

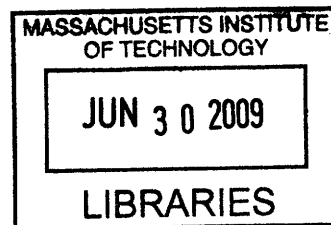
# Managing Multi-tiered Suppliers in the High-Tech Industry

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Submitted to the Engineering Systems Division in Partial Fulfillment of the  
Requirements for the Degree of

Master of Engineering in Logistics

at the

Massachusetts Institute of Technology

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## **Abstract**

This thesis presents a roadmap for companies to follow as they manage multi-tiered suppliers in the high-tech industry. Our research covered a host of sources including interviews and publications from various companies, consulting companies, software companies, the computer industry, trade associations, and analyst firms among others. While our review found that many companies begin supplier relationship management after sourcing events, we show that managing suppliers should start as companies form their competitive strategy. Our five step roadmap provides a deliberate approach for companies as they build the foundation for effective and successful multi-tiered supplier relationship management.

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# 1. Introduction

## *1.1 Motivation*

Our thesis began as a case study on a healthcare company that engages in high-tech manufacturing. The company did not have a unified strategy on how to best manage their second and third-tier suppliers. In this highly regulated industry, we had hoped to develop a framework that the company could use to determine how to manage their second and third-tier suppliers. Additionally, we hoped to better understand how the company segments their suppliers and how they differentiate their supplier relationships.

After our initial review, we realized that our focus on the healthcare company was not adequately answering our question. This review encouraged a shift in our research to look at the entire high-tech industry. Although different in several ways, we felt this original question was not isolated to the healthcare industry. Our research validated this perception. Our new question became, “How should companies manage their multi-tiered suppliers in the high-tech industry?”

## *1.2 Approach*

The first step to answer our thesis question was a thorough and continuous Literature Review. We looked a range of topics related to the core issue. Academic papers were reviewed as well as literature concerning the computer industry’s procurement process. Our second step consisted of five interviews conducted with various employees of the healthcare company where our research began. Each interview provided markedly different opinions on how to effectively manage multi-tiered suppliers.

Research shifted in the third step to web-based articles. Consulting companies were reviewed to gain their perspective and recommendations for supply chain management. Technology providers were examined to learn what products are marketed towards managing suppliers. Finally, analysts firms were evaluated to determine their insights in how companies accomplish supplier relationship management. Each group provided more evidence that there was not one preeminent method to managing suppliers.

Our final major research area was expert opinions. We interviewed a former procurement manager of Bose and a director at the Center for Advanced Procurement and Supply. While the Bose interview described the company's effective approach to multi-tiered management, the latter interview discussed how a flexible and varied approach to different suppliers offers the most success.

After our extensive review, we synthesized what we learned from the variety of resources researched to form a roadmap on how companies should manage their multi-tiered suppliers. This roadmap forms a methodological approach to managing multi-tiered suppliers in the high-tech industry.

## 2. Literature Review

### *2.1 Computer Industry's Procurement processes*

#### 2.1.1 IBM

IBM relies upon a basic strategy of outsourcing non-core activities while keeping core components and systems. This concept differentiates the company from competition through specialized technology rather than through low cost when considering



procurement. IBM strongly believes in establishing a long-term relationship with a few selected suppliers, and many of IBM's outsourced contract manufacturers are located in Asia for the purpose of having a low cost advantage and technology capability. The company also prefers to deal with a small number of large enterprise suppliers who can supply to significant portions of its production. IBM mentions that there are two essential criteria for the selection of new suppliers; Process and IT readiness. (Roy, 2005) The company makes sure that supplier's IT systems and process meet its own standards and are fully integrated with IBM.

Depending on the type of supplier and on IBM's own supplier collaboration strategy, IBM segments its suppliers into four main categories; Regional/Niche, Enterprise/Core, Non-strategic, and Emerging opportunity. Regional/Niche suppliers comprise of 25% of total procurement value and these represent single commodity specialists. On IBM's side, it maintains exclusive relationships with suppliers and in turn participates in their development. Enterprise/Core comprises 65% of IBM's total procurement value, and these supply standardized industry components most of the time. Non-strategic comprises only 5% and provides non-critical valued components to IBM. Lastly, Emerging opportunity also comprises only 5% of total procurement value and involves developing future technologies that IBM may use in the future. (Roy, 2005)



**Figure 1: The Power Matrix (Roy, 2005)**

According to Shaunak Roy's thesis paper on Dell and IBM, IBM has its own supplier segmentation matrix known as the 'Power Matrix'. (Roy, 2005) The matrix in the Figure 1 shows how IBM's bargaining power affects the relationships with suppliers from IBM's standpoint. From a supplier's standpoint, he mentioned that the strategy and interests of suppliers have to be aligned with that of IBM as well as with what IBM can offer to them. It is also worth noting that other companies make use of a Power Matrix when they deal with suppliers.

In the case of Buyer Dominance quadrant, IBM has the advantage since it has a favorable contract condition when their suppliers depend on IBM for a significant portion of their business. Such suppliers could be those who "supply specially tailored components to IBM, but do not have exclusive rights on the technology." (Roy, 2005)

A Supplier Dominance relationship exists when there are suppliers who make specialized components and sell to multiple buyers, not just IBM. For example, Intel or Microsoft would be those suppliers who would supply to IBM but also have other buyers.

Independence relationships exist when suppliers and IBM are both independent of each other for their business. Usually suppliers in this case would supply standardized components to multiple buyers and IBM also has option of purchasing the components from other suppliers.

Lastly, an Interdependence relationship exists when suppliers produce custom tailored components to IBM who depends on the supplier as the components' only source. This is the most ideal relationship since both parties align with each other based on respective business interests.

IBM realizes that in order to be effective in dealing with procurement processes, it is important to have not only a defined strategy but also people who are knowledgeable in the area. One IBM executive mentions that the following are driving factors in achieving a better procurement process: the increase in skill sets of people within the group, a strong understanding of both supplier capability and IBM's strengths, and the integration of the procurement function with the product development processes. (Roy, 2005)

## 2.1.2 Dell

### 2.1.2.1 Centralized Procurement Organization

Dell applies a centralized procurement strategy with the majority of the tasks completed by the strategic commodity group. In this group there are three teams: Business Strategy Team (BST), Strategic Commodity Team (SCT), and Global Supply Team (GST). BST is a cross-functional strategy team that is responsible for major

investment initiatives, strategic alignment of Dell with its business partners, and computer technology development. SCT is basically in charge of developing an executable plan for the strategy developed by BST. Lastly, GST is responsible for daily operations of procurement such as order booking and managing suppliers to make sure that supply-demand is synchronized. All these happen near supplier locations which may be outside the U.S. (Roy, 2005)

The procurement organization focuses on number of things when establishing a supplier relationship. It works with only a few selected suppliers, believes in maintaining deep relationships with suppliers, and carefully monitors supplier performance. By selecting a certain number of suppliers to work with, companies can manage strict quality requirements more easily than dealing with a large number of suppliers. Also, Dell wants to develop a deep relationship with their chosen suppliers; thus having a few selected suppliers aid in achieving this goal. In addition, supplier performance is monitored quarterly through a specific review process that defines objectives at the beginning of each year. These objectives mentioned are defined as specific measurements for each of the five categories: Technology, Quality, Cost, Service, and Continuity of Supply. Consequently, supplier performance is evaluated against defined the objectives as described. (Roy, 2005)

#### **2.1.2.2 Demand-Supply Balance**

Dell meets the customers' demand by directly selling products and by building products-to-order in achieving real-time collaboration between manufacturing and sales. (Fugate & Mentzer, 2004) One of Dell's supply chain competencies is demand management; focusing on managing demand by continuously rebalancing demand with

supply. This means that the company contacts third party suppliers to expedite the process of providing products when in high demand. Additionally, they work with the demand-side in order to provide customers with product promotions, shifting customer demand to better match the available supply. This certainly helps create an ideal situation for both parties.

This section explains Dell's supplier relationships management. By establishing a solid relationship with suppliers in multi-tiers, Dell can benefit from fulfilling the needed supplies more easily when the demand requires them. One of Dell's themes is that the key to the supply chain success is the interplay between process and people. (Fugate & Mentzer, 2004)

Another aspect Dell has on streamlining supplier relationship management is that Dell tries to achieve visibility and low-cost strategy by reinforcing better negotiated contracts with worldwide transportation service providers who directly interact with Dell supplier for business. Knowing that unreasonable contracts negotiated between transportation service providers and suppliers will negatively affect Dell, the company uses its power over suppliers to step forward in interacting with transportation service providers to set up favorable contracts for suppliers; this action reduces costs, informs the company of demand ahead of time through a visible supply chain, and maximizes efficiency through back-stepping two tiers in the process. (Roy, 2005)

### 2.1.3 HP's Procurement Risk Management

Companies, especially in the high tech industries today, minimize procurement risk by adopting different ways to deal with problems. In order to better predict the volatility of component costs, product demand, and supply availability, HP began to

develop the Procurement Risk Management (PRM) framework in 2000. (Connaughton, 2007) When HP initiated this approach, it aimed at resolving problems other companies face when dealing with these risks. First, HP not only wanted to accurately forecast and balance the demand with supply, but also wanted to assess the risks that are involved with making procurement decisions. Secondly, it targeted resolving issues related to mapping forecast scenarios into the valuation process over the course of monitoring the supplier performance under certain contracts. This software tool or process methodology is able to quantify risks and monitor throughout the contract life cycle.

HP's main objective of PRM is not cost savings. According to the report from AMR research by Jane Barrett and Mickey North Rizza, HP's three main goals are minimizing cost volatility, cost erosion, and extreme competition for supply. (Barrett & Rizza, 2007) The volatile costs of components as well as the fierce competition among different suppliers gave rise to HP's PRM. The company states that the guarantee of supply, cost savings, and cost predictability are enabled by mixing quantity with pricing terms. Considering the risks that are involved in contracts during procurement decision-making processes, HP applies fixed quantity contracts for low-volatility situations, flexible quantity contracts for base level situations, and does not apply any contracts for high-volatility situations.

