediment to leveraging the human resource as a supply chain facilitator. As alluded to above, many companies would rather hire experienced managers from the outside than develop great managers internally. A second people challenge has emerged from corporate America's penchant for fads. Many companies spend a great deal of time and money looking for the panacea. As one manager said, "There are no silver bullets, but there are a lot of people willing to sell you one." Pursuing the latest technology or newest management philosophy dilutes focus, wastes resources, and diminishes follow through. This lack of follow through has led to "cynicism" among the ranks of many organizations' management teams. Far too many managers now operate with a "show-me-first" attitude and are unwilling to accommodate innovative philosophies, new practices, or modified roles and responsibilities. When people adopt this intransigence, they become barriers to supply chain integration and an entire cultural makeover is required. A third related hurdle is that many companies pay lip service to the importance of the human resource. They talk the talk of people being the most important asset, but in the words of one manager, "They have taken people out of the picture more than they should have been." Simply stated, many managers and workers alike no longer believe that they can make a difference; they do not feel that their experience or passion are valued. They therefore hoard a wealth of ideas that would lead to better products and processes and could greatly increase customer loyalty. A critical resource goes underutilized. The bottom line is that many companies (even highly admired companies) have created an environment where people lack the power to make something happen, but possess the power to keep something from happening.

To summarize, managers across the supply chain believe that important progress toward supply chain integration

is being made. More and better performance measures are being devised and adopted. Information capabilities are improving rapidly. Alliance management skills are being established. And companies are learning how to more fully inject passion back into the decision-making environment. However, the critical systems—information, measurement, reward, and training—needed to advance supply chain practice are still not in place. Most companies have yet to bring all of the bridges to SCM into full focus. Their approaches to SCM are often ad hoc and poorly integrated, lacking the commitment, intensity, and scope to turn supply chain strategies into a sustainable competitive advantage. Integrated supply chains are not yet competing against other supply chain teams. SCM is still in its infancy.

# Conclusions and Implications

To gain a more complete appreciation for the nature of supply chain management and its potential competitive impact, a triangulation methodology was undertaken. A thorough literature review and environmental scan was combined with a cross-functional mail survey and a series of interviews with companies across the supply chain. Based on the totality of the responses, the SCM philosophy of collaborative competition—that is, competing as allied teams of companies—has gained many adherents. Managers tended to view the critical elements of competitive supply chains similarly, regardless of a functional area or channel position. These fundamental building blocks of effective supply chains are closer channel relationships, integrative inter-organizational processes, linked information systems, aligned goals and measures, and cross-experienced managers.

While managers are inclined to agree on the core elements of SCM, an overall supply chain framework has not emerged and supply chain practices have yet to be routinized. Thus, supply chain practice is often ad hoc and fragmented. Multiple companies working cohesively to address supply chain issues are the exception rather than the rule. Few companies effectively deploy and leverage the building blocks to obtain breakthrough advantages. The following paragraphs highlight key findings and then suggest a comprehensive supply chain framework. Finally, a best practices diagnostic is presented.

## Research Questions

This focus study was conducted to answer seven core research questions. Key findings are enumerated and discussed below for each research question.

**Research Question 1:** What is supply chain management in practice?

1)  The theory of SCM is widely recognized across managerial functions and channel positions. Most managers are familiar with the traditional trade press definition of SCM; that is, managing the flow of materials and information from the "suppliers' supplier to the customers' customer." Taking a composite of all the different theoretical definitions encountered during the study yields the following definition:

    > **Supply Chain Management is the collaborative effort of multiple channel members to design, implement, and manage seamless value-added processes to meet the real needs of the end customer. The development and integration of people and technological resources as well as the coordinated management of materials, information, and financial flows underlie successful supply chain integration.**

2)  There is little resemblance between the theory of SCM and actual practice. Nobody is currently managing the entire supply chain from suppliers' supplier to customers' customer. Very few companies have created the "end-to-end" transparency needed to engage in full-fledged SCM. Among the best of the best supply chain companies, integrative practice spans a triad of companies—typically the company plus up and downstream one tier. Close collaboration with a service provider to close the inbound and outbound gaps in the channel is increasingly common. True integration beyond the first tier in either direction is rare. Second-tier purchasing agreements, occasional second-tier supplier audits, and some second-tier training does take place on a selective basis. However, in most instances, the responsibility for managing beyond the first tier is "handed off" to the first tier with only minimal measurement and follow-up.

3) SCM is generally viewed as a critical strategic initiative; however, some cynicism regarding integrative relationships persists. The surveys revealed that a full 20 percent of the survey respondents indicated that their companies had yet to implement any SCM initiatives. The two primary reasons for not adopting SCM are 1) a lack of resources and channel leverage and 2) the lack of managerial support for integrative relationships. Of those respondent companies that had started the SCM journey, nearly 88 percent identified SCM as a vital part of their business strategy. Purchasers seemed to be the most reticent in their endorsement of SCM as a valuable strategy—many continue to operate on the basis of adversarial buyer/supplier relationships that emphasize "price, price, price!" One manager who opted not to complete the survey made the following statement:

> It is my understanding that supply chain integration (SCI) and supply chain management (SCM) extend well beyond vendor certification and get into partnering, information sharing, and innovative exchanges. I am not a proponent of that type of interaction with a supplier and, fortunately for me, my company has not tried to push me in that direction. It is my contention, and 20 years of purchasing experience bear me out, that upper management is most interested in the cost of the item purchased. There is little to no interest in "total cost" or innovative ways to get extra service or quality. I have worked at some large companies such as 16 years with . . . and three years with . . . Currently, I am into my sixth year with a medium sized company. I have also worked for smaller companies such as five years at . . . While the buzzwords flew, when it came down to the final analysis, I was punished if I wasn't buying at the lowest price. Many times management would "assist" me in finding a lower cost supplier. I learned early on that buzzwords were just buzzwords and innovative procurement techniques were only welcome if they lowered the purchase price.

Managers at the interviewed companies are convinced that SCM is vital to long-term competitive success. Even so, they have not yet figured out exactly how to operationalize their SCM strategies. Chain complexity is a major problem. Similarly, most companies participate in multiple supply chains.

Further, defining the boundaries and intensity of specific relationships in a world where multiple relationships exist between the same two companies complicates supply chain design and management. Thus, considerable experimentation can be expected in the next several years as managers attempt to build world-class supply chains despite these significant complications.

4) Dyadic functional interaction along the plan-design-source-build-deliver sequence is greater than exists in the broader arena of cross-functional process integration. This increased interaction bodes well for greater supply chain integration since it is a natural precursor to broader types of integration and to more effective participation on cross-functional teams. Teaming in turn is a basic building block of supply chain initiatives. Organizations that can seamlessly bridge dyadic relationships can invest time and effort in more complex process integration that spans organizational boundaries. Not surprisingly, there is still ample room for improved (more interactive) internal relationships.

5) SCM definitions lack cohesion and visibility; therefore, supply chain strategies lack specificity and reach. SCM definitions vary widely from company to company and even from manager to manager within the same company. Definitions range from "cross-functional process integration within the firm" to "complete forward and backward supply chain integration." Managers need to recognize that just about everyone possesses a unique idea of what SCM really entails. Discussions of SCM strategies must include clear definitions to help everyone read from the same page. This is true both within the firm and among channel members.

6) One of the greatest barriers to effective supply chain integration is the lack of functional integration within an organization. A chasm of significant size exists between the purchasing and marketing sides of most organizations. This chasm often consists of physical and emotional distance and is embedded in the company's organizational structures and culture. At many companies, it is easier to develop cooperative relationships with external supply chain members than it is to break down the silos that exist around individual functions. This is one reason why many firms define SCM as cross-functional process integration—SCM has simply replaced business process re-engineering (BPR) as the acronym of choice. Interestingly, purchasers do not report the same degree of integration engagement taking place within their organizations as either logistics or production managers.

7) Supply chain initiatives are targeted both up and down stream. The acronym SCM could just as easily have been DCM—demand chain management. A third of the interviewed companies have as a primary strategy the integrated management of the customer side of the channel. Purchasing-driven SCM strategies target suppliers while logistics-based SCM initiatives tend to focus on customers. There really is no standard organizational form for supply chain management groups or initiatives. Few companies have managed to link upstream and downstream strategies.

8) World-class supply chain companies never lose sight of customer needs. They have effectively

   • identified key customers
   • evaluated these customers' competitive requirements and critical success factors, and
   • are striving to build processes back into suppliers that will deliver quality and responsiveness at the lowest possible total landed cost.

   Even at these companies, 95 percent of the effort is on the triad of the firm plus one tier up/downstream.

9) Many materials managers continue to view supply chain management as just the latest management fad. In their opinion, the popularity of the term SCM has led many managers to simply add the term supply chain to traditional practices without adopting the mindset or developing the infrastructure that underlie the integrative nature of true SCM. Thus, they believe that the term SCM is beginning to mean "everything and nothing" at the same time. Some of these managers note that their companies either do not value truly cooperative channel relationships or lack the staying power to build long-term supply chain teams.

**Research Question 2:** What factors motivate firms to engage in supply chain arrangements?

1) Two forces drive greater supply chain collaboration: a need to meet the requirements of increasingly demanding customers and a desire to reduce costs to fend off tough competition. Retailers and third-party service providers are more focused on customer needs while finished-goods assemblers and suppliers place greater emphasis on supply chain efficiencies. At many companies, the two motivations co-exist and create a broad-based appeal for supply chain strategies. Companies that believe in and advertise only the cost reduction benefits of supply chain management tend to face greater resistance to change and more skepticism from managers and employees.

SCM can be viewed as just another reason for reducing head count. Thus, it is important to recognize and promote the dual-impact of increased revenues and greater efficiency to garner support and financially justify SCM while keeping supply chain initiatives balanced and targeted.

2) Several additional reasons for adopting SCM include the following:

   • Unyielding and intensifying competition
   • Widespread information availability
   • Greater focus on core competencies
   • Pressure from key customers
   • Rapid and dynamic change in the market
   • Expiring patents and shorter innovation cycles
   • A need to placate Wall Street
   • The threat of disintermediation
   • Economic globalization
   • Competition to link with the best partners
   • Increased reliance on outsourcing
   • Shifting channel power
   • Significant merger activity
   • Technological innovation
   • A desire to share resources
   • Competitive survival

Supply chain champions need to recognize the myriad forces that necessitate greater collaboration and then qualify and quantify them as thoroughly as possible to provide a compelling justification for change. Broad-based rationale supported by sound analysis provides the stirring motivation needed to engage in resource-intensive efforts like SCM. The truth is that objects at rest tend to remain at rest unless a powerful force is applied to move them. The same is true for companies. Supply chain champions need to understand this fact and make the need for change appear imperative and immediate. This need for change becomes the powerful force or significant emotional event required to overcome organizational inertia.

**Research Question 3:** To what extent does organizational support exist for supply chain initiatives?

1) Supply chain initiatives, like other resource-intensive efforts, require tremendous managerial commitment at all organizational levels and across several key functions. The survey data indicate that comprehensive support does not exist. Top management appears to have SCM on the radar screen but does not fully comprehend how, or even perhaps why, to support supply chain initiatives. Likewise, functional support for SCM is not fully in place, especially among marketing, information systems, and manu-

facturing managers. The surveys highlight the lack of complete managerial commitment as a serious obstacle to SCM. Further, a strong functional bias was evident in the data. Each functional area viewed itself as very supportive of SCM while identifying the other functional areas as less engaged or even obstructive. Such parochialism is counterproductive and becomes a stumbling block to SCM implementation.

2) Channel support, both up and downstream, was viewed as hesitant by the functional managers. Doubt and suspicion are the lingering artifacts of adversarial and asymmetric buyer/supplier relationships. Support beyond the first tier diminishes rapidly with efforts to extend collaboration to the suppliers' suppliers or the customers' customers being meager at all but a few advanced companies.

3) Materials managers across the interviewed companies feel strongly about the importance of SCM. They also express frustration concerning the challenge of getting the complete organizational and channel buy-in. They identified four types of support that are requisites for SCM success.

- Top management commitment is needed to establish vision and dedicate resources.
- Broad-based functional support is critical to make "system-wide" decisions and avoid turf wars.
- Structural change facilitates integration, provides momentum, and assures staying power.
- Enthusiastic channel commitment, both up and downstream, is needed to achieve participation.

Obtaining all four types of commitment simultaneously is the ultimate challenge—there always seems to be at least one piece of the commitment puzzle missing. Very few companies believe that they have everyone on board and are organized for long-term success.

4) Efforts to map the supply chain provide a tangible measure of organizational commitment. Only a few of the interviewed companies have created organizational, process, or technology supply chain maps. As a rule, these firms have not used their supply chain maps to systematically analyze channel costs, value propositions, critical success factors, profitability, channel power, or customer linkage. While most mapping efforts stop at the first tier and are used primarily to aggregate purchases, some go further to evaluate role-shifting opportunities and facilitate second-tier purchasing. Most companies are content to manage traditional one-tier relationships and do not aggressively explore opportunities to create unique value-added processes that span the supply chain.

**Research Question 4:** What benefits/outcomes are expected from supply chain integration?

1) The benefits of SCM can be huge and can help a company achieve much higher levels of customer satisfaction at a lower total cost (see Table 29). However, these benefits are far from automatic—they derive from heightened collaboration, which is inherently difficult to achieve and maintain. Unless targeted precisely and managed carefully, early efforts often do not yield immediate benefits. This finding highlights the vital role of well-conceived pilot projects. Ultimately, sustained effort coupled with changed practice is required to obtain impressive benefits. Only a relatively small percent of companies have leveraged supply chain collaboration as a competitive weapon.

2) Each functional area targets a different and unique set of benefits. Purchasers emphasize lower "cost of purchased items," logisticians target "on-time delivery/due-date performance," and production managers identify "reduced order fulfillment lead times" as the most pervasive benefit. Functional managers are interpreting and evaluating supply chain strategies differently. This creates a natural opportunity for organizational friction that may lead to sub-optimal supply chain execution. That is, since individual initiatives are likely to deliver different and uneven benefits to each functional area, obtaining cross-functional buy-in is difficult. A balanced SCM approach that takes disparate functional views into account is needed.

3) Channel position does have an impact on how managers view the benefits of SCM. Among retailers and finished goods assemblers, customer service improvements were cited just as frequently and with equal or greater emphasis as were productivity improvements. However, managers at first- and lower-tier suppliers as well as service providers place much greater emphasis on cost control. These companies are often on "the losing end of stick" and therefore face tremendous cost and margin pressure. Channel power remains an incredibly important weapon and influences the goals and objectives of different members of the supply chain.

4) The opportunity to establish switching costs or create a relationship or service package that is viewed as indispensable is an infrequently discussed but important benefit of supply chain integration. Managers are working diligently to change the nature of channel relationships and lock in loyalty. The goal is to become a "Customer of Choice" or achieve

**Table 29**
**Top Ten Benefits, Barriers, and Bridges to Supply Chain Management**

| Benefits | Barriers | Bridges |
|---|---|---|
| Increased customer responsiveness | Inadequate information sharing | Senior & functional managerial support |
| More consistent on-time delivery | Poor/conflicting measurement | Open & honest information sharing |
| Shorter order fulfillment lead times | Inconsistent operating goals | Accurate & comprehensive measures |
| Reduced inventory costs | Organizational culture & structure | Trust-based, synergistic alliances |
| Better asset utilization | Resistance to change—lack of trust | Supply chain alignment & rationalization |
| Lower cost of purchased items | Poor alliance management practices | Cross-experienced managers |
| Higher product quality | Lack of SC vision/understanding | Process documentation & ownership |
| Ability to handle unexpected events | Lack of managerial commitment | Supply chain education and training |
| Faster product innovation | Constrained resources | Use of supply chain advisory councils |
| Preferred & tailored relationships | No employee passion/empowerment | Effective use of pilot projects |

"preferred customer status." This channel positioning is the most intangible of all the benefits of supply chain management and emerges from integrated processes and systems as well as from knowledge gained over the life of the relationship.

**Research Question 5:** What barriers must be overcome to achieve effective supply chain integration?

1) Human nature is perhaps the most fundamental SCM barrier. People tend to avoid change when possible, and SCM requires abundant, dramatic change in mindset and practice. Moreover, most corporate cultures and organizational structures impede rather than facilitate change. The fact that most companies have failed to articulate a clear supply chain vision exacerbates the problem. People do not understand what SCM really is or how it will affect their jobs. At times, SCM is even viewed as the latest attempt to reduce payrolls. Such uncertainty leads to high levels of SCM resistance.

2) Materials managers see numerous roadblocks on the path to supply chain leadership. The most formidable obstacles are inadequate information systems, deficient and inconsistent performance measures, non-aligned and conflicting objectives, and insufficient alliance management practices. Independent and alone, each of these barriers is a significant threat to successful collaboration. Together, they present a daunting challenge to effective SCM. Other substantive barriers include the following:

- long-standing, inconsistent policies
- entrenched, traditional practices
- absence of trust
- supply chain complexity
- unwillingness to share information

- organizational structures
- lack of managerial commitment
- resource constraints
- incompatible cultures
- poor human resource practices

Overcoming these hurdles requires concerted effort and extensive resource dedication over a sustained time period. SCM is not a quick or easy remedy to a firm's competitive dilemmas.

3) Incompatible or insufficient information systems are consistently blamed for ineffectual supply chain coordination. The reality is that systems and technology represent only half of the information dilemma (and perhaps the easy half). The other half is a strident unwillingness of managers to share information with other members of their own firms or with supply chain partners. The critical need is to bring connectivity and willingness together simultaneously. Managers need to step back and carefully consider both aspects of the information dilemma.

4) Materials managers are frustrated by the fact that to be viable, specific supply chain initiatives need to have an identifiable and quantifiable impact on the bottom line. Such quantification is often a challenge using existing metrics. Further, many managers feel that the greatest benefits accrue in the area of enhanced customer loyalty, which is extremely difficult to tie back into the "P-and-L" statement. The areas that are easiest to quantify—inventory levels and turns, delivery performance, and materials acquisition costs—often receive the greatest implementation emphasis. From the perspective of many managers, balance is sacrificed and many good ideas are stifled by the lack of receptiveness that comes from an "excessive" emphasis on financial measures. Poor measurement practice results in a lack of

decision transparency and counterproductive behavior.

5) Constant "tug of wars" and "turf protection" divert focus and dilute initiative, rendering SCM strategies ineffective. No single mechanism exists to bring an entire organization together in a cohesive fashion. Further, the sheer complexity of supply chain networks almost guarantees that resources will always be tightly constrained, reducing the likelihood that managers will take the time to make the supply chain and its most critical processes visible. The inability to clearly visualize the supply chain and to see the end from the beginning consistently brings managers back to their comfort zones where they continue to make local, sub-optimal decisions.

**Research Question 6:** What are the principal bridges to effective supply chain integration?

1) The last five years have witnessed a lot of talk regarding SCM; however, both the surveys and the interviews revealed that most organizations are not highly advanced in adopting the practices required for SCM success. Vital integration mechanisms have not been widely adopted and the gap between the most advanced companies and their counterparts is growing. Equally important, SCM is sufficiently complex and intricate that no single practice, or set of practices, can effectively ensure collaboration. Long-term SCM success requires a wide range of changes in organizational culture, measurement, practice, and structure. Table 30 lists the top 25 requirements for effective SCM.

2) The facilitator that has been most visible in recent years is information sharing. However, the survey results show that the system side of information sharing lags behind other bridges in effectiveness. Managers continue to be dissatisfied with their systems capabilities. Given the constantly expanding demands for more robust information systems, one question arises; "Will supply chain managers ever be satisfied with the systems that are put in place?" The answer probably is no. Managers rely on technological solutions to supply chain integration. Unfortunately, the technologies are often hard to implement, can be adopted by rivals, and seldom deliver the differential advantage that is sought. Managers naturally end up hoping that the next technological advancement will get the job done. In a sense, they are chasing "a silver bullet." A more balanced and patient approach to SCM is called for.

3) Most of the bridges to effective supply chain integration are essentially the mirror image of the barriers

noted above. For example, the following list matches the barrier and its mirror-image bridge.

| | |
|---|---|
| • lack of managerial commitment | • high levels of managerial commitment |
| • inadequate information systems | • investment in information systems |
| • inadequate performance measurement | • accurate and comprehensive measurement |
| • poor alignment | • common vision and objectives |
| • supply chain complexity | • rationalization and simplification |
| • lack of trust | • trust-based relationships |
| • counterproductive functional organizations | • cross-functional teams & "end-to-end" groups |
| • inaccurate, unreliable forecasts | • accurate, real-time forecasts |
| • unwillingness to share information | • open & honest information sharing |
| • adversarial relationships | • tightly coupled buyer/ supplier relationships |
| • lack of process visibility | • documented & transparent processes |

It is almost impossible to build all of these bridges at once. Priorities must be set based on the importance of the barrier. The survey data reveal that this often does not happen. Bridge building requires early victories to build momentum, garner support, and earn the resources needed to move forward. Ad hoc efforts are not adequate to bridge the gaps that impede effective SCM.

4) Materials managers view the diverse bridges from a distinctly functional perspective, which means they often disagree regarding the appropriateness and effectiveness of any given mechanism. The clear pattern is for managers to favor practices with which they are most familiar because of frequent use in their functional area. Divergent approaches to dealing with integration barriers may become a significant barrier to greater cooperation. Greater effort to define the role and measure the impact of each integrative practice is needed. Likewise, more cross-functional teaming and better dissemination of success stories/program results can foster greater acceptance of unfamiliar integrative practices.