After 6 years of practice, HP has gained more than \$445 million in cost savings: \$345 million in material cost savings, \$50 million in identified profit saved from commodity shortages, and \$50 million on cost predictability savings. (Barrett & Rizza, 2007)

## *2.2 Academic Papers*

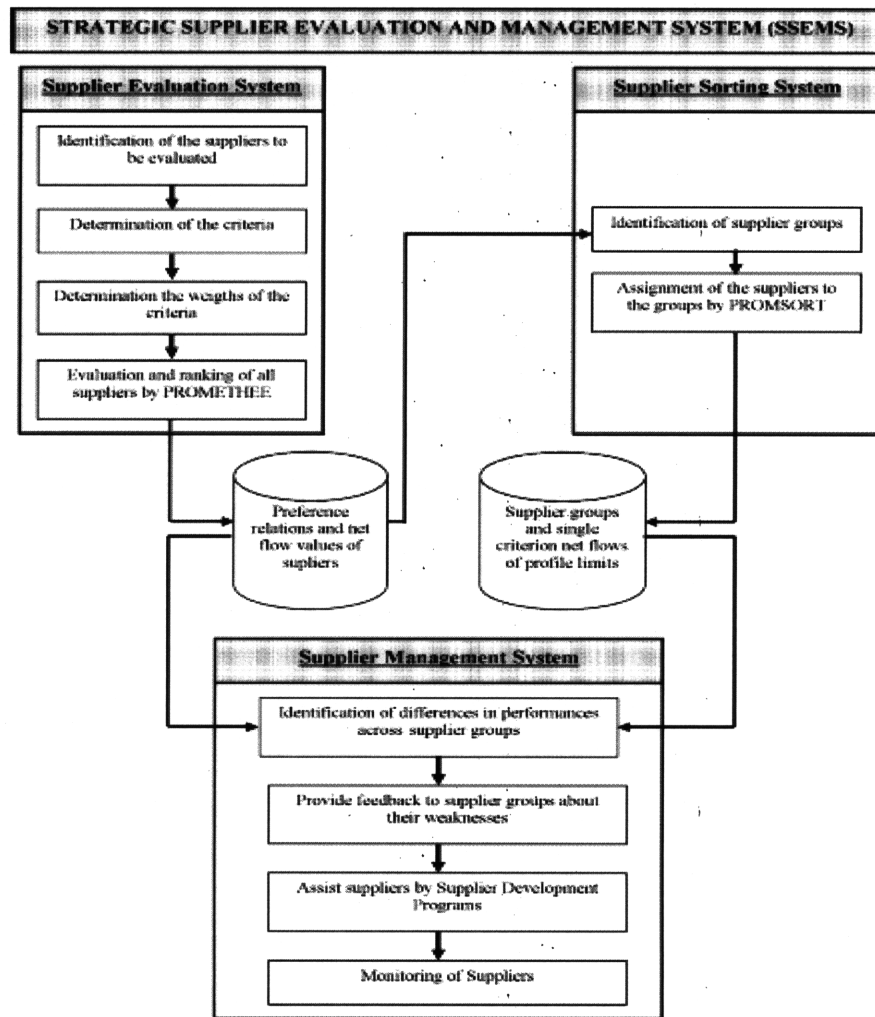
The literature review continued into academic papers addressing various topics that assist in the understanding of managing a supply chain. By looking broadly at supply chain management and researching both core and peripheral topics, we hoped to achieve a holistic view of the concept. The major areas of research were sourcing, supplier technology, supplier strategy, benchmarking, supply chain concepts, the SCOR model, and the Balanced Scorecard.

### *2.2.1 Sourcing*

Sourcing is a crucial topic that deals with many initial supply chain issues. While dealt extensively in our consulting company section, academic commentary on the topic provides an entirely different perspective. Our topic research addressed three articles by Araz and Ozkarahan, Shoa and Ji, and Winter.

Araz and Ozkarahan discuss many theories on strategic sourcing and strategic partners. The primary theory identified is the PROMETHEE method. In this method, alternatives are ranked based on algorithms in a mathematical model using inputs decided by the evaluator. The authors developed an extension to the aforementioned method for evaluating suppliers called Strategic Supplier Evaluation and Management System (SSEMS). There are three components of the analytical system: supplier evaluation system, supplier sorting system, and supplier management system. As shown in Figure 2, the components are inter-connected and affect decisions at every step. The first step is to categorize their suppliers as “strategic partners (‘perfect’ suppliers), candidates for a supplier development program (‘good’ suppliers), competitive suppliers (‘moderate’ suppliers) and pruning suppliers (‘bad’ suppliers) based on the results of the PROMETHEE methods” (Araz & Ozkarahan, 2006). After evaluation, suppliers are

sorted based on the categories mentioned in parallel with assessing their performance. The flow chart continues into supplier management as the evaluator measures supplier performance, develops the supplier, and monitors them. This method is very effective starting at the new product design phase, as the evaluation system effectively organizes which suppliers to use for the process. (Araz & Ozkarahan, 2006)



**Figure 2: SSEMS (Araz & Ozkarahan, 2006)**

The second sourcing article by Shao and Ji describes a mathematical model that analyzes products in an assemble-to-order supply chain. Products were placed in the price-sensitive system and were manufactured by a combination of suppliers. There was



one assembler, three suppliers, and two products with three components. The results of the model indicate that in the decentralized system, reducing suppliers does not improve performance. Furthermore, by incorporating a profit-sharing contract into the model, improvements are made across the entire supply chain. (Shao & Ji, 2009)

Drew Winter's article "Supplier tiering creates purchasing pickle" looked at the argument between giving first tier suppliers autonomy in their supplier selection or using a company's purchasing power to make the selections. The article focuses on large automakers as they continue to work with their upstream suppliers in an effort to be more efficient. Relationships with the first-tier suppliers become strained as Original Equipment Manufacturers (OEMs) force second and third-tier products into the first-tier's supply chain. Although prices are reduced due to the economies of scale OEMs provide, the lack of flexibility hampers the first-tier's ability to effectively manage their working sphere. Developing a strong relationship with the first-tier suppliers that includes input on second and third-tier suppliers will foster a feeling of collaboration, reducing the first-tier pushback against such policies. (Winter, 1996)

### 2.2.2 Supplier Technology

Supplier technological improvements have drastically changed both supplier selection and supply chain operations. Although there is no denying the improvements created by technology, there are many concerns with their affect on the buyer/supplier relationship. Three articles by Iskandar et. al., Caniels and Raaji, and Xia and Xia address this concern.

Iskandar et. al. researched Business-to-Business (B2B) electronic commerce from the suppliers' position. They found that major gaps exist with suppliers and the

implementation of Electronic Data Interchange (EDI). EDI aids in supply chain coordination by instantly completing transactions and exchanging information. The benefits of EDI implementation are well documented: reductions in cost, lead time, and inventory, coupled with efficient material and information flow. The authors sent out surveys to first and second-tier suppliers to gauge their opinions on EDI and implementation status. These surveys uncovered various EDI barriers that were based on a variety of characteristics. For those companies that haven't adopted EDI, the major concern was low benefits, while the companies that adopted EDI expressed a greater barrier due to cost. In terms of tiers, first-tier suppliers gain more from EDI due to the simple fact that the companies surrounding them in the supply chain typically use EDI. Second-tier suppliers do not gain as much from EDI primarily due to the third-tier's lack of EDI implementation. Another perception prevalent with all suppliers is unequal distribution of benefits; upstream suppliers believe that the customer (OEM) gains considerably more from EDI than they do. (Iskandar et. al., 2001)

The positions of Iskandar et. al. can be summarized into five key impressions:

1. "There is a gap of understanding about EDI benefits between firms that use EDI and those that don't."
2. "The distinction between first-tier and second-tier suppliers is becoming ambiguous because of more competitive supplier selection practices."
3. "EDI adoption among second-tier suppliers is low primarily because of perceptions of low benefits and high cost and asymmetric benefits in favor of customers and also because of a lack of trading partners."

4. "There are no essential differences between US firms and Japanese transplants."
5. "Proactive companies perceive EDI as having significant competitive advantages, while reactive companies consider EDI as only a necessity."

(Iskandar et. al., 2001)

The second article addresses suppliers' opinions on the Electronic Reverse Auction (ERA). ERA's are online auctions that encourage competition between suppliers for needed products. These auctions typically add more competing firms to the process which forces costs down. The process has caused a massive disruption in the buyer/supplier relationship as competition has forced product costs to drop, thereby reducing the suppliers' profit margin. The authors' literature review found that the majority of pro-ERA papers were conceptual in nature, while the anti-ERA papers were more empirical based. A survey was distributed to suppliers of a multinational company to determine their opinions on the subject. The results provided four distinct conclusions. First, large suppliers disliked ERAs, while small suppliers generally liked them; ERA's allow small firms to compete on a more level playing field with larger firms. Second, suppliers that compete on price like them, while all others (service, quality, innovation, etc) dislike them due to reduced margins. Third, developing-countries like them, while developed countries' firms showed dislike. Fourth, both individuals in sales and those with higher education disliked ERAs. Overall, the majority of suppliers surveyed had a negative opinion on ERAs. (Caniels & Raaij, 2009)

The final supplier technology article addressed e-market sourcing tools and their effects on buyer/supplier relationships. E-market sourcing tools allow companies to

perform their sourcing online through auctions and supplier requests. Companies using these tools reduce sourcing costs while benchmarking their suppliers. Although quality assurance is a concern when only using e-marketing, companies can incorporate the benchmarking capabilities to enhance their traditional sourcing methods by ensuring competitive prices are achieved. While e-marketing does increase the efficiency of the sourcing process for suppliers, the bargaining power shifted to the customers. Consequently, e-markets generally have a negative effect on the relationship between buyers and suppliers. (Xia & Xia, 2009)

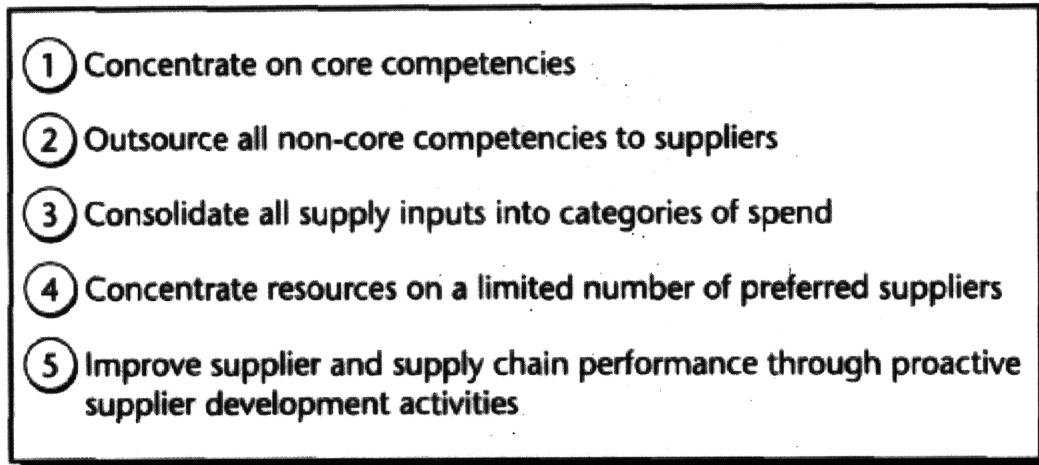
### 2.2.3 Supplier Strategy

The third major topic researched in academic papers was supplier strategy. While it is a comprehensive topic, the research looked at four articles: buyer/supplier power by Cox, supply chain strategy by Narasimham et. al., Derrouiche et. al.'s management framework, and Kleijin and Smits' performance metrics.

Cox's article "Understanding Buyer and Supplier Power" discusses the common view of supply chain management and proposes additional concepts for consideration. Figure 3 represents the generally accepted thought process for procurement and supply chain management. As shown, companies should concentrate on core competencies, outsource all non-core competencies, consolidate all supply inputs into categories of spend, concentrate resources on a limited number of preferred suppliers, and improve supplier and supply chain performance through proactive supplier development activities. However, the author argues that this approach assumes the power is with the buyer, which is not always the case. This approach is only achievable for companies that are able to create strategic supplier relationships. These relationships are only possible if the

buyer can leverage economies of scale, or a unique symbiotic relationship exists between companies. The author recommends a common sense approach to the buyer/supplier relationship, one that focuses on which entity possesses the power. (Cox, 2001)

### **THE INTEGRATED SUPPLY CHAIN MANAGEMENT (ISCM) APPROACH**

- 
- ① Concentrate on core competencies**
  - ② Outsource all non-core competencies to suppliers**
  - ③ Consolidate all supply inputs into categories of spend**
  - ④ Concentrate resources on a limited number of preferred suppliers**
  - ⑤ Improve supplier and supply chain performance through proactive supplier development activities**

**Figure 3: ISCM Approach (Cox, 2001)**

Cox addresses the issue of power between the buyers and suppliers extensively. While most business models infer the power resides with the buyer, Cox points out twelve sources of supplier power over buyers and competitors in Figure 4. These sources of power cause a shift of understanding that translates into a buyer/supplier philosophy: The Power Matrix. As discussed previously, the Power Matrix allows companies to realistically place themselves in the correct power box when attempting negotiations. Figure 5 assigns attributes to companies that will enable accurate demands based on power box position. By objectively determining one's position, companies are able to adjust their supply chain strategy to maximize suppliers both in cost and in reliability. (Cox, 2001)

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## THE FUNDAMENTAL BASES OF SUPPLIER POWER OVER BUYERS

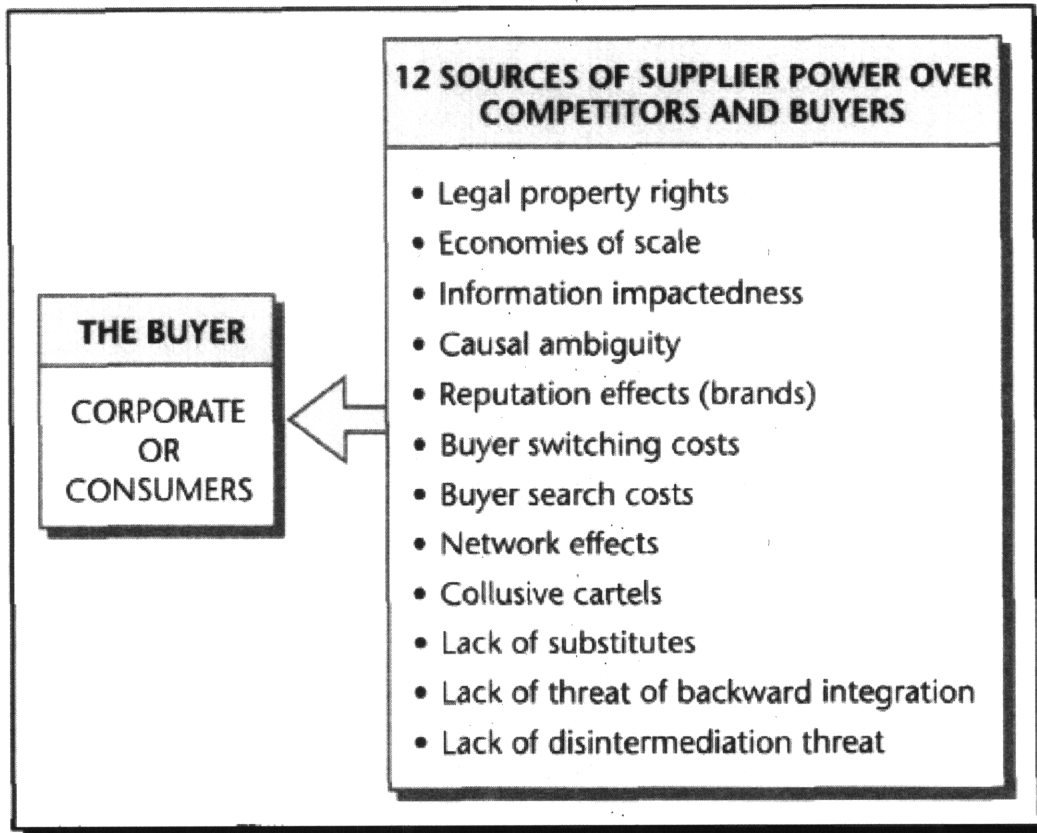


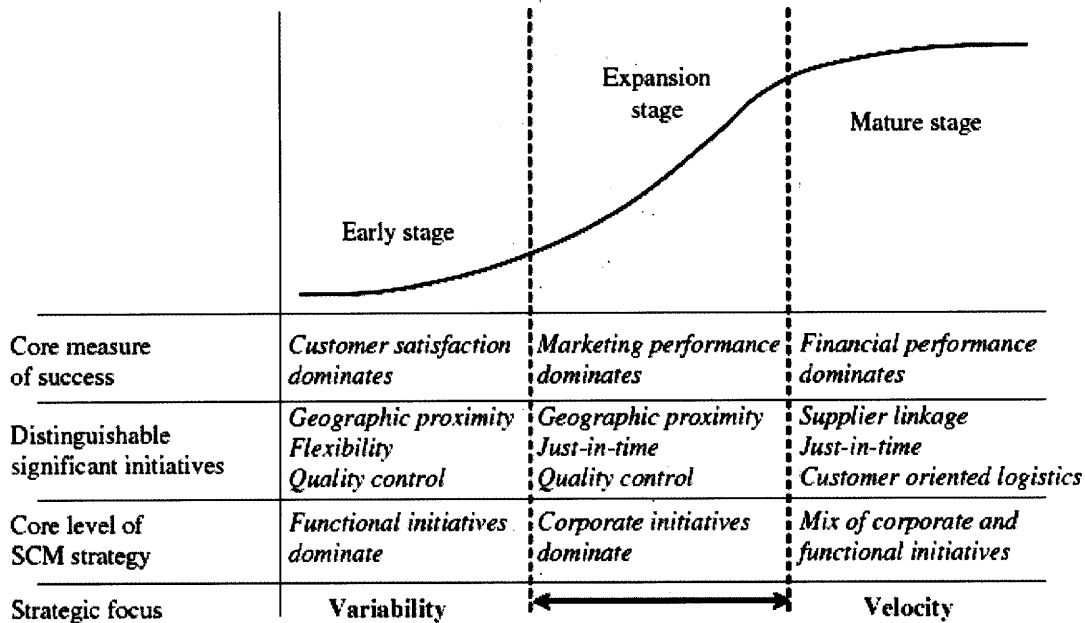
Figure 4: Fundamental Bases of Supplier Power over Buyers (Cox, 2001)

THE ATTRIBUTES OF BUYER AND SUPPLIER POWER

ATTRIBUTES OF BUYER POWER RELATIVE TO SUPPLIER	HIGH	<b>BUYER DOMINANCE</b>	<b>INTERDEPENDENCE</b>	
		<ul style="list-style-type: none"> <li>• Few buyers/many suppliers</li> <li>• Buyer has high % share of total market for supplier</li> <li>• Supplier is highly dependent on buyer for revenue with limited alternatives</li> <li>• Supplier switching costs are high</li> <li>• Buyers switching costs are low</li> <li>• Buyers account is attractive to supplier</li> <li>• Supplier offerings are commoditised and standardised</li> <li>• Buyer search costs are low</li> <li>• Supplier has no information asymmetry advantages over buyer</li> </ul>	<ul style="list-style-type: none"> <li>• Few buyers/few suppliers</li> <li>• Buyer has relatively high % share of total market for supplier</li> <li>• Supplier is highly dependent on buyer for revenue with few alternatives</li> <li>• Suppliers switching costs are high</li> <li>• Buyer switching costs are high</li> <li>• Buyers account is attractive to supplier</li> <li>• Supplier offerings are not commoditised and customised</li> <li>• Buyer search costs are high</li> <li>• Supplier has significant information asymmetry advantages over buyer</li> </ul>	
		<b>INDEPENDENCE</b>	<b>SUPPLIER DOMINANCE</b>	
	LOW	<ul style="list-style-type: none"> <li>• Many buyers/many suppliers</li> <li>• Buyer has relatively low % share of total market for supplier</li> <li>• Supplier is not dependent on buyer for revenue and has many alternatives</li> <li>• Supplier switching costs are low</li> <li>• Buyers switching costs are low</li> <li>• Buyers account is not particularly attractive to supplier</li> <li>• Supplier offerings are commoditised and standardised</li> <li>• Buyer search costs are relatively low</li> <li>• Supplier has only limited information asymmetry advantage over buyer</li> </ul>	<ul style="list-style-type: none"> <li>• Many buyers/few suppliers</li> <li>• Buyer has low % share of total market for supplier</li> <li>• Supplier is not at all dependent on the buyer for revenue and has many alternatives</li> <li>• Supplier switching costs are low</li> <li>• Buyer switching costs are high</li> <li>• Buyers account is not attractive to the supplier</li> <li>• Supplier offerings are not commoditised and customised</li> <li>• Buyer search costs are very high</li> <li>• Supplier has high information asymmetry advantages over buyer</li> </ul>	
	LOW	<b>ATTRIBUTES OF SUPPLIER POWER RELATIVE TO BUYER</b>		HIGH

Figure 5: The Attributes of Buyer and Supplier Power (Cox, 2001)

Narasimhan et. al. provide literature on the importance on aligning corporate level and functional level supply chain management. The authors found that although companies discuss the use of SCM strategies, there is little agreement on its meaning. The article developed a life staged supply chain strategy plan for companies (shown in Figure 6) based on research and surveys. The plan addresses how the age of a company causes the strategic focus to shift from variability to velocity, and changes three major supply chain components: core measure of success, distinguishable significant initiatives, and core level of SCM strategy. The empirical results provide a unique perspective on how supply chain strategy will shift over time, and how companies adjust their strategic focus as their measures of success change. (Narasimhan et. al., 2006)