5) Supply chain education and training is one of the singular requirements for long-term implementation success. The need for training extends throughout the company and reaches up and downstream. Senior managers need to understand the benefits, potential competitive impact, and resource requirements of SCM. Functional managers need to

**Table 30**
**Top 25 SCM Requirements Based on Content Analysis of the Interviews**

| Requirement for Effective Supply Chain Integration | Number of Firms |
|---|---|
| Establish information systems capable of sharing real time accurate & relevant information (connectivity) | 44 |
| Establish performance measures that lead to cooperation/collaboration and create visibility | 41 |
| Garner chief executive commitment | 39 |
| Make the rationale and need for integration/change visible—even palpable. | 38 |
| Establish common supply chain vision and objectives | 38 |
| | |
| Inculcate a willingness to share information across functions and between organizations | 35 |
| Establish a high level of trust within the organization as well as with supply chain partners | 35 |
| Obtain senior functional management support | 33 |
| Provide supply chain training throughout the organization/supply chain and then hold people accountable | 33 |
| Define and document business principles, policies, & procedures and map back to value proposition | 30 |
| | |
| Develop a holistic view via supply chain mapping—organization, process, and technology | 29 |
| Identify and leverage commonalities | 29 |
| Find qualified product suppliers & service providers that are committed to continuous improvement | 28 |
| Simplify the network—supply base, customer base, & service providers | 27 |
| Define the appropriate type of relationship to establish with specific SC members | 23 |
| | |
| Develop mechanisms to share learning throughout the organization and the supply chain | 22 |
| Establish cross-functional management and project teams and develop cross-experienced managers. | 22 |
| Establish a revenue-tracking system | 20 |
| Identify and establish ownership of critical value-added processes and core competencies | 20 |
| Define the specific role(s) of individual supply chain members and aggressively pursue role shifting | 20 |
| | |
| Improve forecast accuracy throughout the entire supply chain | 19 |
| Establish a supplier development program via process improvement and product development teams | 18 |
| Design a proactive supplier scorecard-based rating system to drive continuous improvement | 17 |
| Eliminate unnecessary or slow moving SKUs | 16 |
| Determine the supply chain's value proposition | 16 |

The 26th SCM requirement is follow through—SCM is both a journey and a destination, and it does not happen overnight.

understand the objectives and constraints of other functional areas and need to have the analysis skills to identify and evaluate tradeoffs. All managers need to develop a process mindset and benefit from training in negotiation, team building, process mapping, and total costing. Leading companies have long provided quality and process management training to valued suppliers. These same companies are now making their in-house education opportunities available to select customers, suppliers, and service providers. They also promote best practice dissemination through supplier conferences where leading suppliers take on the teaching role. The sharing of expertise among channel members is an important supply chain facilitator that helps the entire supply chain team become more competitive.

6) Steering committees and advisory councils are important mechanisms for reducing resistance and promoting collaboration. Steering committees generally consist of senior-level executives and are used to increase cross-functional interaction and promote acceptance of specific supply chain initiatives within the firm. Advisory councils generally are comprised of important customers or suppliers and act as sounding boards to enhance corporate relations and improve the materials delivery or acquisition process. Advisory councils can also be used for environmental scanning and best practice dissemination. A related practice of participating in industry-wide benchmarking initiatives also facilitates collaborative learning. Proactive companies engage their partners at every opportunity to solve problems and create value.

**Research Question 7:** To what extent are supply chain practices really being implemented?

1) It has been argued that in today's business world, competition is "supply chain versus supply chain." This phrase suggests that companies now form tightly coupled alliances that compete against each other as cohesive teams. The reality is that interdependency among channel members has always existed. Moreover, for the vast majority of today's companies, commitment to supply chain relationships is lacking. Most companies still behave opportunistically. They are willing to change suppliers if supplier performance lags behind. They are willing to walk away from long-term relationships when managers decide that it is in their best immediate interest. They are willing to take unilateral action and use leverage to promote their own agenda. DaimlerChrysler demonstrated this reality when it recently demanded that suppliers reduce prices by 5 percent immediately and by another 10 percent over the next two years. The suppliers' initial response was to just say no. For now it seems that old habits die hard and that when difficulties arise, commitment to team members evaporates. To return to the "TEAM" metaphor, most current supply chain arrangements emphasize the "free agent" clause in the contract.

2) The terminology supply chain management connotes an emphasis on better management of the supply side of the organization. The fact is that the customer side continues to receive more attention and is more clearly in focus than the supply side. Most companies spend more time and dedicate more resources to build strong customer relations than they do to select and develop a world-class supply base. The logistical network is even further out of focus. Companies do not yet know how to bring the supply and demand sides of the organization together and a disparity in power and prestige persists among functional areas of most companies. While purchasing has arrived as an important weapon in many companies' strategic arsenals, it is not the weapon of choice. Simply stated, most companies do not take a holistic approach to SCM.

3) Six integrative mechanisms have been explored as SCM enablers—three have found favor in the eyes of managers and the budgets of companies while the other three have gone underutilized. Information systems, relationship building, and process change have all received significant attention and generous investment over the past decade. By contrast, measurement and people management have perplexed management. Most companies simply do not know how to measure supply chain activities or build a skilled and passionate workforce. As companies have struggled with these other areas, alignment mechanisms have been largely ignored. The critical issue here is that SCM implementations are out of equilibrium—all six mechanisms need to be evaluated up front so that a comprehensive plan of action can be put in place. It is imperative that the human resource not be the overlooked piece in the supply chain puzzle. While they may not be empowered to make SCM happen, people can certainly undercut almost any effort to enhance supply chain collaboration.

4) SCM is truly in its infancy—but materials managers are optimistic. Much progress toward more effective collaboration has been made, but "end-to-end" management of value-added processes is much more a dream than a reality for most companies. Companies are experimenting with each of the integrative mechanisms and have made solid advances in several areas; however, many deficiencies still exist (see Table 31). Until the power of these mechanisms is harnessed to build integrative competencies, companies will continue to approach SCM in an ad hoc manner, vacillating between competitive and collaborative relationships. Instead of becoming cohesive, integrated teams, supply chains will continue to compete as loose coalitions of companies that temporarily join forces to gain advantage through cooperation.

Having looked at key conclusions and implications drawn from the seven research questions, managers should be fully aware that the journey toward supply chain integration is arduous and precarious. They must be very careful to analyze their company's specific competitive position to verify that the journey is worth taking. They must also seriously consider their company's potential to learn and change. Rigid or bureaucratic organizations are unlikely to achieve the benefits of SCM. Experience clearly shows that few companies have been able to devise and implement winning supply chain strategies. The rhetoric surrounding SCM should be tempered by the recognition that benefits do not accrue automatically or immediately. As with many chemical reactions, until the right catalyst is added, progress is slow, and impressive results are not obtained. Without the assurance that the organization is committed to SCM and understands the challenges and requirements associated with SCM, managers may be better off focusing their competitive efforts elsewhere.

Table 31
Current Status of Integrative Mechanisms

| Points of Progress | Integrative Mechanisms | Deficiencies |
|---|---|---|
| Dramatic investments in recent years<br>Widespread ERP implementation<br>Web technologies used; e.g., web catalogues<br>Forecasts & production schedules shared<br>Better database management & mining<br>    Product flow-through analysis<br>    Customer profiling<br>Adopted functional systems applications | **Information Sharing** | Systems incompatibility<br>Cost & difficulty of implementation<br>Unwilling to share strategic information<br>Lack universal standards<br>Viewed as panacea<br>Still lack accurate, timely, relevant info.<br>Lack linkages past first tier<br>Still use fax & phone to place orders |
| Greater efforts to understand customers<br>Tailored services more widely used<br>Greater efforts to train & certify suppliers<br>Use of continuous improvement clauses<br>Use of long-term contracts<br>Alliance management procedure understood<br>Collaborative improvement initiatives | **Alliance Management** | Excessive dependence on leverage<br>Synergistic alliances are rare<br>Alliances viewed as transitory<br>Different definitions/perceptions of trust<br>Do not share risks and rewards<br>Integration usually ends with first tier<br>Alliance management tools not used<br>Institutional memories are short |
| People recognized as vital to SCM<br>Establishment of in-house universities<br>More use of rotation programs<br>Greater emphasis on teaming | **People Management** | High degrees of lip service<br>Creativity of people remains untapped<br>Lack loyalty both ways<br>Meager training budgets<br>Cultures of trust are rare<br>Too much hierarchical control<br>Risk taking discouraged<br>Cynicism is common |
| Increased use of cross-functional teams<br>Early supplier involvement on NPD teams<br>Shared technology maps | **Alignment Initiatives** | Inconsistent operating goals<br>No shared vision/mission<br>Lack common strategic objectives<br>Inconsistent policies & procedures |
| Use of supplier scorecards<br>Broader range of measures used<br>Benchmarking best in class performance<br>More emphasis on Total Order Performance<br>Measurement used to drive learning<br>Tailored metrics to key customers/suppliers<br>Use of quarterly business reviews | **Performance Measurement** | Poorly aligned metrics (internal & SC)<br>Inadequate supplier measurement<br>Do not evaluate customer profitability<br>ABC & total costing not used effectively<br>Lack good SC-wide measures<br>Lack good customer satisfaction metrics<br>Too financial statement oriented |
| Re-engineering through technology<br>More proactive process mapping<br>Some limited role shifting—mostly ad hoc | **Process Integration** | Lack process transparency & ownership<br>Most of the emphasis is internal<br>Difficult to share resources<br>Difficult to value contributions |

## A Framework for Supply Chain Integration

No comprehensive framework for designing and executing a supply chain strategy was discovered during the research. Managers rely either on narrowly targeted and compartmentalized integration programs (ERP, CPFR, VMR, supplier development, etc.) or on ad hoc approaches to achieving the conceptual ideal of creating seamless value-added processes. Such approaches fail to provide the vision and the understanding that is needed to really undertake the monumental task of building an integrated supply chain team. To help promote more systematic efforts to achieve competitive supply chain collaboration, the six-stage framework depicted in Figure 6 was developed. This framework pieces together the key findings from the environmental scan, the cross-functional surveys, and the channel interviews to provide a roadmap for managers to use as they travel the path to supply chain leadership.

### Stage 1: Develop an Overall Understanding of the Supply Chain

The first step in building a cohesive supply chain team is to create a visual image of a company's most important supply chain. This is done via supply chain mapping. Managers need to know who the major players are in the supply chain and what role they play and value they add. For relatively simple supply chains, every major organization that participates in the chain can be shown in the map. For more complex supply chains, some aggregation into types of players may be needed to make the mapping feasible. Once the supply chain is mapped in some detail, several critical questions need to be asked:

1) What is the overall value proposition of the supply chain? That is, what are the sets of satisfactions delivered to the ultimate customer? Only when the overall value proposition is clearly understood can managers effectively understand the vital value-added roles that must be played for the supply chain to be successful. Further, if the day ever arrives when supply chains truly compete against supply chains and a company must choose which supply chain team to belong to, it will be critical to be able to determine who best delivers on the overall supply chain's value proposition.

2) What are the value propositions and critical success factors for each supply chain level/player? As this knowledge is gained, managers begin to more clearly understand their companies' roles in the supply chain. They also begin to understand how they can better meet customers' needs as well as how they should evaluate and select important suppliers.

**Figure 6**
**Supply Chain Integration Framework**

**Develop Overall SC Understanding**

Map SC: Organizations, technologies, capabilities
  Determine SC value proposition
  Determine value proposition & success factors at each level
  Determine where SC leverage & profitability are located.
    Identify critical value-added processes & technologies
    Evaluate linkage to end customer
Specifically define "As-is" value-added roles of SC members

**Position Organization within SC**

Re-evaluate organization's value proposition from SC perspective
  Identify the organization's core competencies
  Design & develop critical processes to support core competencies
Outsource non-critical activities
Role-shift where appropriate; i.e., move to "To-be" roles

**Build Customer Success Infrastructure**

Classify customers & measure profitability
Establish appropriate customer relationships
  Implement SC partner development initiatives
  Build good relationships with important customers
  Establish mechanisms for transactional relationships

**Build Supplier Success Infrastructure**

Classify suppliers—materials & service
Establish appropriate supplier relationships
  Implement SC partner development initiatives
  Build good relationships with important suppliers
  Establish mechanisms for transactional relationships

**Create & Communicate Common Vision**

Establish vision & mission statements, policies & procedures
  Promote internally & garner broad-based commitment
  Share externally with key SC partners
  Make available to entire SC
Measure alignment among core "partners"
Identify, communicate, and resolve critical gaps

**Cultivate Integrative Mechanisms**

Consensus effort to identify internal & external barriers
Prioritize specific initiatives to build key integrative mechanisms
  • Alignment mechanisms          • Cross-functional processes
  • Cross-experienced managers     • SC performance measurement
  • SC information sharing          • Alliance management techniques

**Constantly Re-evaluate—Scan & Plan**

Monitor market & competitive conditions
  Conduct periodic environmental & technology scans
  Periodically evaluate industry and SC structure
Re-evaluate SC fit—beware of and be aware of role shifting
Benchmark value-added: competitors, best-in-class & customers
Establish continuous improvement programs

3) Where are leverage and profitability located within the supply chain? To identify key leverage points, at least three issues must be understood. First, what are the critical technologies employed throughout the supply chain? Second, what do the most important value-added processes look like up and down the supply chain? Third, what is each key player's linkage to the end customer? As these questions are answered, managers can specifically define the "as-is" value-added roles of supply chain participants. They can also begin to identify role-shifting opportunities and threats. At this point, managers can focus on evaluating their company's own competitive strategy.

## Stage 2: Position the Organization within the Supply Chain

Having mapped the supply chain, managers are prepared to re-evaluate their organization's value proposition from a supply chain perspective. Simply stated, is there a good fit between the value the company promises to deliver and the value that is actually required by the supply chain? If the fit is questionable, a serious evaluation of the company's participation in the supply chain should be undertaken to answer the following questions: Can the company really deliver on the required value proposition? Is the company trying to participate in the wrong supply chain? Are there more appropriate supply chains for the company to participate in? What does the company need to do to reposition itself as a valued participant within the supply chain? Many of the dot-com companies that have struggled to survive would have benefited from this type of self-evaluation. The critical issue at this stage is to clearly identify and define the organization's core competencies that support the chosen value proposition. Likewise, the specific value-added processes needed to support and augment the core competencies must be defined and designed for maximum effectiveness. When this is done, outsourcing decisions and role-shifting strategies can be more accurately assessed.

## Stage 3: Build the Supply Chain Infrastructure needed for Success

Stage three really consists of two separate steps that should be considered together. Building a customer success infrastructure is the first step. This is done by classifying customers based on their relative importance to the company's current and long-term success. It is vital that managers recognize that their companies almost never have the resources to be all things to all customers. Thus, the previous two stages are designed specifically to help managers determine which customers it makes the most sense to serve and satisfy, what products or services they require, and how much of the upstream processing will be completed by the company and how much will be provided by suppliers and service providers.

Aligning the company's core competencies with its most important customers' critical success factors is vital to achieving meaningful supply chain integration. An important caveat arises from the experience of the past several years. In their quest to become "suppliers of choice" and lock in customer loyalty, some companies have delivered outstanding product/service packages at incredibly low prices only to find out later that they were doing so at a loss. For this reason, it is important to measure customer profitability. If a company has an outstanding value proposition and is operationally excellent, it will be able to convince its customers to pay a fair (and profitable) price. Of course, managers should consider the lifetime profit potential of customers as it performs this analysis.

Appropriate relationships should then be established with specific customers. For the most important customers, partnership development initiatives should be undertaken. Collaborative forecasting, vendor-managed inventory, co-located manufacturing, cooperative research and development, and joint problem solving are all initiatives that should be considered. The goal is to leverage the knowledge and resources of both companies to achieve higher levels of competitive success. For important customers that do not merit such intensive attention and resource sharing, sound and mutually beneficial relationships should be pursued. Managers should seek to establish processes that enhance familiarity while delivering valued products and services. The goal is to achieve high levels of satisfaction by meeting these companies' most important needs. Over time, some of these companies may emerge as leaders in their markets and become the most sought-after and valued customers. Finally, most companies serve many customers who are not viewed as terribly important. These are the infrequent customers whose purchase volumes are too small to really even make the company's radar screen. Individually, these customers are often viewed as insignificant. As a group, however, they can be quite profitable. Further, some of these so-called insignificant customers may at some point in the future become important players in the industry. For these reasons, it is important to establish the systems and policies needed to effectively and efficiently service these transactional relationships. Delivering high levels of standardized service should be the minimal target.

Building a supplier success infrastructure is the second step in establishing a foundation for long-term supply chain success. The pattern is the same—classify suppliers and establish appropriate relationships with them according to their importance. Critical suppliers should be targeted for intensive relationships where resources are shared and true synergies are sought. Important suppliers should be treated with respect and in a fair manner. Managers need to avoid opportunistic behavior with

valued suppliers, even if these suppliers are not viewed as extremely important. New technologies or innovative processes that radically change the power relationship may be developed. Good will and trust are key ingredients in all but purely transactional buyer/supplier relationships. Finally, efficient and fair systems and policies should be put in place to support the remaining transactional buyer/supplier relationships. Learning to manage the continuum of relationships that must be dealt with in any successful supply chain is a critical capability to develop.

## Stage 4: Create and Communicate a Common Supply Chain Vision

If a supply chain is to compete as more than a loose coalition of companies, real alignment must be established. Alignment begins with the creation of a common vision and a shared mission. Most companies have vision or mission statements; unfortunately, many of these statements consist of totally forgettable platitudes. One of the managers interviewed in the study suggested that most of these statements are comprised of lip service and shallow cliches that are ultimately meaningless. Such vision and mission statements do very little to guide or motivate integrative behavior. Therefore, it is important to make the company's supply chain vision statement specific and unique to the organization. To be effective, vision statements should directly influence the company's most important supply chain policies and procedures. This linkage to day-to-day decisions creates a tangibility that overarching vision statements often lack. A senior-level steering committee should help develop the vision and promote it within the organization. Management and employees at all levels should understand the supply chain vision and direction of the company and understand what it means for them. Only then can they comfortably support the supply chain strategy. After garnering internal support, the challenge is to share the vision with key supply chain partners. Customer advisory boards and supplier councils can be very helpful in this effort. Likewise, quarterly business reviews and special face-to-face meetings can be used to share and promote the supply chain vision. Ultimately, the vision should be widely publicized to the entire supply chain via the company's web page or other corporate communication.

Once the vision is established and communicated, alignment among supply chain partners must be measured. One of the interviewed companies uses a 138-point audit/benchmarking instrument to make sure that all of its key suppliers understand its expectations. The instrument helps highlight problem areas and disseminate best practice. Partner scorecards offer another vehicle for evaluating supply chain alignment. The final step in the process of getting all major supply chain partners on the same page is to identify, communicate, discuss, and resolve alignment disparities.

## Stage 5: Cultivate Integrative Mechanisms

The first four stages of the supply chain framework focus on the design of a competitive supply chain. Stage five shifts the emphasis to managing for effective collaboration. Stage five begins with an effort to identify internal and external barriers to cooperation. Steering committees and advisory boards play a crucial and invaluable role in this effort since a consensus is required. Once problem areas have been discovered and opportunities for improvement defined, specific programs or initiatives must be prioritized. Pilot projects can be carried out in any of the six integrative areas; however, a balanced approach should be pursued. The six core integrative mechanisms are

- Alignment mechanisms
- Cross-experienced managers
- SC information sharing
- Cross-functional processes
- SC performance measurement
- Alliance management techniques

Managers should take great care to select initiatives that can be successfully implemented to create visibility, build momentum, and justify further investments. More difficult initiatives can then be tackled.

## Stage 6: Constantly Re-evaluate and Continuously Improve

To keep pace with a rapidly changing global marketplace where competition promises to intensify from already fierce levels, supply chains must be dynamic and flexible. The learning supply chain is the ideal and monitors market and competitive conditions continually. To promote this attribute, it is vital to institutionalize periodic environmental, technology, and industry scans. Benchmarking efforts should also be used to keep the company at the cutting edge of supply chain practice. Serious benchmarking companies compare themselves against leading competitors, best-in-class performers, and the needs of demanding customers. Successful supply chain companies use the scanning and benchmarking process to help managers 1) grasp the ramifications of constantly changing consumer and supply environments, 2) recognize channel alternatives, 3) assess a wide range of tradeoffs, and 4) balance both the short- and long-term requirements of the organization. With the understanding that comes from these rigorous learning efforts, companies can position themselves for success even as the supply chain in which they compete evolves. They are also well positioned to avoid the threat of disintermediation while leveraging opportunities to insinuate themselves more fully into the chain's critical value-added processes.

Equal in importance to the scanning/benchmarking effort is the need to put in place continuous improvement initiatives. For any improvement effort to be effective, it

must unleash the creativity and knowledge of the people involved in creating value. A clear theme from the study is that too many companies have essentially silenced one of their greatest sources of competitive advantage—their people. That is, people at all levels no longer really believe that they can make a difference in the way their companies operate (this desire to be creative and have an impact has led many young managers to abandon their companies to join entrepreneurial start ups in the past several years). Traditional suggestion boxes are not adequate. More creativity, passion, and accountability are needed. Pet project type programs that allow managers to pursue their own special interests, enlisting their colleagues for assistance and expertise are a step in the right direction. Ultimately, everyone must be involved and accounted for in the quest for innovation. This effort must be done through formalized (but not rigid) continuous improvement initiatives.

To summarize, the integrative supply chain framework emphasizes supply-chain level planning and constant scanning. Planning begins with mapping, continues with positioning, and culminates with communicating the vision and the direction. Planning creates understanding, gets everyone on the same page, and directs resource utilization in a way that mitigates threats and capitalizes on opportunities. Scanning identifies the barriers and the opportunities for improved integration. Scanning likewise is vital for supply chain managers to understand evolving competitive, industry, and market environments. In short, companies must plan and scan in order to continuously select and build the right competitive capabilities and establish the most creative and productive relationships. This endeavor is the essence of strategy, and strategic supply chain management can help an organization survive and prosper in an ever-changing world.

## A Benchmarking Diagnostic

Finally, throughout the research, best practices were identified and compiled into a benchmarking diagnostic (see Table 32). The best practices are organized into two main sections—the first targeting supply chain design and the second looking at supply chain integration and management. The design segment of the diagnostic follows the planning portion of the integrative supply chain framework (Stages 1, 2, 3a, 3b) and is divided into the following five sections:

- SC information sharing
- Understanding the Supply Chain
- Organization Design and Positioning
- Customer Relationship Management
- Supplier Selection, Management, and Development
- Logistics System Design and Development

The issues evaluated here are 1) a company's understanding of its primary supply chain, 2) its own organization and positioning, 3) the companies with whom it should establish relationships, 4) the nature of specific relationships, and 5) efforts to develop relationships and capabilities to add greater value.