**Figure 6: Life Staged Supply Chain Strategy Plan (Narasimhan et. al., 2006)**

In the third supply strategy article, Derrouiche et. al. address supply chain collaboration and its many forms. The major collaborative strategies defined are quick response, efficient consumer response, continuous replenishment policy, vendor managed inventory, and collaborative planning, forecasting, and replenishment. In an attempt to organize and aid in understanding these strategies, the authors developed a framework based on five criteria: extent of collaboration, objects involved in the collaboration, nature of the collaboration, decision level, and frequency of decision. The framework presents a usable model defining each collaborative approach within the five criteria to company managers as they decide on strategy implementation. (Derrouiche et. al., 2008)

The final supply strategy article discusses performance metrics related to supply chain management. Kleijnen and Smits researched multiple companies and found that each measured supply chain performance using different metrics, including fill rate, confirmed fill rate, response delay, stock level, sales/inventory ratio, and sales among



others. Organized companies typically work these metrics into a balanced scorecard (BSC) to provide an analytical model that can be evaluated. This balanced scorecard will be further explained later on in the chapter. The authors take this process further by recommended four-step methodology for researching supply chains:

- 1) “Select a specific supply chain.”
- 2) “Determine a list of recommended performance metrics, submetrics, and sub-submetrics. Next, apply the BSC approach to determine the supply chain’s main metrics.”
- 3) “Design a simulation model that explains how the supply chain’s performance metrics react to environmental and managerial control factors.”
- 4) “Perform sensitivity analysis, optimization, and robustness analysis of the supply chain simulation model” (Kleijnen & Smits, 2003)

Using this approach to evaluate supply chains will ensure analytical and objective results, uncovering the major drivers of the supply chain. Understanding how to evaluate supply chains is important to our research in that our conclusions prove that to manage second and third-tier suppliers, a company must fully understand their own strategy and devise a supply chain with second and third-tier suppliers who meet its needs and requirements. (Kleijnen & Smits, 2003)

#### 2.2.4 Benchmarking

Benchmarking has become a valuable tool as companies strive to achieve greater performance in their supply chain. By understanding this tool and using it to determine suppliers’ performance versus industry standards, companies have more information to gauge their suppliers. This concept directly relates to Supplier Relationship Management

(SRM) as companies decide on how much companies should manage their second and third-tier suppliers. Three articles were reviewed that look into the challenges of benchmarking and the advantages of benchmarking, and they provided the results of a successful benchmarking initiative.

The first article outlines Joe Francis's personal challenges with benchmarking. While he views the concept as essential for successful businesses, the author experienced many hardships with such programs. The eight major challenges he experienced are sponsorship, scope, selection of processes and metrics, standards, sources, cost, time, and deriving meaning. To ensure success, he recommends addressing each challenge systematically. Preparing the meticulous proposal addressing these challenges and incorporating a methodical procedure guarantees the greatest probability of a successful benchmarking initiative. (Francis, 2008)

Wong and Wong discuss many of the advantages benchmarking offer to companies that employ it. Higher profitability, operational performance, innovation, and increased strategic thinking have all been gained from benchmarking as companies learn to outperform their competitors. Companies are also able to objectively look at their own strengths and weaknesses; this process provides the opportunity to correct deficiencies while ensuring company strategies take benefit of their strengths. Although more analytical tools and models are needed to aid benchmarking beyond the intra-company level, the knowledge gleaned from benchmarking helps companies improve and outperform their competition. (Wong & Wong, 2008)

The final article illustrates the insight and benefits gained from a successful benchmarking project. Briscoe et. al. performed a benchmarking study on supply chain

integration in the semi-conductor industry. The authors' conclusions directly relate to our thesis question: how should companies manage their multi-tiered supply chains. As companies begin collaborative projects to increase their supply chain performance, efforts to reach beyond the first-tier have proven challenging; cost concerns, knowledgeable personnel, and low motivation hamper efforts. Quality concern issues are at the forefront as companies attempt to implement programs to achieve better quality assurance further upstream in the supply chain. While first-tier suppliers are beginning to realize the importance of managing their supplier quality, the need for management support does not always exist. Unfortunately, management support is also the most important element to achieve success with quality initiatives. The authors suggest six major conclusions from their research:

- 1) "Physical and institutional distance creates organizational reticence. The natural tendency is to 'hand off' responsibility for upstream implementation to the first-tier suppliers. Important initiatives are easily dropped in the handoff process. Important initiatives should be championed across tiers."
- 2) "A clear and compelling reason for change must exist."
- 3) "First-tier suppliers (customers of the lower tiers) must speak with a common voice."
- 4) "Benefits must be clearly documented and success stories shared aggressively."
- 5) "Senior management commitment must be obtained."

- 6) “Resource constraints must be addressed. Proactive supplier development is often the key to both short- and long-term success of supply chain initiatives”  
(Briscoe et. al., 2004)

### 2.2.5 Supply Chain Concepts

The three topics addressed in this subject are Quality management, Kyoryoku Kai, and risk management. Each provides a different perspective to supply chain priorities, as well as characteristics and methods to further their incorporation into companies’ strategies.

Quality management is a topic previously assumed to be the focus of operational managers instead of supply chain managers. Foster and Ogden found increasing that the opposite is proving to be true. In research that studied the difference between operational managers and supply chain managers, the authors uncovered this poor assumption, as well as the preponderance of supply chain managers who stress both quality tools and values. The quality tools supply chain managers use were benchmarking, complaint resolution, design for the environment, ERP, supplier development, focus groups, and supply chain management. Values that separated supply chain managers from operational managers included visionary leadership, customer-driven quality, organizational learning, personal development and growth, and focus on innovation. The interest shown by supply chain managers in these areas identifies a forward-minded view they hold. These characteristics of supply chain managers and their differences with operational managers aid our thesis research as we interview personnel within both fields. Additionally, this article detailed many tools that supply chain managers use for quality

control, which is one of the primary factors that drive companies to actively manage suppliers. (Foster & Ogden, 2008)

The Kyoryoku Kai is a Japanese world-class supplier network built by OEMs through a long development period. (Hines, 1994) These networks are interconnected with the OEMs and are characterized as “many tiered system with a high bought-in content at each level, a close and flexible long-term relationship between buyer and seller, a small number of direct suppliers, a reliance on small subcontractors, price determination through target costing, a high degree of strategic and operational assistance given to suppliers, and a high devolved design and supplier driven innovation” (Hines, 1994). Although these are business driven, Japanese culture does contribute to their performance. Much of the success of Japanese companies, particularly automakers, is attributed to this tight supplier relationship. This success has driven many to view their setup as the ideal supply chain, moving Western companies toward failed attempts at achieving this philosophy. The author stipulates the failures are due to the mistrust of inter-company relationships and Japanese refusal to share suppliers. In an attempt to create this successful system in Western countries, the author advises modifying the traditional Kyoryoku Kai in the following ways:

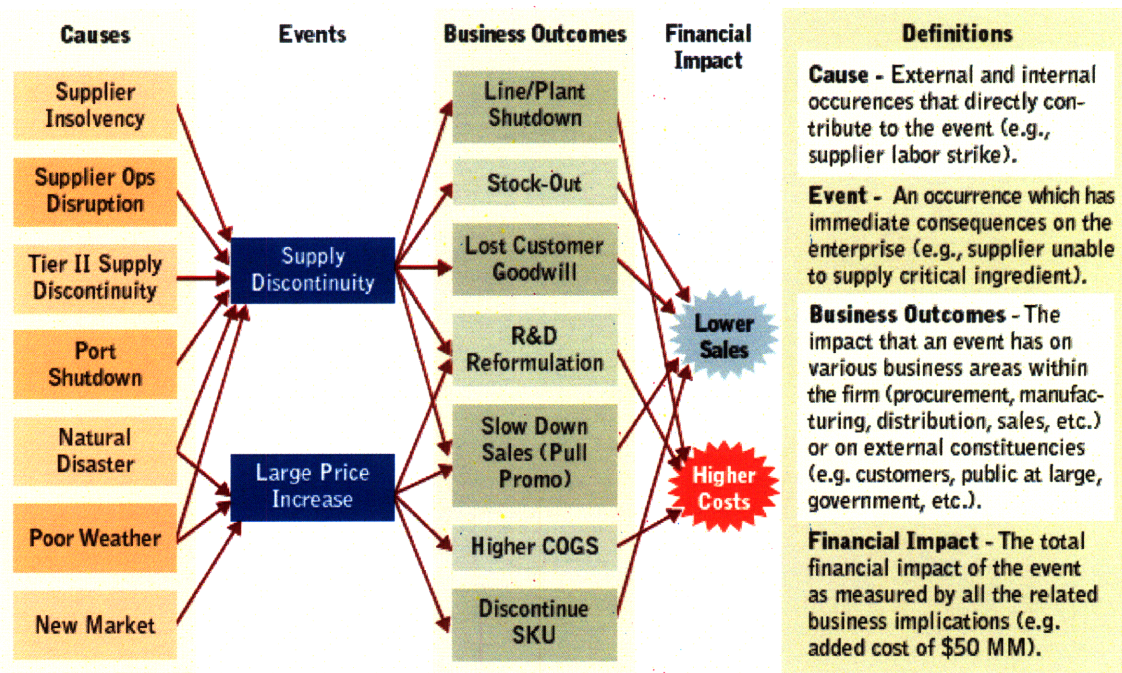
- 1) “Membership should not be limited to direct suppliers as in Japan, as the active development and networking with some indirect suppliers was felt to be crucial.”
- 2) “The inclusion of service companies, particularly those that constitute the outward face of the customer firm’s quality.”

- 3) “The size should be kept small, at least in the first months so that customers and suppliers could learn the technique together.”
- 4) “A modification of traditional Japanese paternalistic relationship whereby suppliers are dominated.”
- 5) “To start the group, a benchmarking of each supplier is to be undertaken which can act as the focus for deciding future events as well as a measuring tool for development success.”
- 6) “Lastly, particularly as the technique is new outside Japan and involves considerable administrative support especially in the setting up stages, outside facilitation was felt necessary” (Hines, 1994).