The integration and management half of the diagnostic looks specifically at practices used to facilitate greater collaboration. Practices are categorized across the six integrative mechanisms identified and explored during the focus study: alignment mechanisms, performance measurement, information sharing, human resource management, alliance management practices, and process change and integration. The number of practices in each section does not necessarily parallel the emphasis currently found in each area; rather, the number of practices highlights the variety of approaches being undertaken. Thus, the fact that the people empowerment section is longer than any other section should not be construed as an indication that companies place more emphasis or are more advanced in the people management practices.

As has been noted previously, this study's most successful supply chain companies take a balanced approach to supply chain design and management. Even these advanced companies, however, could find many opportunities to progress down the path to supply chain excellence by benchmarking their practice against their counterparts. Indeed, the very best supply chain companies are the ones that have mastered the art of learning. They therefore avoid complacency and are viewed by their rivals as agile, lean, and tough competitors. They recognize that while they are ahead of the pack, they are only in the very early stages of a long journey. Balance, experimentation, focus, intuition, tenacity, and vision are the attributes that will help them become tomorrow's supply chain champions.

<div align="center">

**Table 32**
**A Benchmarking Diagnostic—Supply Chain Management Best Practices**

</div>

**Understanding the Supply Chain**
Overall organizational SC map complete with value propositions, customer success factors, and specific roles.
Supply chain technology maps for core technologies.
Supply chain process maps for core commodities.

**Organization Design and Positioning**
Use of information technology to facilitate hybrid centralized/decentralized organization.
Use of global commodity teams.
Creation of executive-level supply chain management position.
Use of "order fulfillment" steering committee with senior managers from each operating unit.
Creation of cross-functional and inter-organizational teams to manage supply chain projects.
Co-located manufacturing.
Co-located supplier personnel for product design and vendor managed replenishment.

**Customer Relationship Management**
Employ customer selectivity policy that defines nature of relationship based on customer importance.
Customer profitability analysis (by customer and by channel).
Dedicated cross-functional account management teams.
Computerized customer profile in database.
Use of alignment matrix to match customer needs (success factors) to organization's capabilities.
Top management spends 20% or more of its time visiting and working with customers.
Customer advisory board to voice concerns, provide improvement suggestions, and act as a sounding board.
Formal efforts to seek customer feedback and identify measures used by customers.
Specific program to define unique customer needs so that tailored products and services can be developed.
Formal program to educate customers on processes or on the impact of their decisions on the rest of the SC.

**Supplier Selection, Management, & Development**
Rigorous supplier selection involving capability assessment and relative ranking of performance.
Supplier classification and supply-base rationalization.
Periodic supplier conferences that emphasize expectations and sharing skills.
Supplier recognition programs.
Supplier process development involving process engineering and other support.
Second-tier purchasing agreements to leverage global buying power.
Supplier councils to voice concerns, provide improvement suggestions, and act as a sounding board.
Hold an increasing percent of "purchased" inventory on consignment basis (pay at use/pay at scan programs).
Invite first-tier (and occasionally second-tier) suppliers' personnel to participate in in-house training and development.
Vendor compliance programs that are established via collaborative effort.
Supplier Information Guide that spells out expectations, rewards, & penalties.
Rigorous supplier audit and improvement initiative to benchmark and disseminate best practice.
Web-based catalogue for all standard buys.
Establish policy stating desire to become a "Customer of Choice" in key commodity areas.

**Logistics System Design and Development**
Rigorous carrier selection/classification involving capability assessment and relative ranking of performance (by mode/route).
Optimize warehouse/distribution center network—correct number and location of facilities.
Shipping/delivery point analysis—when to ship through DC or direct from factory or to DC or direct to store.
Load optimization via packaging analysis, use of optimal order increments, and maximizing weight/cube.
Use of consolidated shipments via consolidation points whenever possible.
Use of supplier milk runs to achieve truck load shipments.
Use of multi-plant pick up and delivery to achieve truckload shipments and reduce empty backhauls.
Use of customers' or suppliers' private transportation system (integration of transportation networks).
Consolidated shipments with non-competing companies who share the same customers or same suppliers.
Manage inbound transportation—compare prepaid & collect terms to determine who should pay for inbound freight.
Use of cross docking or flow-through warehouses.
Use of time windows and drop shipping to improve synchronization and driver turnaround.
Periodic carrier conferences that emphasize expectations and sharing skills/programs.
Carrier recognition programs.
Selective use of 3PLs for outsourced logistics services.

**Alignment**
Specific formal efforts to share supply chain vision/strategy throughout the organization.
Specific formal efforts to coordinate objectives/goals throughout the organization.
Specific formal efforts to achieve consistency in operating procedures throughout the organization.
Specific formal efforts to align measures throughout the organization.
Specific formal efforts to share supply chain vision/strategy across the supply chain.
Specific formal efforts to coordinate objectives/goals across the supply chain.
Specific formal efforts to achieve consistency in operating procedures across the supply chain.
Specific formal efforts to align measures across the supply chain.

**Information Sharing**
Policy to standardize information systems (hardware & software) across divisions, units, facilities, and geography.
Receive orders electronically via EDI or web.
Transmit orders electronically via EDI or web.
Use of electronic funds transfer.
Use of advanced shipping notices.
Share long-term product and technology plans/roadmaps.
Share purchase/production histories and production/purchase plans on a rolling horizon basis.
Transmit product designs electronically (throughout company and to involved suppliers/customers).
Employ customer databases for profitability and performance analysis.
Employ supplier databases for profitability and performance analysis.
Employ SKU/common manufacturing databases for SKU rationalization and profitability analysis.
Implementation of effective enterprise resource planning or connected best-of-breed system.
Use intranet and/or in-house publication to facilitate communication and create sense of community.
Systematic approach to rapid best practice dissemination.

**Alliance Management**
Formal mechanism to identify potential alliance partners and define intensity of relationship.
Use of alliance creation guidelines that lead to clearly defined roles and responsibilities.
Use of alliance monitoring guidelines.
Systematic approach to share risks and rewards.
Form methodology in place to drive joint problem resolution.
Systematic approach to promote collaborative improvement efforts.
Use of clear long-term contract.
Use of confidentiality agreement.
Use of continuous improvement clauses.
Build trust—don't just talk about it (must be evaluated from both sides of the relationship).
Established policy promoting frequent, honest, and open information sharing.
Participate in industry initiatives—especially learning and benchmarking initiatives.
Use of quarterly business reviews.
Dedicated alliance relations teams to foster "personal" relationships and continuity between alliance partners.

**Performance Measurement**

Rigorous supplier performance measurement that utilizes a frequently updated scorecard.

Use a balanced approach to evaluate total order performance.

Make up-to-date supplier scorecard information available via web (for specific supplier and best in class).

Revenue tracking and profitability by product, customer, supplier, and channel.

Constant best-in-class and customer benchmarking (include suppliers in benchmarking process).

Employ rigorous and comprehensive total costing (product, process & supply chain).

Employ rigorous and comprehensive activity-based costing (product, process & supply chain).

Employ rigorous target costing to set and achieve the appropriate price for engineered and purchased parts.

Use measures that capture overall supply chain performance.

Use measures that communicate impact of decisions on other supply chain members.

Use process-oriented and team-based measures that promote cross-functional collaboration and mitigate turf protection.

Use measures tied to value proposition—provide understanding, promote correct/learning behavior, are accurate & timely.

Use measures that are specifically aligned with individual customer needs and the measures that customers actually use.

Use of measurement to drive learning and improvement (not to punish poor performers).

**People Empowerment**

Extensive in-house training that is extended to upstream suppliers (build/acknowledge/reward competence).

Really use suggestion boxes—recognize and reward implemented suggestions/respond to all suggestions within two weeks.

Computerized training that includes simulation of advanced supply chain practice.

"Book of the Month" club provides common forum and keeps employees & managers reading about state-of-the-art practice.

In-house SCM certification for employees and managers.

Employee recognition/team recognition—"dinner of champions" used to celebrate successes.

Training rotations for new managers that involve three to six month assignments in multiple functional areas.

Use senior managers as best-practice identifiers and cross pollinators.

Established program to create cross-trained workers & cross-experienced managers.

Reward programs (including stock options) for employees who complete certain training/education.

Annual personal development plans.

Formal socialization programs/activities to create unity and team mentality.

Policy in place that encourages learning through experimentation.

Aggressive use of "pet project" programs to unleash individual passion and drive continuous improvement.

**Process Design & Integration**

Use of "As-is" and "To-be" process maps.

All initiatives and value-added activities are mapped back to the strategic plan and value proposition.

Coordinated integrated product development teams that bring suppliers and customers together.

Designation of process owners, critical support, and tangential assistance for all key processes.

Aggressive use of pilot programs.

Aggressive use and dissemination of success stories.

Gap and opportunity analysis to establish priorities and focus resources.

Use of coordination and planning meetings to bring decision makers together.

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# Literature Review

*I tell people to elevate the understanding of supply chain management in their mind, because it is becoming the determinant of victory or defeat.*

*Jack Kahl, CEO of Manco*

*Companies don't get it. Strategy involves more than managing the warehouse or transportation. It's also production, marketing, sales, and planning—the management of materials, information, and funds from the raw materials supplier to the end customer.*

*Jim Kilpatrick, Sr. Mgr. Deloitte Consulting*

## Introduction

It is a familiar list: shrinking product life cycles, increasing global competition, faster technology cycles, demanding investors, and more-demanding customers. While these themes have consistently appeared in the business press over the past 10 years, company responses to this competitive environment are just beginning to coalesce around a few common strategies. These include implementing lean manufacturing, utilizing advanced information technology for communication and planning, improving supply-base management, making distribution systems more efficient, and formulating cross-functional approaches to problem solving. When combined into one program, these strategies form the foundation for supply chain management.

This section first reviews the competitive forces motivating companies to adopt supply chain management and then looks at some of the key techniques and activities that successful supply chains use to support their ability to improve service levels while reducing costs and improving financial performance. The next section reviews the elements and players involved in supply chain management, which leads into creating definitions for this broad business approach. Finally, previous research addressing the barriers, bridges and benefits of integrating supply chains is reviewed.

## Competitive Motivations and Strategic Company Responses

Over the last 10 years, customers have continuously ratcheted up demands for more product variety, higher product and service quality, lower prices and faster delivery (Rich and Hines, 1997; Greis and Kasarda, 1997; Davis, 1993). Some of these demands, especially increased variety and faster delivery, can be met through maintaining inventory. Management, however, has learned the hard way that inventory is an asset to be carefully managed (Dell and Fredman, 1999). As life cycles turn faster, excess inventory either blocks the release of new products or must be severely discounted. Work-in-process inventories delay internal cycle times, reducing a firm's ability to be responsive to customers.

## Lean and Variation

To increase responsiveness, many firms turned to lean manufacturing (Cox, 1999; Womack and Jones, 1996; Christopher, 1992) and the collaborative approach to managing suppliers that supported Japanese lean manufacturing (Hines, Rich, Bicheno, and Brunt, 1998; Nishiguchi and Brookfield, 1997; Rich and Hines, 1997; MacDuffie and Helper, 1997; Hines, 1996; Helper and Sako, 1995; Dyer and Ouchi, 1993; Lamming, 1993). These efforts resulted in increased internal quality, reduced cycle times, and reduced internal inventories. Eventually, the lean journey leads to a desire to understand all of the external inputs—both upstream and downstream—into the system, such as supplier quality and customer ordering patterns. This review often has led firms to recognize that they are part of a larger system and their success is largely a function of the quality of inputs (e.g., product and information) received from that larger system (Jones, Hines, and Rich, 1997; Towill, Naim, and Walker, 1992; Forrester, 1961).

The lean approach to manufacturing, however, is often challenged by variation (Davis, 1993; Cusumano, 1994). Most difficult are sources of variation that emanate from customers and competitors, including fluctuations in demand rates, increases in product family breadth, or declining duration of product life cycles. In addition, shortages in supplier capacity can cripple lean supply chains (Hilsenrath, 2000). Variation increasingly characterizes today's business environment and can compromise company-centered lean initiatives.

## Financial Pressure and Core Competencies

In addition to pressure from customers for greater variety at lower cost, Wall Street is pressuring firms to manage assets much more efficiently. The success of firms like Dell, Costco and Wal-Mart has helped to reinforce analyst perspectives that high sales volumes and low inventory levels are not mutually exclusive. Furthermore, managerial recognition that all assets in a company need to be productive and create value has produced a new focus on working capital (Christopher and Ryals, 1999; Tyndall, Gopal, Partsch, and Kamauf, 1998) and inventory velocity (Dell and Fredman, 1999; Bartholomew, 1999). The velocity of material flows through a supply chain can be increased by applying lean principles and communicating information among chain members (Dell and Fredman, 1999).

Wall Street pressure also has increased managerial recognition that firms cannot be effective trying to be all things to all customers and should focus on a limited set of core competencies (Fine, 1999; Cox, 1999; Sheridan, 1999; Quinn and Hilmer, 1994; Venkatesan, 1992; Welch and Nayak, 1992; Miles and Snow, 1992). The more a firm concentrates on core competencies, the more it believes that other firms are better suited to manage some parts of the company (e.g., information systems, payroll, parts production, transportation, and entire logistics operations), thereby raising the strategic profile of the purchasing field (Das and Narasimhan, 2000; Cox, 1999; Carter and Narasimhan, 1994). Charles Fine, the author of Clockspeed, considers effective supply chain design to be the ultimate core capability and that supply chain management is critical to company success (Quinn, 2000). Indeed, increased outsourcing to fewer suppliers managed using collaborative techniques can be characterized as "a means of achieving the advantages of vertical integration without owning the means of production and the inherent risks of advances in technology or changes in the law." (Rich and Hines, 1997)

The net effect of these strategic and financial factors is a dramatic increase in outsourcing. Already, many manufacturing companies are spending upwards of 50-80 percent of cost of goods sold on purchased items (Anderson and Katz, 1998), a number that in today's economy will likely increase due to the leverage for profit improvement from the purchasing function. This dependence on outside sources, along with the sheer amount of dollars flowing out to the supply community, has also raised the profile of supply chain management in companies and garnered the attention of CEOs and CFOs alike. Successful companies have learned that focusing only on top-line increases is insufficient for overall success. Even internal increases in manufacturing productivity alone are insufficient. Rather, these firms understand that strategic management of the total cost structure of the company is necessary for competitive and financial success and that effective supply chain management can both fuel growth and lower costs (Tyndall, Gopal, Partsch, and Kamauff, 1998; Sabath and Frentzel, 1997; Monczka, 1996). The Gartner Group predicts that supply chain initiatives will likely shift their focus from cost-cutting to revenue growth by 2003 (Enslow, 1999).

## Responsiveness

With increased understanding of the deleterious effects of inventory, many authors are advocating that these new networks of organizations can be more responsive than firms in the past (Christopher, 2000; Towill and McCullen, 1999; Closs, Roath, Goldsby, Eckert and Swartz, 1998; Narus and Anderson, 1996; Miles and Snow, 1986). Enabled by a new-found flexibility, companies and their respective supply chains can be more responsive to customer desires, creating opportunities to charge higher prices or expand market share. Bowersox, Stank, and Daugherty (1999) apply the concept of responsive supply chains to new product launches. To satisfy more demanding customers while continuing to earn shareholder's their return, firms are realizing they must be more agile. Since they no longer own the assets, more cooperative and collaborative relationships between supply chain members may be required to support agility and responsiveness (Christopher, 2000).

While partnering has been advocated for several years, recent authors are rightfully questioning its application in certain circumstances (Gadde and Snehota, 2000; Kapoor and Gupta, 1997; Ramsay, 1996). Several authors have created frameworks and models for use in determining the best model of supplier relationship to use, given product, market, and risk characteristics, many of which carve out only limited scenarios for partnering (Bensaou, 1999; Cox, 1999; Anderson and Katz, 1998; Gulati and Singh, 1998; Cooper, Ellram, Garner and Hanks, 1997; Cooper and Gardner, 1993; Kraljic, 1983). Groves and Valsamakis (1998) note that partnering produced mixed results across a variety of industries.

Another technique being used to support agility in supply chain management is the concept of postponement. Wroe Alderson first wrote about postponement back in the 1950s (Pagh and Cooper, 1998) and it has resurfaced as an effective tool to balance the tradeoffs between costs, inventory, product flexibility, and service (Van Hoek, Commandeur and Vos, 1998; Van Hoek, 1998a; Feitzinger and Lee, 1997; Bowersox and Closs, 1996; Daugherty and Pittman, 1995; Davis, 1993). Pagh and Cooper (1998) address the strategic choices between speculating and postponement, depending on market demand. Related to postponement are the use of modular designs, which enable firms to create expanded choices for customers, but keep costs down (Baldwin and Clark, 2000; Van Hoek and Weken, 1998). Similar to postponement, this concept is not new, either (Starr, 1965).

The focus on a asset velocity/utilization and increased outsourcing activity are leading firms to realize that they are no longer solely responsible for their own corporate destiny. A company's ability to be successful, now more than any other period, depends on a network of suppliers, service providers, and customers (Gulati, Nohria, and Zaheer, 2000; Johnson and Davis, 1998). Given the competitive climate of today, it is a rare company that can "go it alone" in its industry (Monczka and Morgan, 1998a). Indeed, there is growing acceptance of the notion that the level of competition has moved beyond company vs. company to supply chain vs. supply chain (Lambert and Cooper, 2000; Kilpatrick and Factor, 2000; Cox, 1999; Dell and Fredman, 1999; Bradley, et al., 1999; Christopher, 1992).

Table 33 summarizes the literature and indicates that the three driving forces for firms to integrate their supply chains are increasing levels of competition from both domestic and global competitors, customers with ever-increasing demands, and new capabilities afforded by advances in information technology.

There is growing recognition that the strategies embedded in good supply chain management--strategic sourcing, partnering/supplier management, lean manufacturing, communication, designing products for modularity, postponement—can be effective tools to satisfy demanding customers and other stakeholders. There is also, however, mounting evidence that most firms and supply chains have a long way to go before they begin to realize the benefits of a truly integrated supply chain (Kilpatrick and Factor, 2000; Poirier, 1999; Harps, 2000; Thomas, 1999; IIE News, 1999; Akkermans, Bogerd, and Vos, 1999; Whipple, Frankel, and Anselmi, 1999; Poirier, 1997; Quinn, 1997a; Neuman and Samuels, 1996). Further evidence indicates that the gap between leaders in supply chain management and those struggling with its implementation is growing (LaLonde, 2000; Poirier, 1998).

Good supply chain management requires the systems of one company to interact with the systems of suppliers and customers. Traditionally, these interfaces have been handled by different functions in the business (purchasing, manufacturing, engineering, logistics, marketing, and finance). Throughout the 1990s, firms tried to implement business strategies that called for these functions to work together, without great success (Quinn, 1997b). Perhaps the dissatisfaction with the results of supply chain initiatives to date is not too surprising given the difficulties of cross-functional relationships (Ellinger, 2000; Marien, 2000; Stank, et al., 1999c) and purchasing's historical limited strategic role (Leenders, Nollet, and Ellram, 1994; Ellram and Carr, 1993).

## Supply Chain Management Defined

As companies continue to focus on the customer and work toward integrating their internal functions, they are beginning to understand the workings of the larger systems to which they belong. They are also generating a clearer understanding of the scope of supply chain management. Both communities are realizing that to fully capitalize on the potential of supply chain management, activities inside the company must become integrated. Designers must work with marketers to meet the needs of customers and also with manufacturing/operations to produce the good or service. Products may need to be redesigned to support postponement strategies or for easier manufacturing and assembly. Manufacturing must work with marketing and purchasing to forecast and satisfy demand, as well as with finance to be efficient with resources and assets. Logistics must work with operations and purchasing to coordinate product movement. Information on demand, inventory, and order levels, as well as product definition and customer data, must be made transparent, or at least, transportable to the necessary participants in the chain.

All of these projects and initiatives must be actively managed and coordinated. The level of inter-company coordination is only surpassed by the level of intra-company integration required by supply chain management. All of the entities must work together to create goods and services that satisfy the varied demand criteria of final customers (Oleson, 1998).

With so many functions and players involved, especially when combined with processes and flows involved, a unified understanding and definition of supply chain management has been slow to emerge. Integration barriers, in both academic and practitioner communities, have also slowed development.

### Table 33
### Literature Review—Motivating Forces and Benefits of SCM

| | \multicolumn{13}{c}{MOTIVATION} | \multicolumn{14}{c}{BENEFITS} |
| | Global competition | Demanding customers | Changing IT capabilities | Differentiation/Core Competency | Inability to forecast | Internet | Cost containment | Partnerships | Risk of inventory | Shift in SC power | Compressed PLC | Channel master requires | Mergers/downsize | Revenue growth | Increased inventory velocity | Reduced SCM costs | Product availability | Decreased order cycle time | Capital utilization/efficiency | Responsiveness | Reduced logistics costs | Economic value added (EVA) | Speed to market | Increased on-time delivery | Know/meet customer needs | Stock price/shareholder value | Net profit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL | 8 | 6 | 5 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 6 | 6 | 6 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 |
| Waller et al. | | | | | | | | | | | | | | | × | × | × | | | | | | | | | | |
| Walker & Alber | | | | | | | | | | | | | | | | | × | | × | | | | | | | | |
| Van Hoek et al. | × | × | × | × | × | | | | | × | | | | | | | | | | | | | | | | | |
| Tyndall (00) | × | | | | | × | | | | | | | | × | | | | × | | | | | × | | | × | |
| Timme et al. | | | | | | | | | | | | | | × | | | | | × | | | | | | × | × | |
| Tan et al. | | | | | | | | | | | | | | × | | | | | | | | | | | | | |
| Stank et al. (a) | | | | | | | | | | | | | | | × | | × | × | | × | | × | | | | | |
| Sheridan | | | | | | | | | | | | | | | × | | × | × | | × | | | | | × | | |
| Sabath | | | | | | | | | | | | | | × | | | | | | | | | | | | | |
| Quinn (00) | | | | | | | | | | | | | | | × | × | | | | | × | | | | | | × |
| Pitera | × | × | × | × | | | | × | × | | | | | | | | | | | | | | | | | | |
| Monczka (96) | | | | | | | | | | | | | | | | | | | | | | | × | | | | |
| Metz | | | | | | | | | | | | | | × | | × | | × | | | | | | × | | | |
| Lummus | × | × | | × | × | | | | × | | | | | | | | | | | | | | | | | | |
| LaLonde & Masters | × | | × | | | | | | | | | | × | | × | × | | | × | | | | | × | | | |
| Fine | × | | | | | × | | × | | | × | | | | | | | | | | | | | | | | |
| Cox | | | × | | | × | | | | × | | | | | | | | | | | | | | | | | |
| Cook (00) | | | | | | | | | | | | × | | | | | | | | | | | | | | | |
| Cook (97) | | | | | | | | | | | | | | × | | × | | | | × | × | | | | | | |
| Closs et al. | | | | | | | | | | | | | | | | × | × | | | | | | | | | | |
| Christopher & Ryalls | | | | | | | | | | | | | | | × | | | | | | × | × | | | | | |
| Bovet & Sheffi | × | × | × | | | | | | | | | | | | | | | | | | | | | | | | |
| Blackwell | × | × | | × | | | × | | | | × | | | | | | | | | | | | | | | | |
| Andraski | | × | | | × | | × | | | | | | | | | | | | | | | | | | | | |

One of the first organizations to acknowledge the integrative nature of supply chains was The Council of Logistics Management. They have recently updated their definition to recognize that supply chain management is larger than any one function and define logistics as "that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements." (CLM, April, 2000).

Another early definition (Christopher, 1992) stated that supply chains are "the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer."

Today, after 15 years of building on the early work of CLM, several good definitions of supply chain management (SCM) exist. Giunipero and Brand (1996) noted that three typologies of SCM have developed, ranging from a flow of goods-only, to a flow of goods and information, to an integrative value-added approach. Since then, most definitions have moved beyond the simple flow of goods perspective and now consider the integrative nature of supply chains.

Similar to the CLM definition, Cooke (1997) states that SCM is the, "successful coordination and integration of all those activities associated with moving goods from the raw materials stage through to the end user, for sustainable competitive advantage. This includes activities like systems management, sourcing and procurement, production scheduling, order processing, inventory management, transportation, warehousing, and customer service." Quinn (1997a) adds that, "successful SCM coordinates and integrates all of these activities into a seamless process. It embraces and links all of the partners in the chain. In addition to the departments within the organization, these partners include vendors, carriers, third-party companies, and information systems providers."

Lambert, Cooper, and Pagh (1998) continue the integration theme and reinforce the concept of value, defining SCM as "the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders." Cooper, Lambert, and Pagh (1997) note that this definition is broader than the traditional definition of logistics and point out the need for integration beyond the logistics function. They also consider that some of the difficulty surrounding the definition of SCM stems from the fact that several functional areas are now directly involved and bring their own perspective to the situation. Babbar and Prasad (1998) note

that academia has not done much work to integrate knowledge across the fields of international purchasing, inventory management, and logistics, much less with other functions.

Ballou, Gilbert, and Mukherjee (2000) review the definitional changes over time from a logistics perspective and define a supply chain as, "all those activities associated with the transformation and flow of goods and service, including their attendant information flows, from sources of raw materials to end users. Management refers to the integration of all these activities, both internal and external to the firm." They address integration at three levels: within a function, across functions, and across organizations.

Mabert and Venkataramanan (1998) incorporate the product design process and define the supply chain as "the network of facilities and activities that performs the functions of product development, procurement of material from vendors, the movement of materials between facilities, the manufacturing of products, the distribution of finished goods to customers, and after-market support for sustainment."

Simchi-Levi, Kaminsky, and Simchi-Levi (2000) capture the integrative element and add a twist of the traditional purchasing "seven rights" statement. They also recognize the systemic feature inherent in supply chains and define SCM as "a set of approaches to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements."

Ayer (2000) continues the focus on flows, but also adds a knowledge dimension, stating that "supply chain management is more than the physical movement of goods from 'earth to earth.' It is also information, money movement, and the creation and deployment of intellectual capital."

A simple and straightforward definition is offered by Alber and Walker (1998). They add the critical element of financial flows through the supply chain and define a supply chain as "the global network used to deliver products and services from raw materials to end customers through engineered flows of information, physical distribution, and cash."

The MIT-Industry Integrated Supply Chain Management Program also incorporates the financial element and defines supply chain management as "a process-oriented, integrated approach to procuring, producing, and delivering products and services to customers." ISCM has a broad scope that includes sub-suppliers, suppliers,

internal operations, trade customers, retail customers, and end users. ISCM covers the management of material, information, and funds flows (Metz, 1998).

Company definitions echo the perspective of the earlier writers. Maytag defines supply chain integration as "a process for achieving a clear line of sight from the supply base to our customers with buyer and seller working jointly to drive out nonvalue-added costs, improve quality, speed order fulfillment, and introduce new product and process technology" (Porter, 1997).

Similarly, Tyndall, Gopal, Partsch and Kamauff (1998) define SCM as "the coordinated flow of materials and products across the enterprise and with trading partners. It also includes the management of information flow, cash flow, and process/work flows."

An analysis of the above definitions reveals the elements critical to supply chain management:

- A Focus on Customers
- Effective and Efficient Management of Flows
  - Product and material flows
  - Information and data flows
  - Cash flows
- Intra-company Coordination
  - Marketing
  - Engineering
  - Purchasing
  - Manufacturing
  - Logistics
  - Finance
  - Human Resources
  - Information Systems
- Inter-company Coordination
  - Raw material suppliers
  - Material converters and assemblers
  - Transportation companies
  - Service providers
  - Warehouse operators
  - Retailers

Based on this review of the literature and interviews with SCM professionals, we state that:

**Supply Chain Management is the collaborative effort of multiple channel members to design, implement, and manage seamless value-added processes to meet the real needs of the end customer. The development and integration of people and technological resources as well as the coordinated management of materials, information, and financial flows underlie successful supply chain integration.**

## Elements of Supply Chain Management

Cooper, Lambert and Pagh (1997) and Lambert and Cooper (2000) developed a framework for SCM that divides elements and key decisions into three areas:

- **Supply chain network structure** ("Who are the key supply chain members with whom to link processes?"). The primary aspects of a company's network structure are:
  - the **members** of the supply chain (primary and secondary).
  - the **structural dimensions** of the network.
    - horizontal structure: number of tiers across the supply chain.
    - vertical structure: number of firms represented in each tier.
    - a company's horizontal position within the chain.
  - the different types of **process links** across the chain.

- **Supply chain business processes** ("What processes/activities that produce a specific value to customers should be linked with each of these key supply chain members?") Based on their research, they include the following eight as key business processes:
  - Customer relationship management: Identify key customers, service levels required and profitability.
  - Customer service management: Interface with production and distribution operations to assist and inform customers.
  - Demand management: Balance enterprise-wide supply and demand through determining what and when customers order, perhaps even synchronizing supply and demand.
  - Order fulfillment: Achieve high order fill rates through seamless integration of manufacturing, distribution, and transportation plans.
  - Manufacturing flow management: Pull-based manufacturing with continuous reduction in cycle times and lot sizes.
  - Procurement: Strategic plans developed with suppliers to support manufacturing flow management and new product development. Suppliers can be segmented (Dyer, Cho and Chu, 1998) and then appropriate relationships determined based on key characteristics. Rapid communication can be developed freeing buyers to work on relationships rather than executing orders.
  - Product development: Integrate customers and suppliers into the process to reduce cycle time. Coordinate with customer relationship management, select materials and suppliers in conjunction with purchasing, and develop production technology that integrates with manufacturing flow.
  - Returns/reverse logistics: Can be a competitive advantage or environmental requirement. May be

considered a more holistic view of logistics in that fewer materials flow back, reuse of material is possible and recycling is facilitated (Carter and Ellram, 1998; Walker, 2000).

- **Supply chain management components** ("What level of integration and management should be applied for each process link?") This section addresses four types of links/levels of integration and nine areas of management that must be addressed when managing supply chains
  - Types of Links/Level of Integration: Different levels of integration are called for in different situations.
    - *Managed process links*: Those considered most important, often with tier one customers and suppliers. May learn of important processes through monitoring links (e.g., multiple tier one suppliers all ordering from same tier two supplier).
    - *Monitored process links*: While important, do not merit full resources, so they are simply monitored and often are between two other tiers.
    - *Not-managed process links*: Products/services do not warrant resources to manage or monitor (e.g., box supplier's upstream suppliers).
    - *Non-member process links*: Links from member of one chain to another chain (e.g., common supplier to competitor).
  - Components of Management critical to SCM: Based on literature review and their own research, the following components were identified:
    - *Planning and control*: Joint planning between chain members and establishing key performance metrics.
    - *Work structure*: How a firm performs its tasks and activities. This will affect the level of integration across the chain.
    - *Organization structure*: Whether or not firms engage in joint problem solving through tools such as cross-functional teams.
    - *Product flow facility structure*: Refers to the network of firms throughout the chain. May involve decisions on where inventory is best stored in chain.
    - *Information flow facility structure*: The kind of information passed and frequency of updating are key elements.
    - *Management methods*: Includes cultural and leadership issues. More difficult to mesh firms of different cultures (e.g., top down with bottom-up).
    - *Power and leadership structure*: Presence of power brokers within the chain will affect relationships and attitudes toward partnering.
    - *Risk and reward structure*: Level of sharing across chain affects long-term commitments.
    - *Culture and attitude*: Meshing cultures cannot be underestimated; may include how employees are valued and the degree of empowerment.

The manner in which the numerous elements of supply chains are managed, especially those that involve behavioral rather than technical items, will always be tricky and always involve choices. Cox (1999, p. 175) addresses this point, writing, "There are clearly a variety of power configurations within different types of supply chains and these configurations occur for a variety of reasons. The conclusion that must be drawn from this is, therefore, that there cannot be any one single approach to supply chain management that is appropriate in all circumstances."

Other authors have observed that there are multiple flows or distinct supply chain processes at work. Harrington (1998) notes that there are four distinct processes: sourcing/inbound, processing/manufacturing, outbound distribution, and reverse logistics. Walker (2000) also identifies four flows albeit with a different slant. His include the forward supply chain (delivering existing products), the new product introduction chain, the consumables chain (restocking regularly consumed items), and the reverse supply chain. He also notes that the three flows of information, physical distribution, and cash must be carefully engineered.

The manner in which a firm should approach the challenge of integration across the extended enterprise often starts with a solid understanding of customer requirements, around which the elements of a supply chain can be aligned. Segmenting customers by competitive need or products by demand characteristics is a critical step in enabling a firm to focus strategic resources on areas customers value (Bovet and Martha, 2000; Fisher, 1997; Fuller, O'Conor and Rawlinson, 1993). A review of core competencies leads to strategic outsourcing decisions in which a firm claims its part of the value chain (Anderson and Katz, 1998; Quinn & Hilmer, 1994; Quinn, 1997; Venkatesan, 1992).

## Benefits of Integration

If a firm is successful at overcoming the significant and complex barriers to integrating supply chains, substantial benefits can be realized, ranging from satisfied customers to lower costs to improved financial performance (Bhaskran, 1998; Christopher, and Ryals, 1999; Harps, 2000; Gentry, 2000; PMG, 1999; Pitera, 2000; Tan et al., 1998; Stank et al., 1999; Bartholomew, 1999).

Simulations of supply chain management bridges have validated many of these findings (Towill and McCullen, 1999; Waller, Johnson, and Davis, 1999; Closs, Roath, Goldsby, Eckert, and Swartz, 1998; Disney, Naim, and Towill, 1997; Towill, 1995; Lee and Billington, 1995; Towill, Naim, and Wikner, 1992).

Table 33 lists the range benefits of proper management of the supply chains. These include:

- Increased market share and sales growth
- Reduced inventory levels
- Reduced SCM costs
- Decreased order cycle/fulfillment time
- Increased asset and capital utilization
- Improved delivery performance
- Flexibility in meeting/responding to customer requirements
- Improved return on assets and sales
- Increased forecast accuracy
- Reduced cash-to-cash cycle time

Revenue growth fueled by increased responsiveness occurring at lower cost using fewer assets translates into stellar performance. Supply chain management, when properly implemented, has the power to deliver across multiple dimensions of competition.

## Barriers to Integration

To satisfy the demand of customers and shareholders in this time of rapidly changing technology and increasing competition, companies have determined that they must focus on their own core competencies and source goods and services that lie outside of their competencies (Quinn and Hilmer, 1994; Sheridan, 1999). Today, carrying inventory is too expensive an option to support delivery, so the inventory must be replaced by information and communication (Harps, 2000; McCosh, 1999). Since most companies are unwilling to share information with just anybody, they are carefully selecting supply chain partners. This carefully selected group of companies now has all of the capabilities of vertically integrated firms of the past without the inertia (Rich and Hines, 1997; Ellram, 1991). They are experts in their fields, lean, agile, and nimble. They are willing to communicate technology plans, customer demand, and production plans. They are poised to compete against a similar collection of firms.

And many are not satisfied with the results. For the most part, supply chain management is not delivering the expected returns for companies (Kilpatrick and Factor, 2000; Lancioni, Smith, and Oliva, 2000; IIE News, 1999; Lonsdale, 1999; Fisher, 1997). Product is not flowing smoothly to customers all the time and inventory write-downs are still occurring. Given the tremendous potential of supply chain management and the number of firms that have begun the journey or are planning to adopt SCM, expectations are not being met. The reasons for implementation failures are wide-ranging. Table 34 lists the findings of several authors that have written about supply chains and the reasons for implementation failures

or trouble spots. It should be noted that while some of these articles generated their observations through structured research projects, many of the obstacles identified are based on expert opinion and have not been tested.

Several themes are represented in Table 34: definition and vision for SCM, information systems, communication, measurement systems, alliance issues (e.g., guidelines), and organization resistance are all mentioned by several authors. One of the most frequently mentioned barriers is internal organizational resistance to collaborate with other functions (Stank, Daugherty, and Ellinger, 1999; Akkermans, et al., 1999; Lummus and Vokurka, 1998). Stank et al., (1999c) indicate that even marketing and logistics personnel do not collaborate that frequently and that when they do, it is usually on an informal basis. For those firms that do collaborate more regularly, overall firm performance was improved. Lummus and Vokurka (1998) address relationships between marketing and upstream supply chain personnel in how the bullwhip effect can be minimized. Das and Narasimhan (2000) report that excellence in purchasing and integrating purchasing into manufacturing activities supports performance across all important manufacturing priorities.

Regarding integration across companies, Cooper and Lambert (2000, p. 5) write: "Successful SCM requires a change from managing both individual functions to integrating activities into key supply chain processes; traditionally, both upstream and downstream portions of the supply chain have interacted as disconnected entities receiving sporadic flows of information over time." Thomas (1999) reports that consulting surveys also indicate difficulties is collaborating across the chain.

## Bridges to Integration

To overcome of the barriers to supply chain integration, many authors have offered enabling strategies that should facilitate effective and efficient SCM. Often, these enablers are developed to address a particular barrier. Table 35 summarizes the literature and includes items such as:

- Sharing information / transparent information
- Creating a chain-wide information technology architecture
- Implementing increased cross-functional decision making and a process orientation, and Increasing top management involvement (in both strategy making and relationship development)
- Developing goals and performance measures to drive supply chain behavior (internal and external)
- Paying attention to organizational and human factors
- Developing guidelines to help alliance management
- Adopting a strategic perspective toward SCM

**Table 34**
**Literature Review—Barriers to Effective SCM**

Note: The "TOTAL" values at the top of each barrier column are, left to right: 9, 8, 7, 6, 6, 6, 6, 6, 6, 5, 5, 4, 4, 4, 4, 3, 3, 3, 2, 2, 2, 2, 2, 2, 2, 2, 1, 1.

| Study | Internal turf wars | Organizational structures | Lack vision of SCM | Lack SC measurement | Lack channel trust | Executive commitment | IS/IT deficiencies | Lack alliance guidelines | Poor SCM planning | Poor SCM understanding | Unwilling to collaborate | Conflicting internal metrics | Make/buy processes | Poor SC design | Lack SC training | Non-aligned internal rewards | Sub-optimal roles | Sharing costs/benefits | Common suppliers | Firm clusters to work together | Protect intellectual property | Poor product design | Resistance to change | SC power inequalities | Poor SCM finance skills | Resource constraints | Inconsistent SC processes | Internal operational control |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL** | 9 | 8 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| Zaheer et al. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |  |
| Van Hoek et al. |  | x |  | x |  |  |  |  |  |  |  |  | x |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Tyndall (00) |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |
| Tyndall et al. | x | x |  | x | x | x |  |  |  |  | x |  | x |  |  |  |  | x | x |  |  |  |  |  |  |  |  |  |
| Timme et al. |  |  | x |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |
| Sheridan |  |  |  | x | x |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Quinn (99) | x |  |  |  | x |  | x |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |
| Quinn (97b) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  | x |  |  |  |  |
| Quinn (97a) | x | x |  | x |  |  | x |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |
| Pitera |  | x |  |  |  |  | x |  | x |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |
| Noble |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |
| New |  |  | x |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Neuman & Samuels |  |  |  | x |  |  | x |  |  |  |  |  |  | x | x | x |  |  |  |  |  |  |  |  |  |  |  |  |
| Morgan |  | x | x | x |  |  | x | x | x | x | x |  | x |  | x | x |  |  |  |  |  |  |  |  |  |  |  |  |
| Monczka (96) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  | x |  |  |  |  |  |  |  |
| Monczka & Morgan (98b) |  |  | x |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Monczka & Morgan (98a) | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x | x | x |  |  |  |  |  |  |  |
| Monczka & Morgan (97) | x |  |  | x |  |  |  |  | x | x |  | x | x | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Milligan |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lummus |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lonsdale |  |  | x |  |  |  |  |  | x |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Laseter |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lambert & Cooper |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  | x |  |  |
| LaLonde & Masters | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LaLonde | x | x |  |  | x |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |
| Kilpatrick |  |  |  | x | x | x |  |  |  |  | x |  |  |  |  |  |  | x |  |  |  |  |  |  | x |  |  |  |
| Groves et al. |  |  |  |  |  |  |  |  |  |  |  |  |  | x | x |  |  |  |  |  |  | x |  |  |  |  |  | x |
| Cox |  |  | x |  |  |  |  |  | x |  |  |  | x |  |  |  |  |  |  |  |  |  |  | x |  |  |  |  |
| Bender |  |  |  |  | x | x | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |
| Andraski | x |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |
| Anderson et al. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Akkermans et al. | x | x | x |  | x |  |  |  |  |  |  |  |  |  |  |  |  | x |  | x |  |  |  |  |  |  |  |  |

**Table 35**
**Literature Review—Bridges to Effective SCM**

Column legend (BRIDGES) with TOTAL in parentheses:

1. Information transparency (12)
2. CFT/CF collaboration (10)
3. IT architecture/Internet (9)
4. Adopt strategic SCM vision (8)
5. Focus on segmented customers (8)
6. Attention to human factors (8)
7. Formal performance tracking (8)
8. Supplier certification/reduction (8)
9. Collaborative planning (8)
10. Shared investments/benefits (7)
11. Business process tied to goals (7)
12. Defined alliance expectations (6)
13. Role shifting (6)
14. Manufacturing flexibility/control (6)
15. Attention to SC dynamics (6)
16. Top management support (5)
17. Trust (5)
18. Use of SC diagnostic/mapping (5)
19. Change management (5)
20. Open communication (4)
21. VMR/co-located employees (4)
22. Synchronize supply & demand (4)
23. TQM/BPR/Lean (4)
24. Integrated product development (4)
25. SC-wide IT strategy (3)
26. ERP/coordinated data (3)
27. Postponement (3)
28. Chain-wide metrics (2)
29. Explicit strategies and goals (2)
30. Supplier councils (1)

| TOTAL → | 12 | 10 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference / Col#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Zaheer et al. | | | | | | | | | | | | | | | | × | | | | | | | | | | | | | | |
| Waller et al. | | | | | | | | | | | | | | | | | | | × | | | | | | | | | | | |
| Walker & Alber | | | | | | | | | × | | × | | | | | | | | × | | | | | | | | | | | |
| Tyndall et al. | | × | | | | | | | | × | × | | | | | × | | | | | | | | | | | | | | |
| Towill & McCullen | × | | | | | | | | | × | × | | | | | | | | | | | | | × | | | | | | |
| Tan et al. | × | | | | | | × | × | | | | | | | | | | | | | | | | × | | | | | | |
| Stank et al. | × | | × | | | | | | × | | | | | | | | | | | | | | × | | | | | | | |
| Stank et al. (a) | | | | | | | × | | | | | | | | | | | × | | | | | | | | | | | | |
| Sheridan | × | | | × | | × | × | × | × | | | × | × | × | | | | × | × | | | | | | | | × | | × | |
| Rangan et al. | | | | × | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Quinn (97b) | | × | | | | | × | × | | | | | | | × | | | | | | | | | | | | | | | |
| Quinn (97a) | | | | × | × | | | | | | | | | | | | × | | | | × | | × | | × | | | | | |
| Porter | | | | | | | | | | | | | | | | | | × | | | | | | | | | | | | |
| Poirier | | | | × | | | × | × | × | | | × | | × | | | | | | | | | | | | | | | | |
| Pitera | | | | | | | × | | | | | | | | | | | | | | | | | | | | | | | |
| Petzinger | | | | | | | | | | | | | | × | | | | | | | | | × | | | | | | | |
| Pagh & Cooper | | | | × | | | | | | | | | | | | | | | | | | | | | | | | | × | |
| Oleson | | | | | | | | | | | | | | × | | | | × | | | | | | | | | | | | |
| Noble | × | × | | | | | × | | | × | | | | | | | | | | | | | | × | | | | | | |
| Monczka (96) | × | | | × | | | | | | × | | | | × | | | | | | | | | × | | | × | × | | | |
| Metz | × | × | | × | × | × | × | | | | | | | | | | × | | | | | | × | | | | | | | |
| Marien | | | × | | × | | | × | | | | | | × | × | × | | × | | | | | × | | × | | | | | |
| Lummus | | | | × | × | | | | | | | | | | | | | | | | | | | | | | | | | × |
| Lonsdale | | | | | | | | × | | | | | | | | | | | | | | | | | | | | | | |
| Kilpatrick | | × | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hines et al. | | | | | | | | | | | | | | | | × | | × | × | | | | × | | | | | | | |
| Fawcett et al. | | × | × | | | | × | × | | | | × | × | | | | | | | | | | | | | | | | | |
| Ellinger | | × | | | | | | × | | | | | | | | | | | | | | | | | | | | | | |
| Cox | | | | | | | | | × | | | | | | | | | × | | | | | | | | | | | | |
| Cook (00) | × | | × | | | | | × | | | | | | | | | × | | | | | | | | | | | | | |
| Christopher | | × | | | | | × | × | | | | | | | | | | | | | | | | | | | | | × | |
| Carter & Narasimhan | | | | | | | | | | | | | | | | | | | | | | | | | | | | | × | |
| Burnell | × | | × | | × | | | | | | | | | × | × | | | × | | | | | | | | | × | | | |
| Bowersox & Closs | × | × | | | × | | | | | | | | | | × | | | | | | | | | | | | | | | |
| Bovet & Sheffi | | | | × | × | | | | | | | | | | | × | | × | | | | | | | | | | | | |
| Blackwell | | | | | | | | | | | | | × | | × | | | | | | | | | | | | | | | |
| Bender | | | | × | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Benchmarkingreports | | × | | | | | | × | | × | × | × | | × | | × | | × | | | | | | | | × | | | | |
| Bartholomew | | | | | | | | | × | | | | × | × | | | | | | | | | | | | | | | × | |
| Ballou et al. | × | | | | | | | | × | | | | | | | × | | × | | | | | | | | | × | | | |
| Andraski | × | × | × | | | | | | | | | | | | | × | | | | | | | | | | | | | | |
| Anderson et al. | | | | × | | | | × | | | | | | | | | | | | | | | | | × | | × | × | | |
| Akkermans et al. | | × | × | × | × | | | | | | | | | | | | | | | | | | | | | | | | | |

## Conclusion

To satisfy customers and other stakeholders, companies must be responsive to customers' needs without the burden of inventory. A narrowing strategic focus increases the dependence on outside entities to contribute to the value proposition a firm makes to its customers. Technological advances facilitate the transparency and communication of information. The motivations for integrating supply chains are strong and the potential benefits are extraordinary.