The overview of Kyoryoku Kai and its potential at implementation in the West provide a background to many of the supply chain management theories that have been espoused. While extremely effective in Japan, the theories should not be directly implemented into all companies. (Hines, 1994)

The final Supply Chain Concept article tackles the issue of risk management. This topic is becoming increasingly important as companies shift strategies to reduce inventory, reduce suppliers, and alter operations that minimize cost and increase risk. The author advocates a risk management program with three steps: risk characterization and prioritization, segment-level risk planning, and implementation and tracking. Khemani continues the discussion by illustrating a risk analysis framework in Figure 7 that could be incorporated into a company’s risk strategy. Finally, the author defines seven methods to address risk: avoid, transfer, mitigate, minimize, respond, monitor, and accept. (Khemani, 2007)

## Framework for Analyzing Individual Risks



Source: AT Kearney October 2006

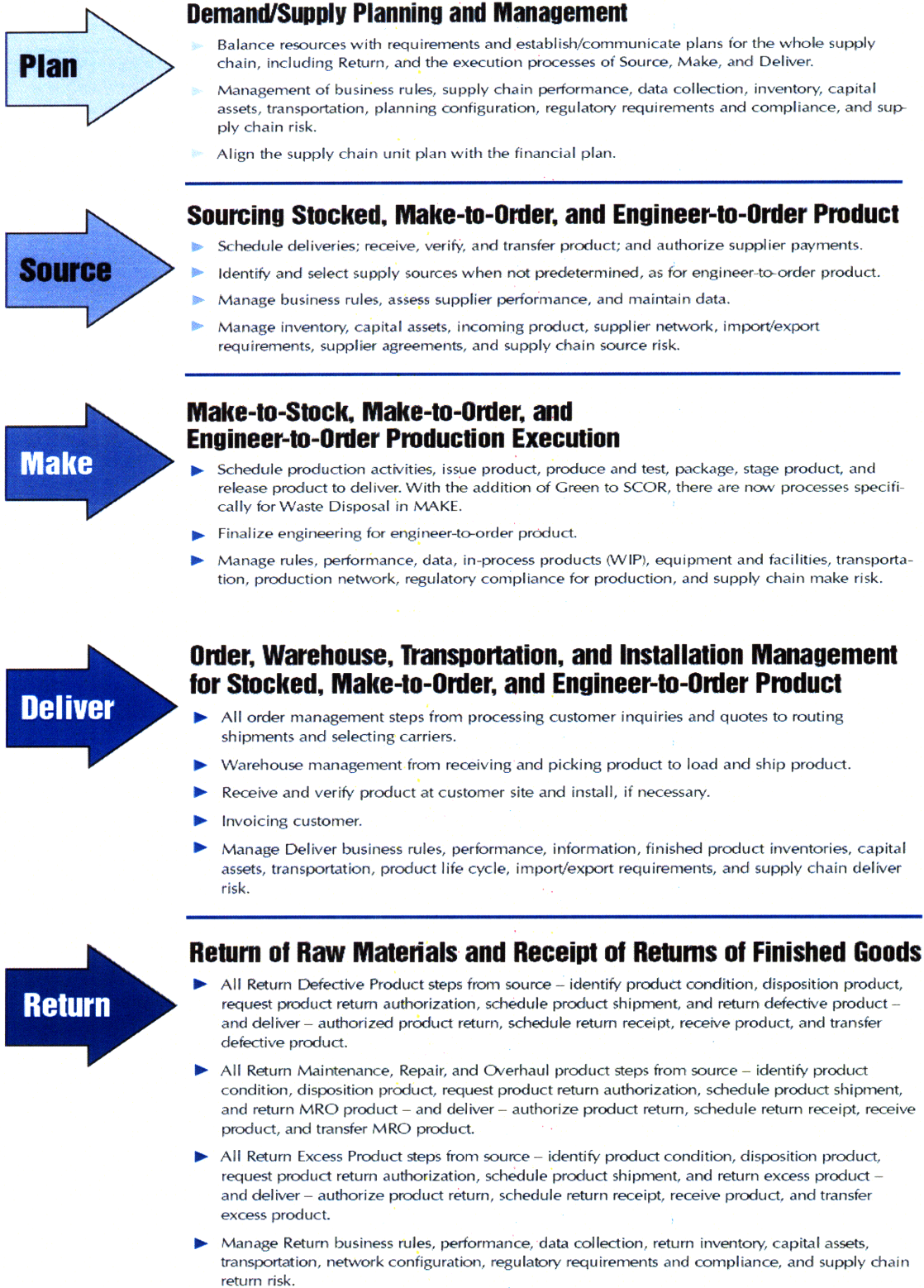
Figure 7: Framework for Analyzing Individual Risks (Khemani, 2007)

### 2.2.6 Supply-Chain Operations Reference Model

The Supply Chain Operations Reference Model (SCOR) was created by the Supply-Chain Council (SCC) to organize its view on supply chain management. The model merges “business process engineering, benchmarking, and process measurement into a cross functional framework” (SCOR). Five contents of the model are standard descriptions of management processes, a framework of relationships among standard processes, standard metrics to measure process performance, management practices that produce best-in-class performance, and standard alignment to features and functionality (SCOR, 2008).

The scope of the SCOR model encompasses five management practices: plan, source, make, deliver, and return. Plan is the “processes that balance aggregate demand and supply to develop a source of action which best meets sourcing, production, and delivery requirements” (SCOR, 2008). Source is the “processes that procure goods and services to meet planned or actual demand” (SCOR, 2008). Make is the “processes that transform product to a finished state to meet planned or actual demand” (SCOR, 2008). Deliver is the “processes that provide finished goods and services to services to meet planned or actual demand, typically including order management, transportation management, and distribution management” (SCOR, 2008). Return is the “processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support” (SCOR, 2008). As illustrated in Figure 8, each practice plays a distinct role in the model’s success.





**Figure 8: SCOR's Five Management Practices (SCOR, 2008)**

Each category process is then broken down during the second step into three types: planning, execution, and enable. Planning ensures resources support demand. Execution is driven by demand and encompasses scheduling, adjusting products, and moving goods. Enable organizes relationships or information for these processes. The final model with all the aforementioned components is assembled in Figure 9. (SCOR, 2008)

## SCOR Version 9.0 Level 2

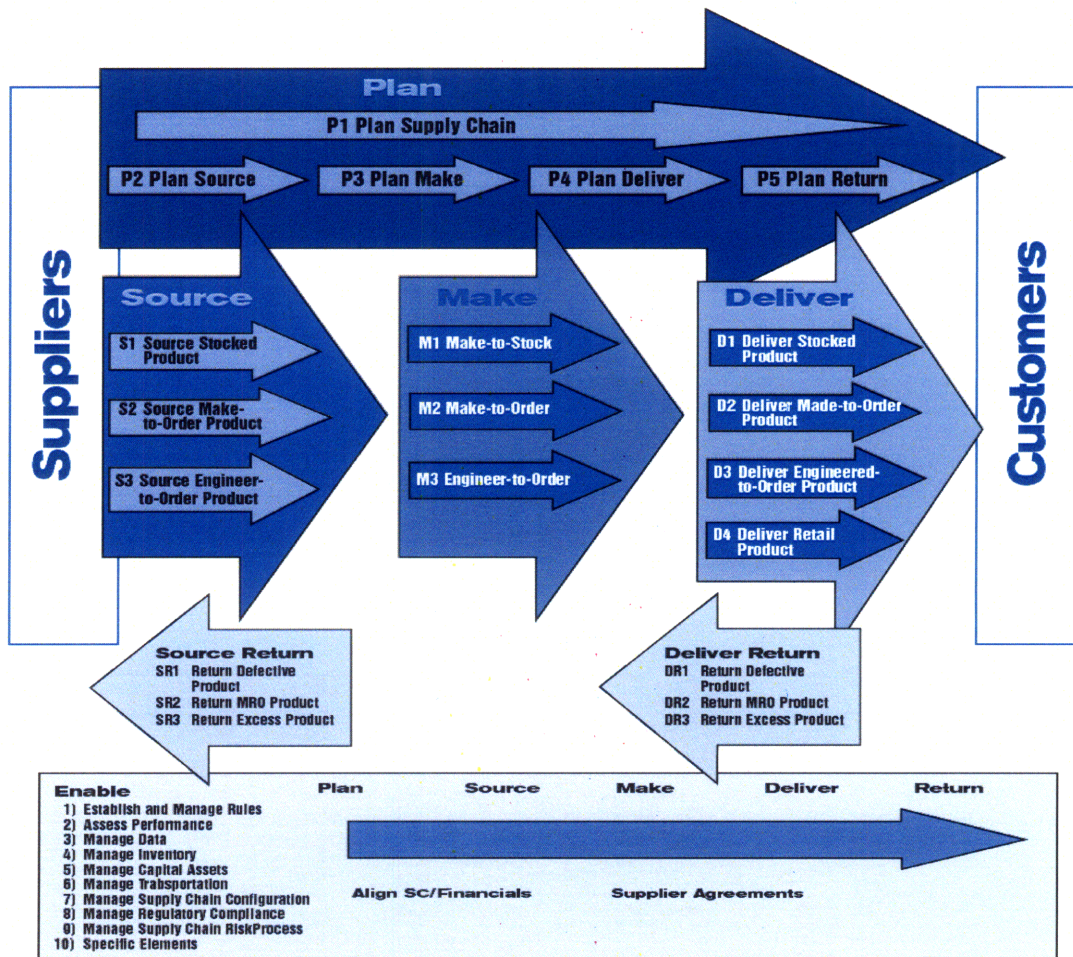


Figure 9: SCOR Model (SCOR, 2008)

In particular, we looked at the SOURCE process and its four categories: source stocked product, source make-to-order product, source engineer-to-order product, and enable source as shown in Figure 10. During this phase, companies look at process flow, inputs and outputs, source of inputs, and output destination for each category. The operational strategy can then be optimized; specifically, the SCOR model reviews each step in the sourcing process for each category. These steps include identify sources of supply, perform sourcing/supplier selection, scheduling product delivery, receive product, verify product, transfer product, and authorize supplier payment. Each step has specific performance attributes assigned to the process and recommends specific best practices. Additionally, each step produces an output that affects different elements of the SCOR model. These outputs allow companies to ensure the supplier's efforts match the company's strategy, the company's supply chain accounts for the suppliers, and the suppliers perform at the required level. (SCOR, 2008)

Enable Source is “a collection of processes associated with managing and monitoring Source process data, performance, and relationships” (SCOR, 2008). Figure 11 outlines the collection of processes that are used to manage the sourcing categories. The following processes specifically supplemented our conclusions: Assess Supplier Performance, Manage Supplier Network, Manage Supply Chain Source Risk, and Manage Supplier Agreements.

### Process Categories

S1: Source Stocked Product	The process of ordering, receiving and transferring raw material items, sub-assemblies, product and or services based on aggregated demand requirements. The intention of Source-to-Stock is to maintain a pre-determined level of inventory for these materials, sub-assemblies or products. No customer reference or customer order detail is exchanged with the supplier, attached to or marked on the product, or recorded in the warehousing or ERP system for Source-to-Stock products. Examples of alternative or related names for Source-to-Stock are: replenishment inventory, drip parts, kan-ban, andon, and bulk or generic stock.
S2: Source Make-to-Order Product	The processes of ordering and receiving product or material that is ordered (and may be configured) only when required by a specific customer order. The intention of Source-to-Order is to maintain inventory ordered (and/or configured) specifically for customer orders only. The product is ordered, received and identified in stock using this customer order reference (order designated inventory). The product is typically identifiable throughout the sourcing process, by the reference to the customer order attached to or marked on the product or packaging and in the warehouse management or ERP system. Examples of alternative or related names for Source-to-Order are: purchase-to-order, special ordering (retail industry), kitting and line sequencing (manufacturing industries).
S3: Source Engineer-to-Order Product	The processes of identifying and selecting sources of supply, negotiating, validating, scheduling, ordering and receiving parts, assemblies or specialized products or services that are designed, ordered and/or built based on the requirements or specifications of a specific customer order.
ES: Enable Source	The collection of processes associated with managing and monitoring Source process data, performance and relationships

Figure 10: SCOR's SOURCE Process Categories (SCOR, 2008)

<b>Process Categories</b>	
ES.1: Manage Sourcing Business Rules	The process of defining requirements and establishing, maintaining and enforcing decision support criteria, in alignment with business strategy, goals and objectives. The business strategy defines the criteria for sourcing business rules that are translated into guidelines and policies for conducting business within the enterprise and other legal entities. Sourcing business rules include: supplier selection and negotiation processes, fulfillment and delivery performance and relationship definition for specific levels of collaboration and partnership.
ES.2: Assess Supplier Performance	The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs
ES.3: Maintain Source Data	The process of collecting, sorting, defining hierarchy and managing configuration control of supplier information and source data that are required to make sourcing and related planning and manufacturing decisions. Source data to be maintained includes supplier profile data, financials, quality and delivery performance, spend analysis at various levels of the enterprise, from major business units to material part number
ES.4: Manage Product Inventory	The process of establishing and maintaining physical inventories and inventory information. This includes warehouse management, cycle counting, physical inventories and inventory reconciliation. For Services, this may include tracking the number of service providers and the financial resources committed at any given point in time.
ES.5: Manage Capital Assets	The process of acquiring, maintaining and dispositioning an organization's capital assets located at a supplier's facility and/or outside source, which are used to operate the supply chain.
ES.6: Manage Incoming Product	The process of defining and maintaining the information that characterizes inbound logistics management of all supplier deliveries, including both physical and electronic goods and services. This includes carrier selection and management, tracking deliveries and import
ES.7: Manage Supplier Network	The process of defining and maintaining a unique network of suppliers to deliver a specific product set. This includes establishment of a new supplier or maintaining an existing supplier and all the tasks and activities associated with identifying and qualifying the supplier and finalizing on the sourcing terms and conditions. Also, the management of a supplier certification process, which includes certifying new suppliers and maintaining the current status of existing suppliers.
ES.8: Manage Import/Export Requirements	The process of identifying and complying with import/export regulatory documentation and process standards set by external entities (eg, government).
ES.9: Manage Supply Chain Source Risk	The process of managing Source risks within an overall Supply Chain Risk Program. This includes identifying and assessing Source risks as well as planning and implementing responses to Source risks. Source risks include potential events that could impact the organization's or the suppliers's ability to deliver raw material in a timely manner at a reasonable cost with acceptable quality. Risk Management includes: migration, either reducing the impact of a risk event or reducing the likelihood of its occurrence.
ES.10: Manage Supplier Agreements	The management of existing purchase orders or supplier contracts. This includes managing volume/step pricing, resolving issues, enforcing terms and conditions and maintaining an accurate status for existing purchase orders or contracts.

**Figure 11: SCOR's Enable Source Category (SCOR, 2008)**

As complex business processes are organized into this standard SCOR model, managers gain insight into their supply chain, thus enabling more informed decisions. The new standard model can be “implemented purposefully to achieve competitive

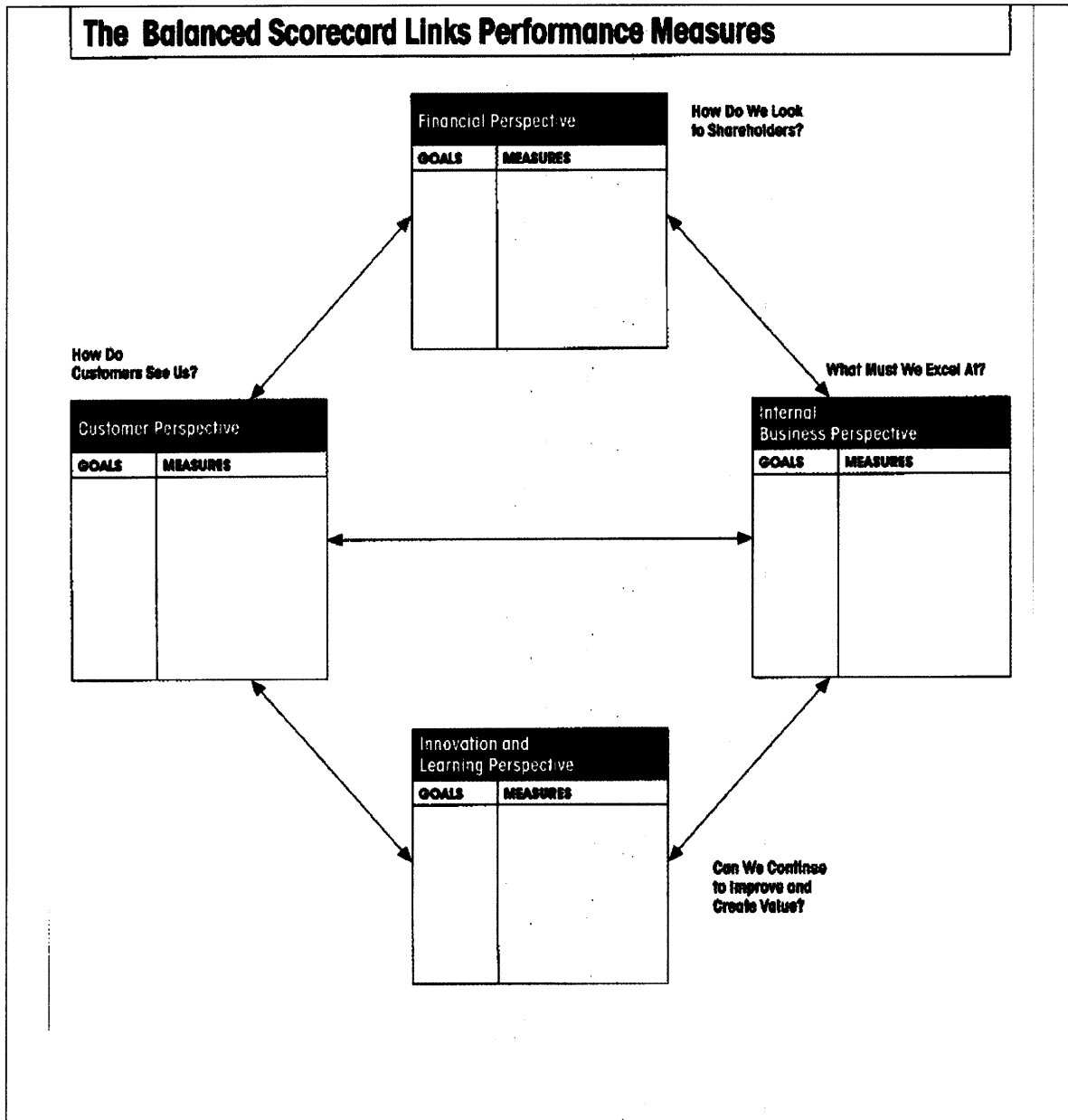
advantage, described unambiguously and communicated, measured, managed, and controlled, and tuned and re-tuned to a specific purpose” (SCOR, 2008). Companies that use the SCOR model gain a significant business advantage with their supply chain management.

### 2.2.7 Balanced Scorecard

The Balanced Scorecard was devised by Robert Kaplan and David Norton to give managers “a fast, but comprehensive view of the business” (Kaplan & Norton, 1996). After coming to the conclusion that no single measure provides managers the information needed to gauge performance, the authors developed this scorecard that incorporates both financial concerns and operational concerns. The scorecard answers the following questions:

1. “How do customers see us? (customer perspective)”
2. “What must we excel at? (internal perspective)”
3. “Can we continue to improve and create value? (innovation and learning perspective)”
4. “How do we look to the shareholders? (financial perspective)” (Kaplan & Norton, 1996)

Based on these questions, Kaplan and Norton came up with the following figure to unify these questions into a company strategy (Figure 12):



**Figure 12: The Balanced Scorecard (Kaplan & Norton, 1996)**

As shown in the above figure, each category provides goals and measures unique to the company and situation. Companies must view all four categories holistically to develop a successful business strategy. Kaplan and Norton provide an example of the goals and measures using a semi-conductor company named ECI. ECI tailored the scorecard to their distinct business strategy, as shown in Figure 13.

<b>Financial Perspective</b>	
<b>GOALS</b>	<b>MEASURES</b>
Survive	Cash flow
Succeed	Quarterly sales growth and operating income by division
Prosper	Increased market share and ROE

<b>Customer Perspective</b>	
<b>GOALS</b>	<b>MEASURES</b>
New products	Percent of sales from new products Percent of sales from proprietary products
Responsive supply	On-time delivery (defined by customer)
Preferred supplier	Share of key accounts' purchases Ranking by key accounts
Customer partnership	Number of cooperative engineering efforts

<b>Internal Business Perspective</b>	
<b>GOALS</b>	<b>MEASURES</b>
Technology capability	Manufacturing geometry vs. competition
Manufacturing excellence	Cycle time Unit cost Yield
Design productivity	Silicon efficiency Engineering efficiency
New product introduction	Actual introduction schedule vs. plan

<b>Innovation and Learning Perspective</b>	
<b>GOALS</b>	<b>MEASURES</b>
Technology leadership	Time to develop next generation
Manufacturing learning	Process time to maturity
Product focus	Percent of products that equal 80% sales
Time to market	New product introduction vs. competition

Figure 13: ECI's Scorecard (Kaplan & Norton, 1996)

While ECI has specific goals they incorporate into their scorecard, other companies may have unique goals that they measure differently from ECI. One of the best features of the Balanced Scorecard is versatility; the scorecard is generic to companies or industries. Changing the goals and measures to match a company's strategy transforms a generic model into a powerful tool to measure performance. By using the balanced scorecard, companies are able to objectively view their strategy from the four perspectives outlined and improve their performance by constantly striving to achieve their goals. (Kaplan & Norton, 1996)



### 3. Case Study

#### *3.1 Background of Healthcare Company Case*

Our initial research focus was the supply chain management of a global medical device manufacturing company, referred to as 'MedCo.' With operations throughout the world, sales in the millions, and thousands of employees, MedCo is a world leader in the healthcare industry. The company globally outsources the component manufacturing for the majority of their products, while completing the final assembly and testing before shipping to their customers throughout the world. Their supply chain network maintains distinct first, second, and third tiers suppliers, and has been continually shifting their component assembly further upstream. The industry as a whole is highly regulated by the US Food and Drug Administration (FDA), which affects their operations extensively.