To date, however, the benefits have eluded many firms. The task of coordinating across the enterprise and across the chain while managing ever-changing information technology is proving to be daunting. The barriers facing firms are grounded in people, organizational, and technological issues.

Meanwhile, competition continues to intensify, forcing firms to create bridges to the gaps created by integration barriers. Training employees in the dynamics of e-commerce and the techniques of integration will help firms to realize the tremendous potential of supply chain - management.

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# Survey Instrument

*Date*

*Address*

Dear:

Supply Chain Management (SCM) has attracted much managerial attention because of its huge potential competitive impact. Experience, however, demonstrates that managers have adopted a variety of disparate approaches to SCM implementation. To help clarify the nature and role of SCM as well as to quantify its competitive impact, we are currently benchmarking supply chain integration efforts.

In their quest to compete, leading companies are increasing supply chain integration. Thus, defining and promoting best practice in the area of supply chain integration is our primary objective. Indeed, this research is one part of the long-term Supply Chain Integration Futures Study, which will provide ongoing insight into effective supply chain management. Because of your position as a key knowledge holder within the SCM process, we are asking you to contribute to the insight generated by this study. For this study to have maximum impact, your participation is essential.

The enclosed survey was designed to minimize the amount of time required to complete it—the survey takes about 15 to 20 minutes to complete. The *American Production and Inventory Control Society,* the *Council of Logistics Management,* and the *National Association of Purchasing Management* have each provided assistance for this project.

If you would like a copy of the study findings, please so indicate on the last page of the survey. All responses will be kept strictly confidential. We have enclosed a business reply envelope for your convenience. Also, a fax response sheet is provided to give you an opportunity to participate in future aspects of the study.

Thank you for your contribution to our increased understanding of SCM.

Sincerely,

Stanley E. Fawcett
Project Coordinator

*This project will provide you up-to-date information on best practices in supply chain integration and is funded by the Center for Advanced Purchasing Studies.*

# Managing Supply Chain Integration

## Instructions

1.  We would like to thank you for your contribution to this project.

2.  Strict confidentiality will be maintained throughout the project.

3.  Please return the completed survey in the self-addressed stamped envelope within 10 days.

4.  If you would like a copy of the study findings, please ✓ the ❏ at the end of the survey.

    If you have any questions concerning the project, please contact us at:

    Dr. Stanley E. Fawcett          (801) 378-5890 Stan_Fawcett@BYU.edu
    Dr. Gregory M. Magnan      (206) 296-6466 GMagnan@seattleu.edu

    Please return the completed questionnaire to:        Stanley E. Fawcett
                                                         Marriott School of Management
                                                         Brigham Young University
                                                         668 Tanner Building
                                                         Provo, UT 84602

# Managing Supply Chain Integration (pre-test)

1. Size of firm? _____        Number of employees _____        Annual sales in 1998 $_____

2. What is the primary industry in which your business unit competes? _____

3. Is your firm actively engaged in supply chain integration initiatives? Circle one: YES   NO      If yes, to what extent?

|  | *Extent of Engagement* | | | | | | |
|---|---|---|---|---|---|---|---|
|  | Totally Engaged | | | | | | Not Engaged |
| Cross-functional process integration *within the firm*. . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Forward integration with valued first-tier customers. . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Backward integration with important first-tier suppliers . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Complete forward and backward supply chain integration . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

4. Referring to the following diagram, answer the questions below by circling the appropriate response.

| **2/3TS** | **1TS** | **DM** | **IC** | **EC** |
|---|---|---|---|---|
| 2nd / 3rd tier Supplier | First-tier Supplier | Dominant Manufacturer | Intermediate Customer | End Customer or Retailer |

Service Provider
**SP**

| | | | | | | |
|---|---|---|---|---|---|---|
| Where is your firm in the supply chain for its primary product? | 2/3TS | 1TS | DM | IC | EC | SP | None |
| Which firm possesses the most channel power or influence? | 2/3TS | 1TS | DM | IC | EC | SP | None |
| Which firm sets the objectives for SC integration? | 2/3TS | 1TS | DM | IC | EC | SP | None |
| Which firm sets the basic policies that guide SC integration? | 2/3TS | 1TS | DM | IC | EC | SP | None |
| Which firm sets the technology standard for SC integration? | 2/3TS | 1TS | DM | IC | EC | SP | None |

5. To what extent have the following led your firm to seek greater supply chain integration?

|  | *Importance of Environmental Forces* | | | | | | |
|---|---|---|---|---|---|---|---|
|  | Critical Factor | | | | | | Not a Factor |
| Intensifying industry competition . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Channel power has shifted downstream . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Economic globalization—gaining access to global markets . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Suppliers have initiated integration efforts . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Customers have initiated integration efforts . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Need to compete against other global supply chains . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Desire to improve customer satisfaction . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Desire to improve supply chain productivity . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Desire to focus on core competence (outsource other activities) | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Opportunity to build the best team of supply chain partners . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

6. Indicate the **degree of cooperation/interaction** between personnel in your business unit.

|  | *Degree of Cooperation* | | | | | | |
|---|---|---|---|---|---|---|---|
|  | High | | | Average | | | Low |
| Between Purchasing and Manufacturing. . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Between Purchasing and Logistics . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Between Purchasing and Engineering. . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Between Manufacturing and Logistics . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Between Manufacturing and Marketing . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Between Engineering and Marketing . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Between Engineering and Manufacturing . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

7.  Based on your firm's business strategy and competitive environment, indicate the relative importance of the following *competitive initiatives* to your firm's long-term success by allocating 100 points among them. For example, if all of the initiatives are equally important, give each 20 points (100 ÷ 5 = 20). More important initiatives should receive more points.

    _____ Bringing new and innovative products to market (rapid product innovation)

    _____ Being flexible and responsive to customer needs/requests

    _____ Offering the highest quality products and service

    _____ Delivering products on time with shorter lead times

    _____ Being the low-cost provider

8.  Indicate the level of **<u>organizational support</u>** for supply chain integration initiatives.

    *Level of Managerial Support*

| *Within your Firm* | Very High | | | | | | No Support |
|---|---|---|---|---|---|---|---|
| Logistics management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Marketing management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Manufacturing management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Purchasing management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Information systems support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Top management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| *Across the Chain* | | | | | | | |
| 1st-Tier supplier management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 2nd-Tier supplier management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Service supplier management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1st-Tier customer management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 2nd-Tier customer management support | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

9.  To what extent do the following **act as barriers to supply chain integration**?

    *Degree to which each acts as a Barrier to SCM*

| | Serious Barrier | | | | | | Not a Barrier |
|---|---|---|---|---|---|---|---|
| A lack of willingness to share needed information. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Difficult to establish relationships based on shared risks & rewards. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Difficult to evaluate contribution of each supply chain member. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Inadequate information systems. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Inconsistent operating goals. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Lack of clear guidelines for managing supply chain alliances. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Lack of employee loyalty/motivation/empowerment. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| No systematic approach to measuring customer requirements. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Non-aligned performance measures. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Organizational boundaries prevent integration. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Value-added processes are not accurately costed. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Downsizing has reduced firm's resource base available for SCM | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

10. Is your firm engaged in **<u>supplier</u>** development? YES NO What percent of your supplier development efforts are spent at each supply chain level—if the level does not exist in your supply chain, please indicate "NA."

    _____ % 1st Tier          _____ % 2nd Tier          _____ % 3rd Tier          _____ % 4th Tier

11. Is your firm engaged in customer development (customization, key account management, joint research)? YES   NO What % of your firm's efforts are spent at each supply chain level—if the level is not applicable, please indicate "NA."

    _____ % 1st Tier          _____ % 2nd Tier          _____ % 3rd Tier          _____ % End Customer

12. Indicate **your firm's position relative to leading competitors** in your primary industry along the following dimensions.

| | *Competitiveness Relative to Industry Rivals* | | | | | | |
|---|---|---|---|---|---|---|---|
| | Much Greater | | About the Same | | | Much Less | |
| Sales growth in the last three years . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Market share growth in the last three years . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Growth in Return on Assets (ROA) in the last three years . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Overall competitive strength . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

13. To what extent has supply chain integration **improved your firm's performance** in the following areas?

| | *Degree of Performance Improvement* | | | | | | | *Percent Improved* |
|---|---|---|---|---|---|---|---|---|
| | Greatly Improved | | | | | Not Improved | | |
| Ability to handle unexpected challenges. . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Cost of purchased items . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Firm profitability. . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Inventory costs . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Market penetration . . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| On-time delivery/Due-date performance . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Order fulfillment lead times. . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Overall customer satisfaction . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Overall product cost . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Overall product quality . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Product innovation lead times . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Productivity . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Responsiveness to customer requests . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| The cost of new product development . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |
| Transportation costs . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 | _____ |

14. To what extent have the following facilitated effective supply chain integration and led to increased inter-firm coordination?

| | *Degree to which each Facilitates SCM* | | | | | | |
|---|---|---|---|---|---|---|---|
| | Effective Facilitator | | | | Not a Facilitator | | |
| A clear mission statement that is shared by supply chain members | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| A defined and accepted approach to sharing risks and rewards . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| A willingness to share information among supply chain members | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Adoption of supply-chain oriented performance measures . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Common goals among supply chain members . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Common operating procedures among supply chain members . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Consistent performance measures used throughout supply chain | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Customer selectivity (working more closely with fewer customers) | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| EDI linkages with other members of the supply chain . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Implementation of cross-functional processes . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Increased employee training regarding supply chain practices. . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Frequent & regular communication among supply chain members | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Relying on suppliers to manage supply chain inventories (VMI) | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Senior level managerial interaction among supply chain members | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Sharing of technical expertise with customers. . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Sharing of technical expertise with suppliers . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Supply base reduction strategies. . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Use of activity based costing . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Use of clear guidelines to manage supply chain alliances. . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Use of clear guidelines to select supply chain partners . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Use of cross-functional teams. . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Use ERP/SCM software . . . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Use of supply chain teams with members from multiple firms . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Use of total cost analysis . . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

15. Indicate the extent to which you agree with each of the following statements as they relate to your firm's supply chain:

| | Strongly Agree | | | | | | Strongly Disagree |
|---|---|---|---|---|---|---|---|
| A common set of operating policies are shared by members of the supply chain. . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| A written agreement or contract is an integral part of all our alliances . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Adequate information systems linkages exist with customers . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Adequate information systems linkages exist with suppliers . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Channel power has shifted from manufacturers to retailers over the past 5 years . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Clear guidelines and procedures are used for creating alliances . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Clear guidelines and procedures are used for monitoring alliances . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Consistent performance measures are used across different departments/functions | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Current information systems satisfy supply chain communication requirements | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Customer alliances operate under principles of shared rewards and risks . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Customer relationships are evaluated on the basis of their profitability . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Efforts to increase inter-functional coordination have increased over the past 5 years | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Employees are more loyal to our organization today than 5 years ago . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Our firm is more loyal to its employees today than 5 years ago . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| High levels of trust have been achieved with tier 1 suppliers. . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| High levels of trust have been established with important customers. . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Information applications are highly integrated within the firm . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Information systems are highly integrated throughout the supply chain . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Middle managers are more empowered to make operating decisions than 5 years ago | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| More process oriented performance measures are tracked today than 5 years ago | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| More supply chain oriented performance measures are tracked today than 5 years ago | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| My firm aggressively seeks to understand our customers' customers requirements | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| My firm aggressively helps 2nd tier and other upstream suppliers improve performance | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| My firm customizes products and/or services for important customers . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| My firm has adopted a key account approach to managing its best customers . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| My firm is flexible in terms of accommodating customers' special requests . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| My firm regularly solicits customer input . . . . . . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| My firm relies on 1st-tier suppliers to manage suppliers further upstream (2nd tier etc) | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| My firm understands clearly the competitive imperatives throughout the supply chain | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Non-management employees are more empowered to make operating decisions . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Operating goals are consistent across departments within my firm . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Operating goals are consistent among supply chain members . . . . . . . . . . . . . .. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Overall supply chain performance measurement capabilities have improved over past 5 years | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Significant investments are being made in application-specific information systems | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Significant investments are being made in enterprise-wide information systems. . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Strategic objectives are closely aligned among members of the supply chain . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Supplier alliances operate under principles of shared rewards and risks. . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Supplier performance is closely monitored and is the basis for future business . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Suppliers are carefully screened and assessed before they are selected . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| The firm has undergone major process re-engineering during the past 5 years. . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| The internet is emerging as a key tool to manage both customer and supplier interactions | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Value-added resources are shared among supply chain members. . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

16. Please provide the best 3-year-average performance data possible for.
_____ % Sales Growth        _____ % Growth in ROA        _____ % Market Share Growth

### THANK YOU FOR YOUR TIME AND ASSISTANCE

❏ Please send me a copy of the study findings.        Name_____

# Managing Supply Chain Integration (pre-notification)

1. Is **Supply Chain Integration** a passing management fad or a critical competitive strategy?
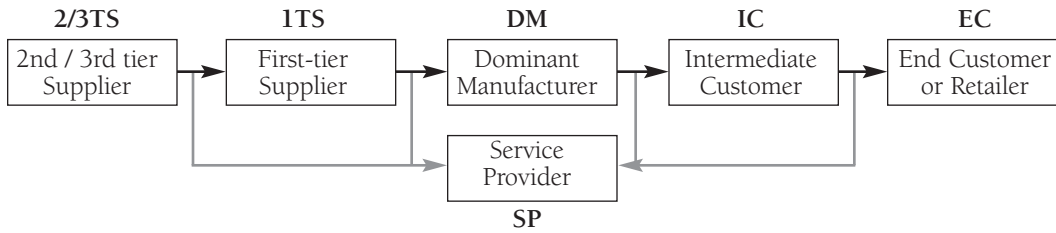
|  | Critical Strategy |  |  |  |  |  | Passing Fad |
|---|---|---|---|---|---|---|---|
|  | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

2. Is your firm **actively involved** in supply chain integration initiatives? Circle one:     YES     NO

3. How extensively is your firm **engaged in the following integration** efforts?

*Extent of Engagement*

| | Totally Engaged | | | | | | Not Engaged |
|---|---|---|---|---|---|---|---|
| Cross-functional process integration *within the firm*. . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Forward integration with valued first-tier customers. . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Backward integration with important first-tier suppliers . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Complete forward and backward supply chain integration . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

4. Referring to the following diagram, answer the questions below by circling the appropriate response.

| 2/3TS | 1TS | DM | IC | EC |
|---|---|---|---|---|
| 2nd / 3rd tier Supplier | First-tier Supplier | Dominant Manufacturer | Intermediate Customer | End Customer or Retailer |

Service Provider

**SP**

| | | | | | | |
|---|---|---|---|---|---|---|
| Where is your firm in the supply chain for its primary product? | 2/3TS | 1TS | DM | IC | EC | SP | None |
| Which firm possesses the most channel power or influence? | 2/3TS | 1TS | DM | IC | EC | SP | None |
| Which firm sets the objectives for SC integration? | 2/3TS | 1TS | DM | IC | EC | SP | None |
| Which firm sets the basic policies that guide SC integration? | 2/3TS | 1TS | DM | IC | EC | SP | None |
| Which firm sets the technology standard for SC integration? | 2/3TS | 1TS | DM | IC | EC | SP | None |

5. To what extent have the following led your firm to seek greater supply chain integration?

*Importance of Environmental Forces*

| | Critical Factor | | | | | | Not a Factor |
|---|---|---|---|---|---|---|---|
| Intensifying industry competition . . . . . . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Channel power has shifted downstream . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Economic globalization—gaining access to global markets . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Suppliers have initiated integration efforts . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Customers have initiated integration efforts . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Need to compete against other global supply chains . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Desire to improve customer satisfaction . . . . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Desire to improve supply chain productivity . . . . . . . . . . . . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Desire to focus on core competence (outsource other activities) | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Opportunity to build the best team of supply chain partners . . . | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

6. How large is your firm?     Number of employees _____     Annual sales in 1998 $_____

7. What is the primary industry in which your business unit competes? _____

# Interview Guide

**On-Site Interviews—Manufacturers**

<u>General Questions</u>:

How do you view supply chain management? That is, do you see it as a passing management fad and buzzword or as a valid and important competitive strategy?

|  | Passing Fad/Buzzword | | | | | | | | | Important Strategy |
|---|---|---|---|---|---|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Why?

What is your firm's working definition of Supply Chain Management?

As your firm began supply chain integration, what were the expected benefits?

What are the principal barriers that you have encountered in your supply chain integration efforts?

What have you done to overcome each of these major challenges?

What are the 3 or 4 most important requirements for successful supply chain integration?

How are the roles of different supply chain members determined and evaluated? Have their been any specific efforts to shift roles and responsibilities to improve overall supply chain performance?

<u>Integration with Suppliers</u>:

What does your supply chain look like; i.e., number of suppliers at each tier?

Who are your three largest suppliers?       What percent of your purchase dollars are spent with each?

_____       _____ %

_____       _____ %

_____       _____ %

How aggressively does your firm pursue integration with suppliers?

| <u>Not at All</u> | | | | | | | | | | <u>Aggressively</u> |
|---|---|---|---|---|---|---|---|---|---|---|
| With first-tier suppliers? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| With second-tier suppliers? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| With lower-tier suppliers? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Service providers? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Who has the major responsibility for supplier development beyond first-tier suppliers?

How do you work with second-tier and lower–tier suppliers to help them achieve higher levels of performance?

How does your firm communicate/share information with       1st-tier? 2nd-tier? Service providers?

What are the 3/4 key measures of supplier performance?       1st-tier? 2nd-tier? Service providers?

With what percent of your suppliers do you have a formal alliance? 1st-tier? 2nd-tier? Service providers?

What are the most important keys to alliance success?

How does your firm help suppliers improve their performance?       1st-tier? 2nd-tier? Service providers?

What are the primary responsibilities of service providers?

How have these responsibilities changed over the past several years? i.e., what activities have you outsourced to service providers?

<u>Integration with Customers</u>:

What does your demand chain look like; i.e., number of customers at each tier?

Who are your three largest customers?     What percent of your sales does each represent?

_____     _____ %

_____     _____ %

_____     _____ %

How aggressively does your firm pursue closer relationships with customers?

|  | <u>Not At All</u> |  |  |  |  |  |  |  | <u>Aggressively</u> |  |
|---|---|---|---|---|---|---|---|---|---|---|
| With immediate, first-tier customers? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| With customers further downstream? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

How does your firm identify customer needs and requirements?

How does your firm identify needs and requirements of customers further downstream, including end customer expectations?

How does your firm measure customer satisfaction?

How does your firm measure the satisfaction of customers further downstream? i.e., the satisfaction of your customer's customers?

How does your firm work with immediate customers to improve their performance?

How does your firm work with customers further downstream to improve their performance?

How does your firm communicate customer needs, preferences, requirements with upstream suppliers?

What SCM practices at your company would you consider to be world-class?

Do you have any supply chain anecdotes/stories that you would like to share?

Let's take a minute to summarize key practices in each of the quadrants in the following matrix.

|  | **Customers** | **Suppliers** | **Service Providers** |
|---|---|---|---|
| **Employee Development** |  |  |  |
| **Information Systems** |  |  |  |
| **Performance Measurement** |  |  |  |
| **Alliance Management** |  |  |  |

## On-Site Interviews-Retailers

<u>General Questions</u>:

How do you view supply chain management? That is, do you see it as a passing management fad and buzzword or as a valid and important competitive strategy?

|  | Passing | | | | | | | | | Important |
|---|---|---|---|---|---|---|---|---|---|---|
|  | Fad/Buzzword | | | | | | | | | Strategy |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Why?

What is your firm's working definition of Supply Chain Management?

As your firm began supply chain integration, what were the expected benefits?

What are the principal challenges that you have encountered in your supply chain integration efforts?

What have you done to overcome each of these major challenges?

What are the 3 or 4 most important requirements for successful supply chain integration?

How are the roles of different supply chain members determined and evaluated? Have their been any specific efforts to shift roles and responsibilities to improve overall supply chain performance?

<u>Integration with Suppliers</u>:

What does your supply chain look like; i.e., number of suppliers at each tier?

Who are your three largest suppliers?          What percent of your purchase dollars are spent with each?