To determine how the company manages their supplier tiers, we interviewed five members from various departments. The interviews exposed stark differences in opinions on how to manage the multi-tier supplies for both their specific products, and the company in general. Initially we assumed that the opinions would be based on position and department; however, this turned out to be a fallacy. The five interviews included a material engineering manager from the US patient-monitoring sector, an executive in the supply management outsourcing sector, a member of the quality and regulatory sector, a supply chain manager from the cardiac care sector, and a material engineering manager from the European patient-monitoring sector.

## *3.2 Interview Results*

### **3.2.1 U.S. Patient Monitoring**

The first interview occurred with a material engineering manager, named M. Within MedCo, M is responsible for patient monitoring in the US and deals directly with suppliers to ensure the sub-assemblies are configured correctly to the specific design parameters. This responsibility includes the complete specification for products, correct rationale of suppliers, and proactive improvement of products. His discussion revolved around the reasons why he deals directly with first, second, and third tier suppliers, how the FDA's involvement affects his actions, and how he would rather shift managing of lower tiers to the first tier suppliers.

M began by outlining how the company's position in a highly regulated industry forces quality monitoring to be the most critical issue in dealing with different suppliers. MedCo has been working to outsource over 80% of their components, sometimes the entire product. This shift forces their suppliers to have a higher level of technical capability than previously required. As a result, MedCo has needed to work closely with their second and third tier suppliers to ensure that the quality of the outsourced components meet the MedCo's high standards. Many problems have been exposed as a result, including second and third tier suppliers' lack of a continual product improvement in the areas of quality and consistency. Additionally, many difficulties exist while maintaining relationships over language and time-zone barriers with those suppliers who are located outside of the U.S, such as in Europe and Asia. In many occurrences, contacting distant suppliers requires the company to travel to the suppliers' manufacturing sites.

The FDA further requires the company to get involved in suppliers beyond the first-tier due to the FDA's strict regulations. The organization drives the industry requirements that greatly influence companies' operations. For example, suppliers must be approved through the FDA, requiring immediate interaction with all their upstream suppliers. MedCo incorporates this approval with its own supplier selection process. As operations commence, MedCo is forced to continue working with second and third-tier suppliers as problems arise. If relationships are poor or non-existent with their upstream suppliers, problems will not be resolved and the whole supply chain will suffer. In an attempt to get the first-tier more involved, and thus correct these problems before they arrive at MedCo, M works with the responsible tier and all those under to correct the problem with the responsible tier, and keep the first-tier in the communication loop. Additionally, these interactions will hopefully put pressure on the first-tier to be more proactive in their quality assurance programs and help strengthen the ability of the first tier suppliers to manage their upstream supply chain.

Although M makes an effort to push problems to the first-tier and aid in their supplier management ability, he mentioned that his department is actually expanding their interactions with the second and third-tier suppliers and developing a consistent plan to deal with all upstream suppliers. The driving force behind this contradicting effort is risk. If MedCo could shift responsibility and risk to the first-tier supplier, their interaction with the upstream suppliers would be dramatically reduced. MedCo is ultimately responsible for their products and the risk associated with ensuring the quality of their products dictates the company's need for more control over their sub-tier suppliers. Thus, although his ultimate goal is to have more of a relationship with second

or third tier suppliers, it is not being done effectively currently due to the tendency to rely heavily on the first tiers to handle the rest of the jobs being done at the company.

M's interview depicted two conflicting strategies that exist within MedCo: shift upstream supplier management to the first-tier, and actively managing second and third-tier suppliers. In M's department, they have the desire and committed resources training first-tier suppliers to actively manage their upstream suppliers. M believes that cost benefits exist, and that it would be more efficient for the first tier to contact upstream suppliers directly. However, he believes the company's current operations under strict FDA regulations governing the medical device industry create a significant barrier to achieving this goal. Risk concerns involving quality assurance have forced him to further increase oversight of second and third-tier suppliers, to include updating plans and increasing contact. In M's department, there is not one distinct operational strategy when dealing with this issue.

### 3.2.2 Outsourcing Sector

Our second interview took place with an outsourcing executive named W. He oversees all industry matters surrounding outsourcing and managing those upstream suppliers. Having been experienced in the areas of purchasing, planning, and operations, W shared his understanding of the current operations being practiced under his supervision. He addressed the company's current approach to second and third-tier suppliers, why they have this structure, and what approach he would like the company to take.

W strictly regulates the supplier selection to the extent that the company provides the list of suppliers which the first tier suppliers can contact for outsourcing. After the

supplier makes their selection, MedCo must again validate the decision and grant final approval. W acknowledged that this approach leads the first tier supplier to take less responsibility of managing their upstream suppliers since W maintains such tight control over the first-tier suppliers' options. However, W noted that this is the current structure and conceded there can certainly be room for improvement. His major concern with the current structure is the company's extremely reactive approach when dealing with their second and third-tier suppliers; they reactively get involved in solving problems with the upstream tiers in an informal way.

The main reasons why the company carefully controls their suppliers are FDA regulations and the quality assurance that the medical device industry requires. W articulated MedCo's necessity to know every step in the management of the critical components. He repeatedly stressed that he must take into account the level of risk he creates by having another company produce components for a product under MedCo's ultimate responsibility. Risk management is the most important factor when considering the relationship with suppliers and their potential difficulties. When a problem arises with key components of unique products at the company, it is critical to trace down the specific issue to the upstream source. The highly regulated medical device manufacturing industry forces personnel at MedCo to have intimate knowledge of component specifications, affording them the ability to fix the problem rapidly without waiting on first-tier action. What prevents MedCo technicians from a proactive approach to their multi-tier suppliers is either the readiness of needed upstream supplier information or the organization's lack of personnel capacity dealing with the overwhelming inflow of data. Technological upgrades and cooperation with suppliers to

make available real-time upstream information for the company's technicians is a goal W strives to achieve.

The default view from the department's stand point is having the first-tier contract manufacturer managing all aspects of their supply chain. However, he purports that this does not happen in practice and is not his strategic view. He would like to have more control over critical components due to the importance of capability and technical expertise, while moving away from those materials that do not have many constraints. His view on managing the suppliers is that he'd rather establish a solid relationship with the second tier suppliers along with the first-tiers than controlling the third or fourth-tier suppliers. The company can always establish relationships with n tier suppliers, but he would not choose to do so until he can better manage the second-tier suppliers. When W was asked if he wished the first-tier would do this for him, he reiterated his unwillingness to give up the responsibility. Although he'd hoped the first tier suppliers would manage some of the non-critical components, W needed the capability to manage from a risk management perspective. He added that cost management is also a crucial issue, especially when considering the contract process. Thus, managing the second-tier suppliers becomes a critical challenge as the company manages both the risks and cost. For this reason, managing the second-tiers should be addressed sooner rather than later. His final point is that when second-tiers are actively managed, expectations are clear; in the current reactive approach, expectations are not always clear.

MedCo's current model for second-tier management is reactive based primarily on its regulated industry and the lack of support needed for a proactive approach. Due to the risk and responsibility of the company, W suggested active managing of both the first

and second tier suppliers. Furthermore, resources permitting, W would like to actively manage all supply tiers, especially those with critical components.

### 3.2.3 Quality and Regulatory Sector

The third interview took place with an employee, E, from the Quality and Regulatory Sector. Her job entails handling all regulations, country-specific requirements, and process controls. Based on all the previously mentioned guidance, she documents, implements, and audits procedures and policies to ensure MedCo's compliance with all requirements. Stated plainly, her job is to understand all the product requirements and clearly explain them to all impacted parties. She does not directly manage suppliers; instead she provides guidance for supplier management. Her conversation addressed the importance of risk within the industry and additional requirements for choosing suppliers.

Risk analysis from E's standpoint is the most important factor for medical device manufacturing companies. According to E, risk is measured by frequency and criticality; how frequently the company faces the issue and how critical those components are in making certain products. Risk incorporates defining focused standards based on the understanding of which suppliers operate within the most critical positions of the risk analysis. E framed her explanation by stressing emphasizing that the risk analysis drives the company's management of second or third-tier suppliers.

Communication with suppliers is part of the risk analysis. If MedCo fails to communicate the correct information or does not confidently present what the company deems important, the business is at risk. In E's opinion, MedCo must understand all requirements surrounding their products, clearly express their expectations to all

suppliers, and verify the suppliers fully comprehend the importance of the standards MedCo maintains. Although first-tier suppliers may be sufficient to perform this, MedCo is responsible for all parts under its label. Thus, the moment the company decides to outsource, it must get involved in all tiers of suppliers.

Cost management issues are the second most crucial factor determining how far upstream the company supervises. If the company produces certain products with a focus on low cost, the decision on the supplier selection and supplier relationship level necessitates more attention. MedCo works with their business units to leverage economies of scale by buying the same components from only a few suppliers. However, this may generate cost or quality issue problems among different departments as they lose control of the supplier selection. The company will also work with their suppliers to improve their component-building process, and therefore MedCo's price for the components.

E described risk analysis at MedCo and emphasized that it is the primary decision driver for the company. She also explained cost management and its place as the second most important decision driver. Although the possibility exists for first-tier suppliers to perform all upstream management, the detailed two decision drivers ultimately determine when MedCo manages their second and third-tier suppliers.

#### 3.2.4 Cardiac Care Sector

The fourth interview took place with D, a supply chain director with the US Cardiac Care. D is in charge of all supply chain activities within the company's US Cardiac Care sector. He expressed his feelings on how the company currently manages



their suppliers and how he believes the company should manage their second and third-tier suppliers.

D reaffirms W's earlier opinion that MedCo is very reactive when managing their second tier suppliers. When problems arise, they begin communications with those troubled second-tier suppliers. There is little attempt to be proactive with second-tier suppliers in general, and D does not feel MedCo should need to be proactive.

After the supplier network including supplier selection has been established, D caters to the stance that wishes contract manufacturers or the first-tier suppliers should be responsible for managing their own sub-tier suppliers. D would like to assist in the processes but believes it to be more ideal having the first-tier suppliers manage everything upstream. Although there would be some loss of control, D feels MedCo maintains adequate control of the upstream vendors in which the first-tier suppliers outsource to by providing strict specifications and expectations, along with ensuring they are on the approved vendors list. Nevertheless, when deciding who should be responsible for managing those vendors, D stressed that the first-tier suppliers are supposed to be in charge of working with sub-tiers in order to resolve issues. While experience dealing with these issues may an issue, first-tier suppliers generally have or could be taught the expertise needed.