_____          _____ %

_____          _____ %

_____          _____ %

How aggressively does your firm pursue integration with suppliers?

|  | <u>Not at All</u> | | | | | | | | | <u>Aggressively</u> |
|---|---|---|---|---|---|---|---|---|---|---|
| With first-tier suppliers? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| With second-tier suppliers? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| With lower-tier suppliers? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Service providers? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Who has the major responsibility for supplier development beyond first-tier suppliers?

How do you work with second-tier and lower-tier suppliers to help them achieve higher levels of performance?

How does your firm communicate/share information with          1st-tier? 2nd-tier? Service providers?

What are the 3/4 key measures of supplier performance?          1st-tier? 2nd-tier? Service providers?

With what percent of your suppliers do you have a formal alliance? 1st-tier? 2nd-tier? Service providers?

What are the most important keys to alliance success?

How does your firm help suppliers improve their performance? 1st-tier? 2nd-tier? Service providers?

What are the primary responsibilities of service providers?

How have these responsibilities changed over the past several years? i.e., what activities have you outsourced to service providers?

# APPENDIX

<u>Integration with Customers</u>:

How aggressively does your firm pursue closer relationships with consumers?

| Not At All | | | | | | | | | Aggressively |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

How does your firm identify consumer needs and requirements?

How does your firm communicate these needs to upstream suppliers?

How does your firm measure customer satisfaction?

What does your firm do to better meet individual customers' needs?

What SCM practices at your company would you consider to be world-class?

Do you have any supply chain anecdotes/stories that you would like to share?

Let's take a minute to summarize key practices in each of the quadrants in the following matrix.

| | Customers | Suppliers | Service Providers |
|---|---|---|---|
| **Employee Development** | | | |
| **Information Systems** | | | |
| **Performance Measurement** | | | |
| **Alliance Management** | | | |

## On-Site Interviews-Service Providers

<u>General Questions</u>:

How do you view supply chain management? That is, do you see it as a passing management fad and buzzword or as a valid and important competitive strategy?

<div align="center">

Passing                                    Important
Fad/Buzzword                          Strategy
1    2    3    4    5    6    7    8    9    10

</div>

Why?

What is your firm's working definition of Supply Chain Management?

As your firm became involved in supply chain integration efforts, what were the expected benefits?

To your firm?

To customers?

To the overall supply chain?

What are the principal challenges to supply chain integration from a service provider perspective?

What have you done to overcome each of these major challenges?

What are the 3 or 4 most important requirements for successful supply chain integration?

How are the roles of different supply chain members determined and evaluated? Have their been any specific efforts to shift roles and responsibilities to improve overall supply chain performance?

With what percent of your customers do you have a formal supply chain alliance?

From the service provider perspective, what are the keys to alliance success?

How have performance expectations changed in supply chain alliances?

How does your firm identify consumer needs and requirements?

What unique and sought-after value-added services do you provide to supply chain partners?

What are the most important measures by which your performance is evaluated by supply chain partners?

How does your firm measure customer satisfaction?

How is information shared in your key supply chain relationships?

What SCM practices at your company would you consider to be world-class?

Do you have any supply chain anecdotes/stories that you would like to share?

Let's take a minute to summarize key practices in each of the quadrants in the following matrix.

|  | **Customers** | **Suppliers** | **Service Providers** |
|---|---|---|---|
| **Employee Development** |  |  |  |
| **Information Systems** |  |  |  |
| **Performance Measurement** |  |  |  |
| **Alliance Management** |  |  |  |

# Channel Perspectives on SCM

Essentials of Supply Chain Management—Retailer Perspective

| Issue/Practice | Retailer 1 | Retailer 2 | Retailer 3 |
|---|---|---|---|
| **SCM Definition** | Internal & external integration. "Hard to get a definition that truly captures the integration required." Focus on first tier. | "Integration of product & information processes with product suppliers & service providers." Must build on internal integration. | Eliminating gaps among SC members to get right product at right price at right time in right condition to consumer. |
| **SCM Commitment** | Critical—"on a scale of 1-10, its an 11." Top mgmt promotes vision. Lack complete functional buy-in. | Greatest commitment from logistics group, where SCM group is housed. Lacks "credibility" with top mgmt. | SCM important. Top mgmt supportive but not driving force. Mixed functional support. |
| **SCM Mapping** | Overall network computer modeled. Macro version posted on wall. Mgmt. focus is on first tier & 3PLs. | No formal SC map. Still have not fully adopted process maps. Lack second-tier knowledge. | No formal SC map. Struggle a little with total costing. Lack second-tier knowledge. |
| **Motivation** | SCM is the business strategy. Must deliver premium customer satisfaction cost effectively. | Need for collaborative solutions & information integration to meet market demands/consolidation. | Consolidating & competitive industry. High service required to avoid role shift out of SC. |
| **Benefits** | Customer satisfaction & loyalty. Increased velocity of materials & money. Network optimization & bottleneck elimination. | Greater profitability via efficiency optimized organization & leveraged volumes/one voice. Better product flow & become preferred customer. | Cost savings through better trade relations & innovative practices. Closer to customer. Simplification. |
| **Barriers** | Expanding the vision of SCM at all levels. Lack understanding. Info. availability & analysis. Functional conflicts. Network complexity. | Conflicting functional objectives; i.e., turf protection. Lack mgmt support. Inconsistent measures. Lack "big-picture/out-of-the-box" thinking. | Resist change; lack of trust. Lack info systems & consistent measures. Conflicting views & experience. SC silos. |
| **Bridges** | Document flows & processes. Track inv. velocity. "Sell" concepts & share data. IS integration with suppliers. Coordinating sessions w/suppliers. | ABC/total costing to show value. Upward market groups that sacrifice for overall organization. Aligned measures & trust. | Evaluate/modify processes. Hire SC mgrs. Align metrics & invest in IT. Show customers benefits of cooperation. Vision. |
| **Performance Measurement** | Emphasize supplier compliance. Focus on delivery reliability & fulfillment on line-item basis. Internal emphasis on flow times. | Scorecard emphasizes on-time, fill rate, cycle time, inventory levels, & "adaptability." Adaptability drives partner choice. Total landed costs. | On-time and fill rate dominate. Also measure success of joint promotions. Would like to increase total costing ability. |
| **Alliance Management** | Velocity strategies require tight interfaces. Information intensive. Most important alliance capability is perseverance. | 1% "high-quality" alliances—share ideas, collaborate on continuous improvement. Formal guidelines to select allies. Shared risks/rewards. | 1% synergistic supply alliances Higher percent with customers-provide training & programs. Clear roles & responsibilities. |
| **Information Sharing** | IS systems focus on "seamless transitions & handoffs." Supplier orders via phone, fax, & EDI. Customer orders via web. | 95% POS sent via EDI. Some EFT & ASN. Minimal CAO. Considered web, but are taking a wait & see approach. A little adversarial. | EDI & WMS provide info back to first-tier suppliers. Significant face-to-face, fax, & phone. Collaborative promotions. |
| **People Management** | Active effort to hire SCM mgmt skills externally. Skill building & people development viewed as key, but training not yet in place. | Integration training focuses on 3 areas: evaluate supplier capability, relational mgmt, & use of 3PLs. Lack common vision & passion. | People success begins with leadership. Extensive senior mgmt education. Tie rewards to results. 360 degree feedback. |

Essentials of Supply Chain Management—Retailer Perspective

| Issue/<br>Practice | Retailer 4 | Retailer 5 | Retailer 6 |
|---|---|---|---|
| **SCM Definition** | "Managing the flow of merchandise through logistics network to satisfy the needs of customers." Focus on internal flows & first-tier relationships. | "Managing the inbound & internal processes to minimize inventory while maximizing service to the customer." First-tier up/downstream. | "Coordinate design, production, & transit cycles to feed mkt. calendar. Includes reverse logistics." First-tier upstream. |
| **SCM Commitment** | SCM is critical part of strategy. Strong operations culture & mentality. Lack complete buy-in. | Collaboration essential to survival. Lack top mgmt commitment. Varying levels of functional mgr buy in. | SCM is critical. New VP of SC operations. Still lack complete buy-in throughout organization. |
| **SCM Mapping** | No formal SC map. Careful mapping of internal processes. Lack second-tier knowledge. | No formal SC map. Many internal processes lack transparency. Lack second-tier knowledge. | No formal SC map. Map key processes to first tier to drive role-shifting. Limited second tier. |
| **Motivation** | Intense competition. Need for asset efficiency. Relentless drive to offer customers great value. | Survival in face of tough competition & industry consolidation. Take time out of system & be more responsive. | Must reduce IPD & fulfillment cycle times & compete for best suppliers. "Easy fruit" picked. |
| **Benefits** | Drives continuous improvement mindset. Increased inventory velocity. Reduced working capital. Better customer satisfaction. | Improved in-stock position. Improved inventory turn & ROI. Improved customer service. Right product at right time. | Lower end-to-end costs. Reduced stockouts & mark downs. Shorter cycles & better forecasts. Customer of choice. |
| **Barriers** | Tradeoffs between price & flexibility. Lack willingness to share info. Poor sharing rewards. Legacy info. systems. Global distances. | Organizational compartmentalization. Counterproductive measures. Inconsistent policies & objectives. Accuracy of forecasts & inv. info. | Silo mentality—turf issues. Lack vision—internal/external. Challenge of tradeoff analysis. Metrics, trust, & info. sharing. |
| **Bridges** | Appropriate mindset—optimization. Partners that demand info. sharing. Simple, reliable processes. Respect for suppliers. Organization structure. | Identification of priorities & educate mgrs on these issues. Invest in & integrate systems to provide real-time inv. data. Standardize policies. | VP-level integration sessions. Education. Trust. SC metrics & decision tools. Rigorous supplier selection/certification. |
| **Performance Measurement** | Focus on continuous cost reduction & net landed cost. On-time delivery & fill rates. Supplier idea generation. Repeat business carefully tracked. | Supplier scorecard update quarterly. Key measures are gross margin, turn, on-time, & markdown percent. Internal focus on ROI & efficiency. | Customer: on-time & damage. Internal: margins & fulfillment. Suppliers: on-time & complete orders. Tradeoff analysis. |
| **Alliance Management** | Frequent face-to-face communication. Focus on fair. VMR & co-branding. Must act to personal & corporate values every time. Share value. | Very small percent synergistic. Rely on size to motivate suppliers— "They need us." Issue resolution & better info. sharing are key. | Limited synergistic activities. Some role shifting; i.e., inspect product on site at suppliers. Share info. & trust building. |
| **Information Sharing** | Biggest challenge to info sharing is management attitude. Greater emphasis on "systems compatibility." Constant communication needed. | Extensive POS system feeds into automated inv. mgmt. system. 100% EDI connection with suppliers. Web in infancy. Constant phone. | Share forecast data with key suppliers. Demand data sketchy at best. System visibility "not there yet." |
| **People Management** | "Success comes from people." Hire motivated people, get cultural buy-in, empower, & turn loose to solve problems. Mgmt. must walk the talk. | People are key, but perhaps "have been taken out of picture more than they should have been." Working to educate regarding collaboration. | In-house university provides training on systems view, process improvement, & brand management. |

Essentials of Supply Chain Management—Retailer Perspective

| Issue/ Practice | Retailer 7 | Retailer 8 | Retailer 9 |
|---|---|---|---|
| **SCM Definition** | "SCM is managing product & cash flows from first tier to cash register." Focus on internal process integration. "Concept not new." | The goal is total pipeline visibility. Focus is on internal process integration and closer relationships with first-tier suppliers. | Do not talk SCM terminology. Focus on internal integration & "flow of goods & money from supplier to customer." |
| **SCM Commitment** | High level of idealism regarding organizational & SCM capability. Lack complete commitment. | SC team in place, but lacks complete commitment from top mgmt & some functional mgrs. | High level of commitment to integration. Top mgmt investing to create team-oriented culture. |
| **SCM Mapping** | No formal SC map. Time spent looking at policies, procedures & processes. Lack second-tier knowledge. | No formal SC map. Working on process transparency & business rules. Limited second-tier knowledge. | No formal SC map. Working to increase process transparency. Limited second-tier knowledge. |
| **Motivation** | Demanding customers. Fierce competition—tremendous merger activity in industry. Low margins. | Customers demand shorter cycles & low prices. Desire to be fully JIT. E-commerce opportunities/threats. | New players at low price point. Cost reduction, shorter cycles, greater variety, & high service. |
| **Benefits** | Cost reductions & strengthened margins. Higher in-stock level of a broader range of high-quality, desirable products. | Get everyone on the same page. Better forecast accuracy. Shorter cycle times, faster inventory turns, fewer stockouts, & reduced costs. | 25/50% decrease in reorder LT. 50% increase on-time delivery. Cost control. Better cross-functional communication. |
| **Barriers** | Functional conflicts—no single individual controls internal value-added processes. No entity controls entire SC. Tradeoffs. Measures. | Notion that SCM is inventory mgmt. Lack top mgmt commitment. Turf protection & functional conflict. Design global network. Resources. | Lack process transparency. Conflicting goals/measures. Turf & tradeoffs. Lack follow through. Employee turnover. |
| **Bridges** | Educate regarding total system costs. Align measures. Create process owners. "Increase discipline to do things right the first time." | Creating a vision of what SCM is & what it can do. Metrics that document progress. Training & education. Defining key processes. | Build a culture & structure capable of working across functions. Training. Process analysis. Aligned metrics |
| **Performance Measurement** | On-time complete delivery is the critical issue. Measuring SKU rationalization. Would like better true landed cost after allowances. | Supplier scorecards emphasize fill rate, quality, & on-time delivery. Responsive to forecast flexibility. Internally—inven. turns & in-stock. | Use supplier scorecard to force rank all major suppliers & drive continuous improvement. 138 item best practice roadmap. |
| **Alliance Management** | 10% at some stage of alliance development. Trust, recognizing mutual objectives, & info sharing are key. "Walk the talk." | A few truly synergistic relationships. Many VMI relationships. Keys are trust, technology linkage, shared vision, & understand "our business." | 10%+ close relationships. Do not enter into LT contracts or volume promises. First right of refusal. "We know each other." |
| **Information Sharing** | 90%+ EDI communication with first tier. Web "conversations." Limited computer assisted ordering. Integrating merged systems. | EDI cascades back 2 tiers. Web interface for customers. Cross-functional teams to coordinate internally. SAP in progress. | Use in-house EDI system to share production data. Moving to web. Know where product is at all times. 99.9% accuracy. |
| **People Management** | People must be educated about the nature of SCM. Customer service training. Some cross-functional teams. Stock options. | Weekly meeting to coordinate activities & resolve problems. SCM education across senior management. | Changing culture is key to leveraging people. Training all senior mgrs in teambuilding. Cross-functional rotations. |

Essentials of Supply Chain Management—Retailer Perspective

| Issue/ Practice | Retailer 10 | Retailer 11 | Retailer 12 |
|---|---|---|---|
| **SCM Definition** | Efficiency & speed into & through the organization. Internal emphasis on building unparalleled processes. Tight first-tier supply relationships. | End-to-end visibility from first tier supplier to retail store. Still in flux. Internal emphasis on process excellence extending 1 tier back. | "Business of delivering value to customers & shareholders." From forecasting to delivery of product. Emphasis on first tier. |
| **SCM Commitment** | Absolutely critical—SCM is here to stay; its irreversible. Top mgmt fully committed at least to first tier. | Absolutely critical. Top mgmt committed. SC team leader reports to VP. Lack lower level buy-in. | VP of supply chain operations. General buy-in but still evolving SCM critical & continual focus. |
| **SCM Mapping** | No formal SC map. Key processes mapped & managed carefully. Lack second-tier knowledge. | No formal map of entire SC. Internal processes being mapped & roles redefined. Lack second-tier knowledge. | No formal map of entire SC. Some process mapping to first tier. Lack second-tier knowledge. |
| **Motivation** | Meet customer expectations—"so many options exist & customers will not tolerate stock outs." | Fierce competition & demanding customers. SCM provides customer focus to entire organization. | Profitably support rapid growth. Better relationships & brand. Optimize total delivered cost. |
| **Benefits** | Better in-stock performance. Lower product costs & faster inv. turns. Improved planning & better communication with SC members. | Improved inventory productivity. Enhanced customer service—better in-stock to promotion. Therefore, greater customer loyalty. | Enhanced profitability. Deliver customer/shareholder value. Reduced delivered costs. Better inventory management. |
| **Barriers** | Lack sufficient training; also, need better information systems & data accuracy. Do not deal well with exceptions. Organization. | Organizational structure & culture. Data integrity—timely, accurate, & relevant. Resistance to change— "gaming the system." Measurement. | Keeping up with HR needs. Lack skills/experience. Metrics. Disparate info systems. Too many SKUs. Change mindset. |
| **Bridges** | Training that shows downline impact of decisions. Process analysis to identify "weak links." Open communication & clear measures. | Top mgmt commitment—provide measures to show SCM impact. Clearly defined objectives. Metrics and scorecards to track progress. | Cross-experienced managers. Co-located managers. Info system investment (migrate to web). Better education/training. |
| **Performance Measurement** | Web-based, real-time scorecards. Emphasis on cash-to-cash cycles & on-time delivery. Measures must promote stated behavioral goals. | Measures must be tied to objectives & show impact of SCM. Scorecard emphasizes on-time & complete shipments. Vendor compliance. | Supplier measures focus on conformance quality, cost, adaptability, & delivery speed. SC metrics evolving slowly. |
| **Alliance Management** | Focus on third-party relationships & "A" first-tier suppliers. Provide real-time communication of performance status. Coordinate plans & products. | Very small percent; i.e., >1%. "ABC" classification of suppliers. Dedicated vendor relations team. Provide some thirrd-party consulting. EDI linkage. | 7 true alliances among 50 "A" suppliers. Trust & cooperative problem solving. Share rewards. Protect supplier technologies. |
| **Information Sharing** | EDI systems combined with web application connects all retail stores, DCs, & key suppliers. Information is the lifeblood of SCM. | EDI with 5-yr "dream" of web-based. Member of net exchange. Vendor advisory council voices concerns, is sounding board, & meets vendors. | IT is decision making & learning enabler. Best-of-breed mindset. Share forecasts/production plans. Moving to web. |
| **People Management** | People are key—every individual must be passionate about his/her job. Daily meetings to review results & coordinate plans/programs. | People are key—training & trust key. Emphasis on building culture of trust by establishing clear objectives, aligned measures, & reliable systems. | Hire good people; empower them, & hold them accountable. Emphasize individual learning & sharing. Matrix organization. |

Essentials of Supply Chain Management—Retailer Perspective

| Issue/<br>Practice | Retailer 13 | Retailer 14 |
|---|---|---|
| SCM<br>Definition | "The practice of coordinating 3+ firms involved in manufacturing, sourcing, movement, & processing of product to the end customer." | "Coordinated, integrated flow of materials utilizing a common info base generated from store level POS data." Extends to second tier. |
| SCM<br>Commitment | Strong senior mgmt commitment. Belief that the organization is in reality a SC company. | Strong commitment among SC group. Lack top mgmt. support & divisional cooperation. |
| SCM<br>Mapping | No formal SC map; processes are mapped & process owners identified Lack second-tier knowledge. | No formal SC map. Well-defined internal map of value-added process. Lack second-tier knowledge. |
| Motivation | SCM is needed to meet customers' expectations, drive differentiation, & create vital non-leverage efficiencies. | Higher, maintained markups. Better meet customer demand. Better financial performance. |
| Benefits | Better coordination of value-added activities. Better consolidation & reduced transaction costs. Logistical efficiencies & customer satisfaction. | Shorter cycles from suppliers. The right product on the shelf. Higher margins & reduced markdowns. Higher stock price. |
| Barriers | Inertia. Lack of world-class systems. Metrics that promote local optimums. Functional silos. Lack of people & infrastructure in global markets. | Organizational structure. Functional conflicts. Set mentality & procedures. Resistance to change. Lack SC understanding. Poor measures. |
| Bridges | Education & participation. Investing in infrastructure. Document & bring facts forward. Process re-engineering & ownership. Information platforms. | Credible & high profile SC champion. Well-targeted pilot projects. Early successes & personal relationships to help overcome set mindsets. |
| Performance<br>Measurement | Measure fill rates, on-time, lead time, responsiveness etc. Use ABC to define total landed cost by product, by supplier, by channel. Fanatical. | Measure focus forward, not back to suppliers. Emphasize consumer fulfillment. Store-level in-stock most important. Lack SC metrics. |
| Alliance<br>Management | 5% synergistic alliances. Key word to describe alliances is "jointly." Jointly share info, jointly set goals, jointly measure, jointly take costs out. | No synergistic alliances. Largest customer for most suppliers—use full leverage. Do not share info. etc. Use LT contracts with 3PLs. |
| Information<br>Sharing | EDI linkages & extranet to share 3-yr history & 18-month forecast. CPFAR pilot test. A great deal of face-to-face time with key partners. | "All the IT needed"—daily POS by item & store (do not share with suppliers). POs via EDI, but do not share strategic info. Share shipping data w/3PLs. |
| People<br>Management | People are key. Extensive education via workshops, seminars, & training rotations. Constant learning via experimentation. Stock options. | People, more particularly the culture, are a critical barrier. Having trouble changing the mindset, traditional practices, & roles/responsibilities. |

Essentials of Supply Chain Management—Finished Goods Assembler Perspective

| Issue/ Practice | Finished Goods Assembler 1 | Finished Goods Assembler 2 | Finished Goods Assembler 3 |
|---|---|---|---|
| **SCM Definition** | Internal process integration, moving to "supplier-to-customer mgmt of value-added processes." Focus is on order mgmt & fulfillment. | "Management of materials & info. flow from suppliers to line-side delivery." Focus is on inbound, especially on first tier. | Global network delivers products & services from raw materials to end customers via engineered flow of info, cash, & materials. |
| **SCM Commitment** | Strong commitment to concept of integration. Top mgmt & senior functional mgmt partially on board. | SCM is viewed as critical at the senior mgmt level. Lack complete functional buy-in. | SCM is critical to strategy & is part of materials culture. Working to broaden buy-in. |
| **SCM Mapping** | Process map all major value-added processes. Functional gaps. No SC map. Meager second-tier knowledge. | Formal map goes to third tier. Have not taken much advantage of knowledge gained from mapping. | Formal process maps for first tier up/downstream & service providers. Limited second-tier. |
| **Motivation** | Global competition & demanding customers. "You have to offer great products built/delivered efficiently." | Flow time & cost reductions are vital to fend off tough competition. Pressure from Wall Street. | Structural change in industry demands efficiency. Intense global price/margin pressure. |
| **Benefits** | Service responsiveness—shorter cycles & complete orders. Reduced inv. Better mgmt of global resources. Better info. sharing up/downstream. | Cost reductions accompanied by reduced materials delivery lead times. Achieve the Spirit of the "7-rights" statement. | Virtual enterprise increases market responsiveness/agility. Improved market share, ROA, delivery, & shareholder value. |
| **Barriers** | Complexity. Organization—group conflict & sub-optimal decisions. Where to focus—up or downstream. Conflicting goals & measures. | Disconnected processes; functional sub-optimization (turf battles). Lack supplier trust. Personalities. Tie-in to P&L. Measures. Fear role shifting. | Lack of trust. Local optimization. Organization & resistance to change. Systems incompatibility. Global issues—culture/distance. |
| **Bridges** | Creation of Order Mgmt Group. Continuous improvement training & enhanced/integrated IT systems. Credible SC champion. Clear vision. | Internal, x-functional advisory council & supplier councils. Proactive info. sharing/measurement. Best practices drive learning. Supplier integration. | Face-to-face communication. Invest in IT compatibility. Aligned process/SC measures. Process mapping. Training/rotations. |
| **Performance Measurement** | Outbound: schedule attainment by mix & volume. Inbound: scorecard emphasizes quality, cost, & on-time. Measures must lead to improvement. | Increased measurement emphasis. Key areas are quality, cost, on-time delivery, & customer satisfaction. Lack effective total costing. | Scorecards & quarterly business reviews. Focus on technology, quality, responsiveness, delivery, cost, & environment. TLC |
| **Alliance Management** | Know "capacities, capabilities, & constraints" of "A" suppliers. Closer relationships but limited synergies. Dedicated teams for key customers. | Only 3 synergistic alliances among 1,000s of relationships. ABC classify to define intensity. Need more trust & info sharing. Good contract is key. | Few alliances—too expensive. Must continuously build the relationship. Share business plans, value propositions. Trust. |
| **Information Sharing** | EDI dominates up/downstream. Goal is to have web catalogue in place within 18 months. Shared forecasts. Joint promotion planning. SAP. | Implementing ERP & engineering systems. Moving to web linkage with suppliers. Lack willingness to share complete information. | "SCM would be dead without information sharing." Use EDI, phone, fax, & face-to-face with suppliers. Must invest in IS. |
| **People Management** | Human resource is vital. Need to expand training & empowerment. Trying to make SC visible so that individuals understand the tradeoffs. | Extensive learning opportunities— 100s of courses available. Stock options offered for completion of training. Annual development plans. | Education needed to create collective SCM understanding. Cross-functional rotations. Must alter engineering mindset. |

Essentials of Supply Chain Management—Finished Goods Assembler Perspective

| Issue/ Practice | Finished Goods Assembler 4 | Finished Goods Assembler 5 | Finished Goods Assembler 6 |
|---|---|---|---|
| **SCM Definition** | "End-to-end Thinking"—even when organization is not executing that way. Begins internally & extends to suppliers & customers. | From "dirt to us." Definition does not include downstream entities. Also focuses on making a set of internal processes world class. | Focus on internal integration & "managing the physical flow to the customer's warehouse." SCM=Eng+Mfg+Pur+Log+Fore |
| **SCM Commitment** | Strong support from SCM group. Lack top management buy-in. All functions not on board. | Top mgmt is fully committed. SCM is vital strategic thrust. Lack divisional and factory support. | SCM organization in place with Ex. VP of SCM. SCM is vital strategy, but lacks total buy-in. |
| **SCM Mapping** | Internal processes mapped. Employ "As is" & "Should be" maps. Lack second-tier knowledge. | No supply chain map. Lack second-tier knowledge. Some processes mapped. | No supply chain map. Lack second-tier knowledge except for one commodity. |
| **Motivation** | Survival. Customer responsiveness. Operational excellence. | Intense competition. Purchased content up from 40% to 70%. Rely on supplier design/technology. | Reduce total landed cost. SCM needed to meet customer service expectations. |
| **Benefits** | Greater customer responsiveness. Doubled inventory turns. Better fill rates/knowledge. A common template across divisions. | Cost reduction. Lead time reduction (goal is 60%). Leveraged commonality & better communication with suppliers. | Improved inventory turns. More rationalized distribution. Quicker delivery to customers. Tailored services/greater trust. |
| **Barriers** | Organization is main barrier. Also, functional conflicts, getting people to see the need for change, measurement, & accountability. | Fiercely decentralized organization. Turf protection/functional conflicts. Non-aligned performance measures. PMs lack of critical SCM skills. | Too cost focused—failure to focus on customer. Getting buy-in at all levels. Poorly aligned measures. Infrastructure. |
| **Bridges** | Creation of Integrated SC Dept. Creation of best-in-class processes. Link measures to objectives. SCM visibility & top mgmt support. | Creating hybrid organization & enterprise-wide commodity teams. Created supply management council. In-house training/university alliances. | Create clear vision. Implement fair & simple measures. Create dedicated cross-functional account mgmt teams. Trust. |
| **Performance Measurement** | Replenishment Cycle Time is key . "Metrics are critical! We don't know what the new ones should be, but we need them." | Scorecard used to share status & promote improvement. Quality, cost, delivery, attitude, & technical support are emphasized. Updated quarterly. | Customer measures—on-time & order fill. Evaluate plant mgrs on their customer impact. Continuous cost reduction. |
| **Alliance Management** | Established "Business Partners" on customer side. Building closer supply relationships. True alliances are a small percent of relationships. | 3% of suppliers are "Partners." Only 1% synergistic. Joint efforts on cost, quality, & design. Continuous supplier improvement & trust. | Do not build supplier alliances; focus is on customer alliances. Use 3-5 yr supplier contracts with improvement clauses. |
| **Information Sharing** | Replicated systems have led to an emphasis on IT cost reduction. 80%+ of suppliers are EDI or web capable. SAP implementation. | 75% of suppliers are EDI connected. Production plans shared on 3-month rolling horizon. Intra & extranets are being used to share information. | Belief that all info sharing will be web-based. Working on web-based VMI. Some web sales directly to end customers. |
| **People Management** | SCM is human resource issue. Everyone must be on same page. Vision, training, & measurement are critical to creating passion. | SCM requires competent, secure people. Over 50 SCM-related classes taught in-house and to first-tier suppliers. Expanding to second tier. | People viewed as one of 3 pillars of successful SCM. Training is critical; also, open communication & trust. |

Essentials of Supply Chain Management—Finished Goods Assembler Perspective

| Issue/ Practice | Finished Goods Assembler 7 | Finished Goods Assembler 8 | Finished Goods Assembler 9 |
|---|---|---|---|
| **SCM Definition** | Focus is internal & downstream to customer; i.e., "doing the right thing to provide the best service to the customer at lowest landed cost." | "Design & coordination of five fulfillment systems." Focus on internal integration with interfaces both up & downstream. | Plan & control the efficient & effective flow of materials & info. from supplier to customer. Focus on first-tier backward. |
| **SCM Commitment** | SCM is vital & SC organization in place, but SC is "something you have to constantly sell in-house." | SCM viewed as "critical to survival." Top mgmt fully committed. Division & functional mgrs not fully on board. | Sr VP of Purchasing, Quality, & Logistics. Critical to business success. Lack complete buy-in. |
| **SCM Mapping** | Very general SC maps, but do not include all players or specify roles. Lack second-tier knowledge. | General map of process, but does not include all players or specify roles. Lack second-tier knowledge. | No formal SC map. Lack second-tier. Mapped material flows to guide consolidation/milk runs etc. |
| **Motivation** | Consolidation among customers. Time compression & constant cost pressure. | "If we are not better at managing the supply chain, we have no reason to exist." Consolidation & competition. | Must support growth w/out capacity investment. Benchmarked SCM processes. |
| **Benefits** | Better inventory management; e.g., 50% increase in sales with 35% less inventory. Lower costs. Better customer service. | Better delivery: on-time & complete. Shorter cycles & greater response. Faster inv. turns, better planning, & more collaboration across depts. | Doubled inventory turns. Reduced expediting/air freight. Better quality & enhanced assembly efficiencies. |
| **Barriers** | Lack of measurement alignment. Internal culture of the organization. Role definition & process complexity. Lack of information systems. | Resistance to change. Culture of independence. Organization. Trusting the "black box" of new IT. Conflicting performance measures. | Internal resistance to dramatic change. Incompatible info systems/connectivity. Finding committed suppliers. |
| **Bridges** | Formal SC organization with top mgmt support. Common vision supported by training & measures. Make process/relationship visible. | Buy-in/organizational support—from top down. Integrative performance measures & better SC assessment. Team processes & success stories. | Document value-added of SCM. Supplier reduction/development. Process standardization. Create Sr. VP. Logistics rationalization. |
| **Performance Measurement** | Case fill is all-important measure. No use of balanced scorecard. Consistency of metrics vary—SC measures lacking. | Emphasis is on quality & delivery (on-time & complete). Do not use scorecards. "To-be" processes designed with accountability in mind. | Use metrics to select suppliers & achieve conformance. Quality (PPM), on-time delivery, eng. support, & SCM commit. |
| **Alliance Management** | Small percent synergistic. Use alliances to experiment. Trust & open communication critical. Share investments in IT & new practices. | 5% partnerships. Only partner with ultrahigh performing suppliers. Open communication, shared expertise, & process development are critical. | No synergistic alliances. Use LT contracts for 40% of major buys. Supplier commitment key. Deploy 6-sigma training. |
| **Information Sharing** | EDI, fax, phone, & web are all used. Rely on best-of-breed IT systems. SAP experimentation. Extranet & CPFAR are new sharing vehicles. | 80% incoming orders are EDI; 15% supplier orders are EDI (fax, phone). Web not an immediate solution. ASN &EFT. Software is key enabler. | 85% orders via EDI. Building web capability using AIAG XML standard. Share quarterly forecasts with key suppliers. |
| **People Management** | People are key; technology is enabler. New SC training program. Cross-experienced managers. Use cross-functional teams. | People are critical—must bring right people together on SC teams. Team members must have expertise & credibility. Best practice training. | People are viewed as key & recognized as barrier. Few formalized efforts in place to leverage people. |

Essentials of Supply Chain Management—Finished Goods Assembler Perspective

| Issue/ Practice | Finished Goods Assembler 10 | Finished Goods Assembler 11 | Finished Goods Assembler 12 |
|---|---|---|---|
| SCM Definition | "Getting the right product to the customer so that the customer & we both make money." Internal integration & 1 tier up/downstream. | Internal integration extended both up & downstream. Most efforts focus on internal integration. Customer integration most difficult. | No formal definition; however, SCM is what this company does. Coordinating a global network of suppliers. first tier upstream. |
| SCM Commitment | Strong strategic issue for 10 years. Complete buy-in among materials managers. Lacks total visibility. | "SCM is not a fad, it's a reality" Materials mgrs committed. Top mgmt beginning to buy in. | Consider the concepts embodied in SCM as essential tool. Lack complete buy-in functionally. |
| SCM Mapping | Greatly reduced supply & customer base has increased visibility. Some second-tier knowledge. "Simple Chain" | Internal SC intricately mapped. Track 400 first-tier suppliers. Lack second-tier knowledge. | No formal mapping. Most info retained in minds of key mgrs. Track first tier for consolidation. |
| Motivation | Intense global competition. Consolidation among customers. Supply-base reduction. | Global customers demand SCM. Global network design. Desire for revenue growth & cost control. | Need for speed to make money. Maintain high margins. 100% outsourced to minimize costs. |
| Benefits | Reduced incoming cycle time & better inventory mgmt while assuring product availability & customer responsiveness. | Preparing for a new way to do global business. New ideas. Feel that costs are down & service up, but haven't documented this. | Better on-time delivery at lower prices. Better global logistics coordination. Stronger ties with key suppliers. Time, time, time. |
| Barriers | Resistance to change--mindset. Lack of internal integration & resource constraints. Poor systems & uncooperative chain members. | Defining what could/should be done. Resistance to change. Lack of SCM knowledge. Required IT & relationship investment. Measures. | Global politics/trade restrictions. Language/culture barriers. Lead times. Logistics. Building trust & increasing communication. |
| Bridges | Eliminate uncooperative suppliers. Reduce total SKUs. Bring second-tier suppliers in for training. Common info & better forecasts. SCM teams. | Education regarding SCM potential & processes—SCM certification. Massive investment in IT systems, including SAP. | Logistical rationalization. Place inspectors at supplier facilities. Reduce lead times. Implement info systems for global tracking. |
| Performance Measurement | Quality, changeover flexibility, delivery, mgmt infrastructure & human rights. Rankings shared with all suppliers. | "Perfect order." Designing system to track "total" customer performance. No formal satisfaction measure. Inbound: on-time/complete orders. | Price, quality, & on-time delivery are the critical measures. Price matters most. Not very advanced in SC measurement. |
| Alliance Management | Close working relationships with top suppliers—but not symbiotic or synergistic. Communication & cooperation are key. EDI=partner. | Strong dealer alliances (global customers want to bypass dealers). 5% of suppliers are "partners." Forming third-party logistics alliances. | Relatively few alliances; rely on leveraging suppliers. Alliances depend on trust & personal relationships. Not formalized. |
| Information Sharing | Industry standards have made EDI the preferred mechanism for sharing information with both suppliers & customers. Some fax & telephone. | Total SAP is being adopted & tied to an Oracle database for better customer analysis. EDI used & web is envisioned to connect the SC. | Do not have state-of-the-art info systems. Receive orders daily from key customers via EDI. Place orders via phone & fax. |
| People Management | Training & motivation are viewed as critical. Also, very important to maintain stable (longevity) mgmt team which is cross-experienced. | People are vital to SCM; therefore, major effort has gone to education, development, & hiring. Cross-functional teams are used. | Dependent on experienced managers who possess know-how in their heads. Everyone must improve continuously. |

| Issue/ Practice | Finished Goods Assembler 13 |
|---|---|
| **SCM Definition** | Focus on outbound relationships & internal integration—"The processes required to efficiently & effectively satisfy customer requirements." |
| **SCM Commitment** | Absolutely committed to SCM. Supply Chain Vision Statement. Top mgmt & functional mgmt support. |
| **SCM Mapping** | Downstream channels mapped. first tier upstream has been mapped. Lack second-tier knowledge. |
| **Motivation** | Compelling cost pressures. Need for mass customization. More powerful & demanding customers. |
| **Benefits** | Greater inventory productivity. Higher levels of customer service & customization. Compressed cycle times & better responsiveness. |
| **Barriers** | Lack information system capabilities. Lack total chain knowledge. Need for process change. Need for common, global performance measures. |
| **Bridges** | Committed & motivated people. Understand & communicate need for change & what needs to be done. Common vision. Global Measures. |
| **Performance Measurement** | Global measures critical to benchmark & share best practice. EVA based measures throughout organization. "Churn Factor." |
| **Alliance Management** | Alliances cultivated upstream, downstream & with service providers. Steady schedules, info sharing, & creativity are critical. Small percent. |
| **Information Sharing** | SAP too inflexible/difficult to install. Adding advanced planning & scheduling software. Internet buying exchange. Some web; mostly EDI. |
| **People Management** | People have to "believe it is the right thing to do." "Book club" provides common vision & discussion. Computerized training & simulation. |

Essentials of Supply Chain Management—First-Tier Supplier Perspective

| Issue/ Practice | First-Tier Supplier 1 | First-Tier Supplier 2 | First-Tier Supplier 3 |
|---|---|---|---|
| **SCM Definition** | "Managing the info & value-added processes that occur from order receipt to delivery to customer." Primarily backward one tier. | Recognize value of "suppliers' supplier to customers' customer" notion, but do not have formal shared definition. | "SCM is a business process & not an organization" designed to smooth the flow of materials & information. |
| **SCM Commitment** | Materials views SCM as vital: "We've exhausted what we can do within our stovepipe." Lack total buy-in. | SCM is critical strategy. Strong functional buy-in. Lack top mgmt. commitment & centralized support. | Strong support from SC teams. Lack top mgmt. commitment. Lack total functional buy-in. |
| **SCM Mapping** | No formal SC map. Many processes mapped. Gaps between supply & marketing. Lack second-tier knowledge. | No formal SC map at corporate. Visibility by commodity. Lack second-tier knowledge. | No formal SC map. Mapping focused on internal processes. Limited second-tier knowledge. |
| **Motivation** | Desire market dominance. SCM increases customer access. Short technology cycles & global rivalry. | Increased outsourcing combined with cost & margin pressure. Desire to be best in class. | Patents set to expire. Global competition & cost pressures. Build customer relationships. |
| **Benefits** | Expanded SC market share at higher margins. Quicker decisions & enhanced efficiency. Better collaboration/relationships. | Enhanced service & revenue growth. Improved cost structure. Support business units' desire to meet performance targets/budgets. | Reduced costs coupled with better delivery & higher levels of customer service. Higher levels of customer loyalty. |
| **Barriers** | Internal: no common vision, silo info, functional measures & conflicts, P&L view, & scarce resources. External: mindset, systems, & leverage. | Decentralized organization. Metrics. Magnitude of change. Top mgmt understanding & commitment. Obtaining general buy-in (turf). | Lack organizational awareness No imminent need to integrate. Inconsistent measures. Lack of clear roles/responsibilities. |
| **Bridges** | Extensive pilot testing. Document results. Use intra/extranets to share information. SC-wide metrics. Join external benchmarking groups. | Documented success stories & momentum. Benchmark metrics & performance. Global commodity teams. Documented procedures. | Cross-functional teams. Info-sharing/coordination meetings. Key customer account teams. Building trust-based relations. |
| **Performance Measurement** | Quality, cost, delivery, & technology. Emphasize cutting-edge technology. Comparative performance data is on web. Rigorous target costing. | Lack common supplier metrics—quality, development times, & cost. Use marketing scorecard, internal customer surveys, & CI clauses. | Focused on cost & delivery dependability. Recognition program. Use continuous improvement clauses. |
| **Alliance Management** | Avoid sole sourcing. Tight relations with <3% of suppliers that represent 80% buy & 95% improvement needs. Audit & improvement initiative. | No central development guidelines. Case-by-case analysis managed at commodity level. Shared savings. Active supplier development. | 90% suppliers on LT contracts. Most advanced are "partners." Ad hoc suggestion program. Some shared rewards & risks. |
| **Information Sharing** | EDI & web connect up/downstream. Annual supplier conference. Supplier brainstorming. Quarterly business reviews. SAP implementation. | 80% of orders via EDI. Migrate to web with new ERP & database technologies. Share forecasts but not actual sales data. | Limited EDI; mostly phone & fax. Experimenting with web. Annual SC top mgmt meetings. Account mgrs know customers. |
| **People Management** | People are key—must have same vision, receive training, & be held accountable. Cross-functional & commodity teams used. | Training in area of leading-edge procurement. Provide overall SC visibility. Personal development plans to guide training. | People are source of expertise & provide means for staying in touch with SC members. Strong emphasis on teams. |

Essentials of Supply Chain Management—First-Tier Supplier Perspective

| Issue/ Practice | First-Tier Supplier 4 | First-Tier Supplier 5 | First-Tier Supplier 6 |
|---|---|---|---|
| **SCM Definition** | "Ability to effectively align internal operations & supplier's operations to meet customer needs." Primary focus one tier backward. | Manage flow of materials & info from "suppliers' supplier to customers' customer." Strong first tier customer orientation—extending to suppliers. | "A process that involves cross-functional teams, supply base, & internal customers." "Aligned customer/supplier expectations." |
| **SCM Commitment** | Vital—VP SCM. Struggle with gaps within organization; i.e., lack total functional buy-in. No champion. | Connectivity with both customers & suppliers required for survival. Strong support; general buy-in. | 10 years' experience with SCM. Strong support—"dedicating resources to make it happen." |
| **SCM Mapping** | No formal SC map. Lack view of processes & interdependencies Lack second-tier knowledge | No formal map of entire supply chain. Detailed process maps at first-tier. Incomplete second-tier knowledge. | No formal SC map. Good view one tier up/downstream. Lack second-tier knowledge. |
| **Motivation** | Cannot grow business without SCM. Customer responsiveness. Lower inventories & costs. Leverage. | Customers demand more & more. Intense competition; globalization. Technological change. | Constant cost pressure. Rapid design cycles. Desire to be customer of choice. Mergers. |
| **Benefits** | Reduce costs while increasing customer responsiveness. Build a supply team that is "unconstrained." Enhance proactiveness. | Optimal supply base by commodity has led to fewer suppliers & closer relationships. Standardized inputs. Lower costs & faster inventory turns. | 5% annual decrease in bill of materials acquisition costs for past decade. Enhanced quality & shorter development times. |
| **Barriers** | Alter mindsets/engineering culture. "Chasm between purchasing & mkt." Lack alignment/common goal. Inconsistent metrics. Too busy. | Decentralized organization. Limited capital. Customers lack flexible policies. Poor costing & budgeting. Lack systems connectivity. | Supplier skepticism—"Do you really walk the walk." Poor communication & lack of trust. Metrics & time constraints. |
| **Bridges** | SC initiative to increase visibility & discussion. Cross-functional teams. Quantify impact. Common vision. Benchmark best practice. | SCM education & success stories. Build trust via joint problem solving. Open books. Focus on total SC costs. Process improvement. | LT contracts that emphasize continuous improvement. Supplier development teams. SC training & success stories. |
| **Performance Measurement** | Supplier scorecard drives CIP. Weighted rating of quality, cost, delivery, service, & technology. Quarterly business review. | Internal: inventory days supply. Suppliers: quality, on-time delivery, & order completeness. Do not certify, but considering it. | Scorecard updated monthly. Quality, on-time, cost reduction & responsive (CT & design). Threshold rising constantly. |
| **Alliance Management** | Limited collaborative alliances. Close relationships with top 60 suppliers (<1%). Defined process, leadership commitment, & trust key. | Few synergistic alliances—closer ties on customer side. Do some VMR for customers. Joint design. Personal relationships are key. | Limited synergistic alliances. Emphasis on dock-to-stock. Supplier alliance council. ESI, shared resources, & joint CIP. |
| **Information Sharing** | Face-to-face, telephone, fax & EDI. Rolling production schedule shared with top suppliers. Moving to web in next year. Electronic catalogue. | Weekly conferences with key customers (monthly video at senior levels). Use e-mail & fax for suppliers. Moving to web (3-5 yrs.). | Annual supplier conference emphasizes shared learning. Phone, fax, EDI, web, & face to face. Web-pull MRP info. |
| **People Management** | People are bridge or barrier. Teams used to build relationships. In-house university. Training offered to first-tier suppliers. Common vision/metrics. | Strong emphasis on teaming (CI & project). Offer on-line courses for global employees. Joint training with local univ. Constant learning key. | Buyers trained to lead supplier development teams. Cross-functional commodity teams. Emphasize shared learning. |

Essentials of Supply Chain Management—First-Tier Supplier Perspective

| Issue/<br>Practice | First-Tier Supplier 7 | First-Tier Supplier 8 | First-Tier Supplier 9 |
|---|---|---|---|
| **SCM Definition** | "Management of materials & information from order placement to receipt of payment from satisfied customer." One tier up/downstream. | Formulating SC position/strategy. Focus on improving communication within and outside firm. One tier up/downstream. | No formal SCM definition. Recognize need to establish closer relationships & technology linkages up/downstream. |
| **SCM Commitment** | SCM is vital to strategy formulation & execution. "It is surely the future." Has top mgmt commitment. | Strong commitment by senior purchasing & materials mgr. Lack top mgmt commitment. | Strong materials commitment, working to sell SC initiatives to top mgmt & functional mgrs. |
| **SCM Mapping** | No true SC map. Purchasing maps define leverage points & aggregation opportunities. Lack second-tier visibility. | No formal SC map. No resources for process mapping. Lack second-tier knowledge. "ABC" classification. | No formal SC map. Limited process mapping. Lack second-tier visibility. |
| **Motivation** | SCM helps leverage global volume. Vital to meet customer demands lower costs & shorter cycles. | Unprecedented customer demands. for service, flexibility, & new product. Anticipated margin pressure. | Demanding customers—want systems engineering. Intense competition; margin pressure. |
| **Benefits** | Leveraged global volumes. Lower costs, less inventory, shorter cycles, greater flexibility, & higher customer satisfaction. Process transparency. | Better communication, lower costs, reduced inventories, faster customer responsiveness, shorter cycles, & faster new product entry. | Increase standardization. Bring right technologies to market. Better delivery performance. Efficient capital/asset usage. |
| **Barriers** | Resist change. Lack skills throughout SC. Protect sensitive info. Role definition/shifting. Tradeoff analysis. Complexity. Cash velocity. Policies. | Lack top mgmt support & know how. Scarce resources & past success. Lack systems, metrics, & discipline. Don't trust suppliers. Turf wars. | Misdirected budget procedures. Organizational structure. Metrics. Functional silos—turf issues. Inadequate info systems. |
| **Bridges** | Rationalized logistics. Redesigned organization. Process ownership. Face-to-face communication. Supplier process development. | Just beginning—recognized need. Education to sell the need. Early successes and metrics to build credibility. SC champion. | Better info sharing in-house & across SC. IT investment. Leadership/SC champion. Cross-functional teaming. |
| **Performance Measurement** | Emphasize traditional cost, quality, & delivery measures. Scorecard used to help manage alliances. Lack SC measures. | Transitioning to process-oriented & SC-oriented measures. Still emphasize traditional cost, quality, & delivery measures. | Measure on-time delivery as vital to lean initiatives. Also, quality, engineering skills, development capability, & technology plans. |
| **Alliance Management** | Few synergistic alliances. Supplier development. Communication & honesty are key. Share technology roadmaps. Exit criteria set up front. | Shifting channel power has reduced trust—key customers don't share risks/rewards. Training for second-tier customers to pull product into SC. | Few real alliances. Co-locate engineers at customers. Clear contracts needed to define roles & sharing. Lack guidelines. |
| **Information Sharing** | Installing SAP. Forecasts shared with suppliers on rolling monthly basis. Best practice sharing across organization via quarterly meetings. | Phone, fax, & EDI. Executives meet with key customers & suppliers. Limited feedback to drive CIP. Systems are critical limiting factor. | Need better information sharing & technology. Require suppliers to be able to share engineering plans electronically. |
| **People Management** | Training required to understand process integration & tradeoff analysis. Provide process eng. training to key suppliers. | Lip service to people as critical. Materials mgr pushing for mentor program. Scarce resources make people development difficult. | Greater need for technical skills among purchasers. Cross-functional teams key to good decision making. |

Essentials of Supply Chain Management—First-Tier Supplier Perspective

| Issue/ Practice | First-Tier Supplier 10 | First-Tier Supplier 11 |
|---|---|---|
| SCM Definition | Emphasis is on internal integration & better cooperation one tier up & downstream. Having difficulty "getting arms around SC concept." | Integration of all the decisions that affect the flow of materials through the organization to the customer. Internal & one tier up/downstream. |
| SCM Commitment | Committed to better integration & strong relationships, but "don't fully relate to concept." No champion. | Materials group is fully committed to SCM. Top mgmt still uncertain; i.e., is SCM a fad. No top-level champion. |
| SCM Mapping | No formal SC map. Have a good grasp of one tier up/downstream. Very limited second-tier knowledge. | No formal SC map. Only starting to evaluate role-shifting opportunities. No real second-tier knowledge. |
| Motivation | Trying to keep up with dynamic environment: customer demands, consolidation, & globalization. | Pressure from customers to become full-service supplier of more complex modules. Pressure to expand skills. |
| Benefits | Cost reduction & faster inventory turns. Global leverage & better information. Quicker innovation. Become customer of choice. | Cost reduction coupled with shorter new product launch times & higher quality. Have greater influence on overall SC/reduce role-shifting threat. |
| Barriers | Changing culture & organization. Employee buy-in & participation. Poor forecast accuracy; unwilling to share info. Poor systems/measures. | Organizational culture & structure. Flavor-of-the-day mentality. Turf protection & conflicting measures. Poor info sharing. NIH syndrome. |
| Bridges | Build team mindset through training & improved work conditions. Cross-functional teams. Tie measures to objectives. Build web IT systems. | Purchasing has greater visibility. Mgmt by objectives program has improved goal consensus. Cross-functional supplier selection team. |
| Performance Measurement | Use quarterly supplier scorecard. Emphasis on cost, quality, delivery, & supplier "support." Response to customer request. Life cycle costing. | Cost, quality, & delivery are focus. Developing comprehensive supplier scorecard. Effort to align internal measures to reduce conflict. |
| Alliance Management | Almost no synergistic alliances. Build closer supply relations with top 10%. Supplier development & shared savings. 95% sole source. | 2% spend with JVs, 75% via LT contracts. 50/50 shared benefits for joint CI projects. 2-4% CI clauses Process development. Consignment. |
| Information Sharing | Mix of EDI & autofax. Do not like EDI because of lack of standards. Half IT staff building intra/extranet. Emphasis on personal contact. | Orders received & placed via fax & limited EDI. Some VMI and ESI in NPD projects. On-site info sharing going both ways. New ERP system. |
| People Management | People are bridge/barrier. Training, teaming, shared rewards & work environment key to participation. Use workforce to sell to customers. | People are bridge/barrier. Training & consistent measures needed to change mindset/overcome NIH. Cross-functional teaming. |

Essentials of Supply Chain Management—LowerTier Supplier Perspective

| Issue/ Practice | Lower-Tier Supplier 1 | Lower-Tier Supplier 2 |
|---|---|---|
| **SCM Definition** | "The linking of external demand to external supply & the facilitation of info flow." Recognize that SCM seldom extends more than 1 tier. | Recognize & talk definition—"from origin to end consumer"—but are far from operationalizing. Focus is on supply & distributor relationships. |
| **SCM Commitment** | Strong support for team efforts, especially for joint engineering. Lack complete SC vision. | View SCM as an important strategy, but lack clear vision & commitment. Many entrenched practices. |
| **SCM Mapping** | No formal SC map; however, do evaluate role shifting 1-tier each way. Lack second-tier knowledge. | No formal SC map. Processes are loosely coupled. No formal role shifting. Lack second-tier knowledge. |
| **Motivation** | Cost, quality, & time imperatives require cooperation. Dynamic market & intense competition. | Improve strategic alignment & integration. Cost optimization. Build strong customer relationships. |
| **Benefits** | Good relationships lead to helpful & responsive suppliers. Shared info leads to faster cycles. Lower cost, better quality, & more innovation. | Consolidate buying where possible. Lower total inventory. Consistent on-time deliveries. Development of trust & greater team orientation. |
| **Barriers** | Changing mindsets, especially with engineers. Establishing channel trust. Poor information systems. Time/resource constraints. | Counterproductive measures & incentives. Transfer pricing scheme. Organization leads to turf protection & adversarial view. Channel conflict. |
| **Bridges** | Build trust—"do what you say you are going to do." "Yellow Pages" to share supplier performance across organization. Upgrade IT systems. | Increase communication, especially face to face. Effort to align goals across organization. Sought early team success. New IT system. |
| **Performance Measurement** | Supplier scorecard measures cost, fill rate, quality, & on-time delivery. Quarterly review. Day-long business reviews. "Dock-to-stock" certification. | Measures emphasize cost & profits. Trying to decrease conflicting measures with distributors. Have not used measures to change culture. |
| **Alliance Management** | Small % up/downstream (<3%). Communication/seamless IT link. LT contract (3-6 yr)—95% "A" items LT contract. Step-down NPD teams. | Synergistic alliances are very rare. One instance of joint basic research. Keys are trust, cultural fit, mutual dependence, & innovation/ideas. |
| **Information Sharing** | Personal, face-to-face & phone to build trust. E-mail. Extranet to share production schedules & customer plans. Weekly technical exchange. | Acquisitions have led to disparate systems. Implementing SAP. Orders come/go by phone & fax. Partnership review meetings. |
| **People Management** | People/teams critical—"Empower people to do the right thing." "You can't have hierarchical control if you want to be in a SC environment." | Employee commitment is key. Trust means doing what you say you will do. Actively seek employee input. Reward input; use teams; training. |

Essentials of Supply Chain Management—Service Provider Perspective

| Issue/ Practice | Service Provider 1 | Service Provider 2 | Service Provider 3 |
|---|---|---|---|
| **SCM Definition** | SCM involves the elimination of non-value-added activities one tier up/downstream. No shared working definition—still a new concept. | Linkages & collaboration from mfg to customer. Involves a variety of relations—transaction to alliances. One tier up/downstream. | Managing the "nuts & bolts" to get product to end customer efficiently/effectively. Integrated activities & processes. |
| **SCM Commitment** | Relatively low internal commitment. Ad hoc support based on market demands. No SC champion. | Strong commitment to managing "A" suppliers & "A" customers. Equate VMI with SCM. | Commitment to provide one-stop, headache-free service. Lack champion & SC vision. |
| **SCM Mapping** | No formal SC map. Limited process mapping. Lack total & ABC costing capabilities. Lack second-tier knowledge. | No formal SC map. Good view one tier up/downstream, especially with "A" firms. Lack second-tier knowledge. | No SC map. Value-added processes mapped. Lack total SC view. Limited role shifting. |
| **Motivation** | End users are more demanding-they do not want to hold inventory. SCM is being forced upon us. | Concentration of leverage with key customers. Need to offer unique services to lock in loyalty. | Desire to offer tailored services & meet ever-rising customer outsourcing expectations. |
| **Benefits** | Cost reduction. Greater information sharing & improved responsiveness. Waste elimination increases profits. Better focus on value-added process. | Increased switching costs for customers. Better positions self-manufactured products. Tighter relations with "partners." | Lower costs, greater flexibility, better service, faster cycles, focused investments, learning, & more-committed customers. |
| **Barriers** | Turf protection. Each SC member focused on P&L. Metrics & mgmt support. Lack desire & connectivity to share info. Resource constraints. | Effective costing & selling services. Unequal channel power—"even in best relationships, customer always has upper hand." Mindset/trust. | "Customers want it all" & make "huge" promises 3PLs have to live up to. Employee turnover, changing technology, & turf. |
| **Bridges** | Need better education within firm & throughout SC. Need a champion with credibility & clout. Need more resources. Better metrics. | Activity based costing. Better info systems, including SAP & EDI. LT contracts, VMI up/downstream. Emphasis on key relationships. | Open communication—daily & weekly coordination meetings. Employee empowerment. Accurate costing/metrics. Trust. |
| **Performance Measurement** | Experimenting with scorecard. Key measures include on-time delivery, quality, cost, and ease of doing business. Lack alignment & vision. | Traditional measures that focus on fill rate, inventory turns, & cost. New "ABC" costing to evaluate customer profitability. Must demonstrate value. | Fanatical about measurement & accountability. Document all processes. Use ABC costing. Tailor measures to customers. |
| **Alliance Management** | Very limited—<2%. Use LT contracts & share design expertise. Keys are mutual dependence, trust, personal relationships, & open communication. | A few close allies up/downstream. Interdependence & integrated info systems. Unique, tailored services. "Push" key suppliers' products. | Trust, open info sharing, clear expectations, tailored services, commitment to joint success, & metrics key. Few real alliances. |
| **Information Sharing** | Phone, EDI, & autofax. Implementing web-based catalogue for customers. Face-to-face very important. Struggle with willingness to share information. | 95% customer orders EDI; 90% orders to suppliers EDI. Sunsetting non-electronic orders. Link computer systems with "key" partners. SAP. | EDI, linked computer systems, & tailored WMS metrics. Key account mgmt & personal relationships. IT investments. |
| **People Management** | People are important, but with 30% annual growth it is difficult to provide needed training. Key managers are stretched thin. | People are critical to tailored services & key account mgmt. Information access & centralized purchasing support field staff. | "People key to 3PL success." Careful hiring & training to build skills & loyalty. Workers are rewarded to share ideas. |

Essentials of Supply Chain Management—Service Provider Perspective

| Issue/ Practice | Service Provider 4 | Service Provider 5 | Service Provider 6 |
|---|---|---|---|
| **SCM Definition** | Management of the entire end-to-end acquisition process from requirement to payment. Focus on first tier upstream. | No formal definition, but recognize importance of greater cooperation. Greater internal process integration to support downstream collaboration. | New approach to logistics involving process integration up/downstream to achieve greater efficiency/service. |
| **SCM Commitment** | SCM viewed as very important. Lack complete top-level support. Lack lower level buy-in. | SCM is a natural progression of good practice. Top mgmt emphasis. Lack complete functional buy in. | Strong commitment without complete understanding. Lack top mgmt follow through. |
| **SCM Mapping** | No formal SC map. Too complex & huge variety of acquired items. Focus only on first tier. | No formal SC map. Have a good grasp of first-tier customer needs. Lack second-tier knowledge. | No formal SC map. Have good grasp of one tier each way. Lack second-tier knowledge. |
| **Motivation** | Increased competition & eroded profits. Consolidated supply base. Need to optimize contract leverage. | Worry about disintermediation. Desire reduced costs & better service. Stronger relationships. | SC design needed to change poor processes. Cost pressure & demanding customers. |
| **Benefits** | Cost reduction: both in unit price & administrative costs. Better global aggregation of volume. More strategic use of time. | Expanded role in SC as a service integrator. Higher switching costs. Reduced administrative costs. Trust leveraged for new business. | Specialization provides 3PL with reason to exist. Shorter cycles, faster turns, lower cost, superior service. Lower price. |
| **Barriers** | Scarce managerial time. Too many teams. Lack full understanding of costs. Non-supportive metrics. Incompatible info systems. | Resistance to changed roles. Old business practices, processes, & relationships. Challenge to convince customers. Documenting benefits. | Risks/rewards not shared. Poor SC metrics—lack total SC cost & tradeoffs invisible. Show P&L impact. Poor SC info sharing. |
| **Bridges** | Education & skill building for new environment. Performance plans that set goals & link compensation. Provide SC tools, data, & metrics. | Communicate viable plan. Early successes. Cross-functional cooperation. Clear communication to build trust. Know customer needs. | Create SC vision, build, & share success stories. Leadership & follow through. Validate value-added. SC metrics |
| **Performance Measurement** | Working to develop SC supportive metrics. Current focus is on contract performance & contract leakage. Variance performance. | Standard measures are fill rates of complete orders, inventory turns, & customer retention. Weekly customer contact. Tailored measures. | Fanatic internal measurement, but not always tied to customer value. Quarterly supplier report card. Monthly business review |
| **Alliance Management** | Only 3 partnerships (6,000+ total suppliers). Supply base divided into four groups. Supply base reduction. Collaboration & trust are key. | Focus on LT contracts—2/3/5 yr. Value-added key, yet cost reduction dominates mindset. Problem resolution & key account teams. | No real alliances. Customers "beat us up." Key is to know customers & their customers. Limited supplier development. |
| **Information Sharing** | Internal info sharing vital to volume aggregation. Use web catalog. Complete web system impeded by culture/processes/policies/people. | Quarterly performance reviews with key customers. Proprietary system documents savings. Fax & phone. Web catalogue for 15% of orders. | Fax, phone, & web coupled with face-to-face business review. Use customer surveys. Willingness a challenge. |
| **People Management** | Project mgmt, problem solving, & teaming skills must improve. Developing training modules. Promote NAPM/APICS certifications. | Emphasis on internal collaboration. Better communication & cooperation between sales & operations. Joint problem solving. Mutual respect. | People are key. Operate in-house university for training & leadership education. Lack of follow up has led to "cynicism." |

Essentials of Supply Chain Management—Service Provider Perspective

| Issue/ Practice | Service Provider 7 | Service Provider 8 | Service Provider 9 |
|---|---|---|---|
| **SCM Definition** | SCM is relationship management. 3PLs bridge gaps in the SC. Recognize end-to-end notion, but manage triadic relationship. | "To add value to our customers' products by managing movement when & where needed." Managing information & relationships rationally. | "We are a conduit—physically, & emotionally—between mfgs & their customers." Seamless & integrated process mgmt. |
| **SCM Commitment** | SCM is a vital strategy. Strong commitment; however, initiatives don't focus on end-to-end visibility. | SCM is the organizational strategy. Strong top management support. Some divisional rivalry. | SCM is what we do—"If you do not find a niche, you fold your tent." Strong top mgmt commit. |
| **SCM Mapping** | No formal SC map. The view for 3PLs really focuses on one tier each way. Lack second-tier knowledge. | No formal end-to-end SC map. Extensive mapping of customers' processes. Lack second-tier knowledge. | No formal end-to-end SC map. Map delivery process from mfg. to customer. Lack second-tier view. |
| **Motivation** | Performance expectations rising: "you're only as good as your last performance." Relationships matter. | The world is changing, especially in the area of technology. Roles must change to deliver value/solutions. | Customers have rising service expectations & need unique solutions. Need critical mass. |
| **Benefits** | Greater efficiency & opportunity to lower costs. Closer relationships & greater cooperation lead to new services & value-added processes. | Opportunity to expand services & increase growth & profitability. Higher customer service at lower costs. Better systems visibility. | Better utilization of assets via closer, more intense relations. Lower cost & better product availability at higher service. |
| **Barriers** | Counterproductive measures—too much emphasis on costs. Lack of trust—don't/won't share the right information. SC turf & visibility. | Entrenched mindsets & resistance to role shifting. Lack holistic vision & ability to make tradeoffs. Scarce human resources. IT systems. | Changing mindsets & building trust. Lack holistic view. Focus on own "world." Information sharing, metrics, & leadership. |
| **Bridges** | Focus on LT relationship & mutual value added (de-emphasize cost). Emphasis on solutions. Training, metrics, & communication. | Strong culture that keys on helping people succeed. Careful hiring & extensive training. Aligned partners & technology development. | Pilot studies to quantify benefit. Development of unique service Improve IT systems & metrics Invest in national capacity. |
| **Performance Measurement** | Emphasis on cost & delivery. Focus on internal operations & on meeting customer expectations. Do not use SC-wide measures. Raised bar. | Critical issues are cost, variability reduction, flexibility, cycle time, capacity, tracking, & trust. Adopting a TC approach. Business reviews. | Critical issues are total cost savings & delivery—on-time, complete orders. Use business reviews & scorecards. |
| **Alliance Management** | Small percent alliances. Focus on key/national accounts. Web alliance with industry competitors. Service alliance to offer one-stop shopping. | Very few (<1% with customers & <3% with service suppliers). Keys are cultural fit, mutual gain, LT view, integrative vision, & patience. | Small percent (5%). Trust & open communication are key. Excellent performance & tailored services also needed. |
| **Information Sharing** | Phone, fax, EDI, & face-to-face. Developing a web strategy. Info. technology is key to 3PL success. Satellite tracking & ASNs. | Phone, fax, EDI, web, & face-to face. Constant personal communication & frequent performance reviews. Willingness & systems both needed. | Customer visits are critical to knowing customers real needs. Day-to-day via phone, fax, & WMS system. Web in future. |
| **People Management** | SC & 3PL service are people driven. High turnover raises costs & reduces effectiveness of training. Fierce competition for people. | Invest in people & create a culture of passion. Cross train employees. Share knowledge. Life-long training in quality, customers, & technology. | People, especially mgmt talent, are vital to creation of new value-added services. Empowerment & openness/honesty vital. |

# Center for Advanced Purchasing Studies

THE CENTER FOR ADVANCED PURCHASING STUDIES (CAPS) was established in November 1986 as the result of an affiliation agreement between the College of Business at Arizona State University and the National Association of Purchasing Management. It is located at The Arizona State University Research Park, 2055 East Centennial Circle, P.O. Box 22160, Tempe, Arizona 85285-2160 (Telephone [480] 752-2277).

The Center has three major goals to be accomplished through its research program:

- to improve purchasing effectiveness and efficiency;
- to improve overall purchasing capability;
- to increase the competitiveness of U.S. companies in a global economy.

Research published includes more than 50 focus studies on purchasing/materials management topics ranging from purchasing organizational relationships to CEOs' expectations of the purchasing function, as well as benchmarking reports on purchasing performance in 30-plus industries.

Focus study research under way includes: *Major Changes in Supply Chain Responsibilities; Strategic Cost Management in the Supply Chain; Purchasing Education and Training in the 21st Century;* and the benchmarking reports of purchasing performance by industry.

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