In some ways, D shares similar views with E from Quality and Regulatory as he thinks that the risk management should be the primary metric used when deciding on involvement. Consequently, D mentioned that the risk management is an ongoing learning process, and there is an issue of optimization between vertically integrated processes and complete outsourcing. He stressed that making sure the first-tier suppliers

maintain their expertise and reaffirm the quality assurance is crucial as they are more concerned with their own process effectiveness.

The most obvious reason, according to D, of having the first tier suppliers manage the rest of the tiers is due to the fact that it is their job; what they are paid to do. The parent company expects all components from their first tier to be fully operational. If a problem exists, it should be corrected by the first-tier; it shouldn't matter to the parent company which company manufactured the failed component, it should only matter to the first tier to ensure the problem is corrected.

D agreed that the company was very reactive when dealing with second-tier suppliers, but believed that the first-tier should be the company that corrects these problems, not the parent company. Additionally, he agreed that risk management should be the primary factor when making supplier management decisions. Overall, he felt first-tier suppliers should manage the supplier upstream because the parent company pays them for that service.

### 3.2.5 Patient Monitoring Sector, Europe

Our fifth and final interview from MedCo was with H, who is a material engineering manager in the European patient monitoring sector; he is the European equivalent of M. H views suppliers based on two distinct areas: the technical side and the commercial side. He discussed managing suppliers by explaining the initial selection of suppliers, the basis of his opinion on how to deal with suppliers, and why the first tier is unable to perform the management role.

Suppliers are chosen by R&D during the New Production Introduction (NPI) phase. There is little freedom in choosing suppliers based on product design and the

industry regulations. Critical parts are established during the NPI stage rather than the maturity phase and there is no distinguishing difference among tier 1, tier 2, and tier 3 in the NPI phase due to the fact that all the specifications are sent out by the company to all the tiers. When suppliers are chosen, criticality of components of product is assessed and incorporated into making managing decisions; they actively manage the critical components and directly establish relationships with those suppliers. Initially, they treat all suppliers the same and when the actual problem arises, they go directly to the source because they do not view the first tier suppliers as any better than the second or third tier suppliers. The majority of his team is not dealing with quality issues; ratio of 1 to 10 (quality to new production issues). Therefore, there are limited resources when facing those issues.

H believes that resource and quality issues are the first priority, and he has found that it is quicker for the company to engage in problem solving phases directly as opposed to waiting on the first-tier. Additionally, having the responsibility for quality controls is the most critical factor from his stand point. Thus, after deciding on the suppliers and launching the production phase, when the company runs into a problem with a specific component, they go directly to the manufacturing supplier even though it may not be the first tier supplier

H approaches problems in this manner for three main reasons: qualification, speed, and cost. MedCo has a better chance of finding out the real root cause since the company has the qualification, or technical expertise, that most first-tier suppliers lack. If first-tier suppliers understand the problem and are able to correct it, it is worth pushing up responsibility to the first-tier suppliers. However, H has found that is rarely the case.

With the qualification, it becomes faster and therefore cheaper to go directly to the root cause rather than going through the first-tier suppliers in resolving these issues. Speed is a driving force because typically the longer the problem lingers, the longer the product is not produced. If the product is not produced, then the product cannot be sold; this immediately affects the company's revenue and can ultimately lead to lost customers if the problem persists. Logistics costs can also come into the equation as unusable components will have to be returned and delayed products may have to be rush delivered.

Due to the fact that many first-tier suppliers work on margin products, and inventory has been shifted back to them from the parent company to save their costs, first tier suppliers are already in a tough pricing situation. They do not have the financial ability to handle sub-tier supplier problems. This fact creates an enormous speed and cost difference when attempting to have the first-tier or upstream suppliers troubleshoot and correct problems as opposed to the parent company managing directly. However, as mentioned above, if the first-tier supplier is correcting the problem, then the company should not intervene. From the technical angle, H mentioned that the company has tried to shift the supplier management issues to the first-tier suppliers in the past. However, training personnel to handle the problems was not sustainable due to the massive turnover of technical expertise in the upstream tiers.

H concluded that managing multi-tiered suppliers can be viewed from a technical and strategic point of view. When looking at from the strategic stand point, MedCo would love to set up a specific strategy of handling multi-tiered suppliers by delegating tasks to the first tier suppliers, and shifting some management of their upstream suppliers for noncritical components. However, when looking at from the technical stand point, H

concluded that it is cheaper, safer, and more efficient for the company to contact upstream suppliers directly rather than having the first tier suppliers handle these issues. According to H, there is no right or wrong answer in managing suppliers; the goal is to choose the best alternative solution in terms of risk, cost, and quality management. It is important to note this approach is different from M's identical division in U.S.; M wants to rely heavily on the first tier suppliers despite the fact that the FDA puts rigorous restriction to have the company itself manage all upstream suppliers to meet the regulations requirement.

### *3.3 Summary*

The research into MedCo produced five interviews with five distinct opinions on how to manage second and third tier suppliers. M wanted to shift management to first tier even though he currently manages second and third-tier suppliers. W wanted to manage all second and third-tier suppliers if possible. E looked to managing only the suppliers that produced critical parts based on risk. D wanted the first-tier supplier to manage everything upstream. H concluded that although it would be beneficial for the first-tier to manage, it was unrealistic and more cost effective if the company managed all the tiers.

Although the opinions were different, there were a number of themes that carried throughout all interviews. The healthcare industry is extremely regulated by the FDA, resulting in a limited supplier pool, and mandating the highest quality assurance for all products. Based on the quality assurance requirements, risk analysis is the major driver for decisions in the company, in particular how they manage their suppliers. The second major driver for managing suppliers is cost, which may come in the form of not only

initial component cost, but cost to correct manufacturing problems. Another major point that carried through multiple interviews is the concerns with the first tier's ability to manage their upstream suppliers.

Some of the departments' opinions overlap whereas others' stand alone as unique viewpoints regarding this issue of managing multi-tiered suppliers in the industry. Especially in the healthcare industry where there is a heavy regulation due to FDA requirements, certainly more than one thing shapes the supplier relationships. What appears to be lacking is a company wide strategy supported by all departments. Our objective to create a decision framework to aid in developing this strategy led us to take a step back and research how other businesses are dealing with this issue.

## 4. Web-Based Research

### *4.1 Consulting Companies*

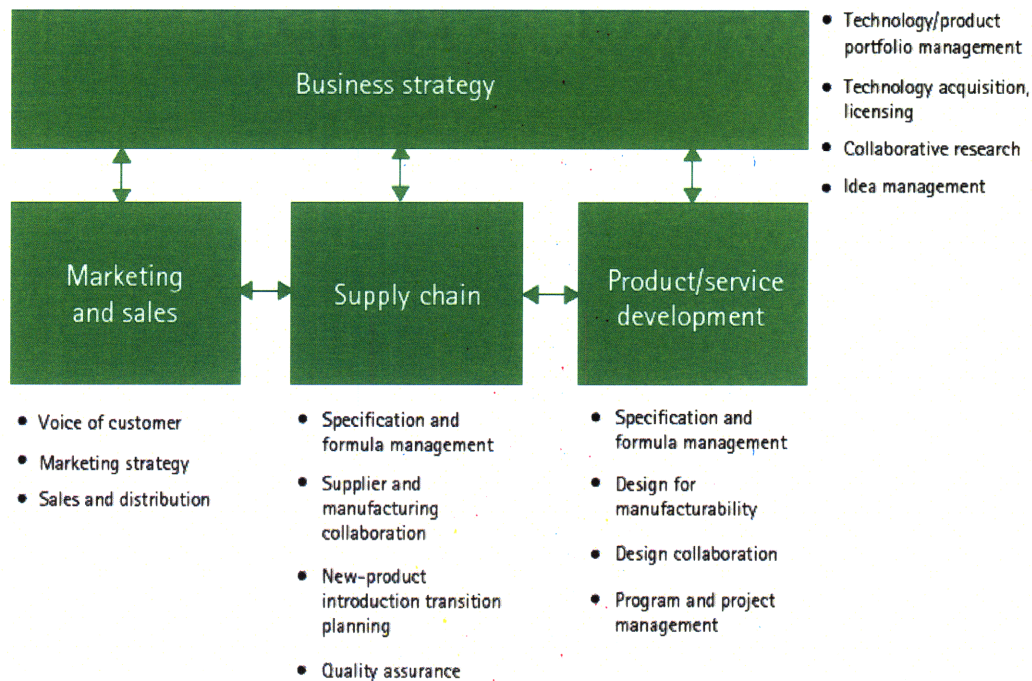
#### 4.1.1 Introduction

Consulting companies provide another point of view when discussing supplier management. White papers from five consulting companies' websites were examined, and their relevant views are summarized in this chapter. While the companies are clearly attempting to market their services through these articles, they do address current supply chain management issues and provide opinions on how to successfully navigate through these issues. We looked at five global consulting firms who have backgrounds in supply chain management: Accenture, AT Kearney, Bearing Point, Deloitte, and McKinsey. While each firm has individual views, common themes dominate their opinions.

#### 4.1.2 Accenture

Accenture research created outlines for how to be successful in Supplier Relationship Management (SRM). The first article addressed a specific scenario and how supplier management can increase its success. Surveys formed the basis of the following two, with results that provide guidance for company operations with suppliers. The three articles are: “Product Life Cycle Management,” “Procurement Performance,” and “Procurement Leaders using Supply Chain Management.”

The concept of product life cycle management (PLM) deals primarily with new product development and its sustainability as the product is brought to market. However, it can be applied to all products throughout their life. Accenture’s model in Figure 14 expresses the collaborative effort needed from all corporate departments, including the supply chain. Constant communication provides feedback on potential improvements and adjustments as necessary during implementation from all sources.



**Figure 14: Product Life Cycle Management (Supply Chain Management Viewpoint, Accenture)**

Suppliers play a critical role in providing quality assurance, verifying product specification, supplier and manufacturing collaboration, and product planning. In most companies, many of these concepts are undertaken during the initial development phase. What differentiates this model from common practice is the constant feedback throughout the product's entire life cycle. Using aspects of MedCo as an example, after the development phase companies fail to develop constant working relationships with suppliers; they relegate to a pure reactive position dealing with supplier problems as they arise. Supplier integration benefits the company with possible innovative ideas and reduced response-time with supply disruptions. Additionally, cost-reductions have occurred from this model as companies are able to increase supplier efficiency through

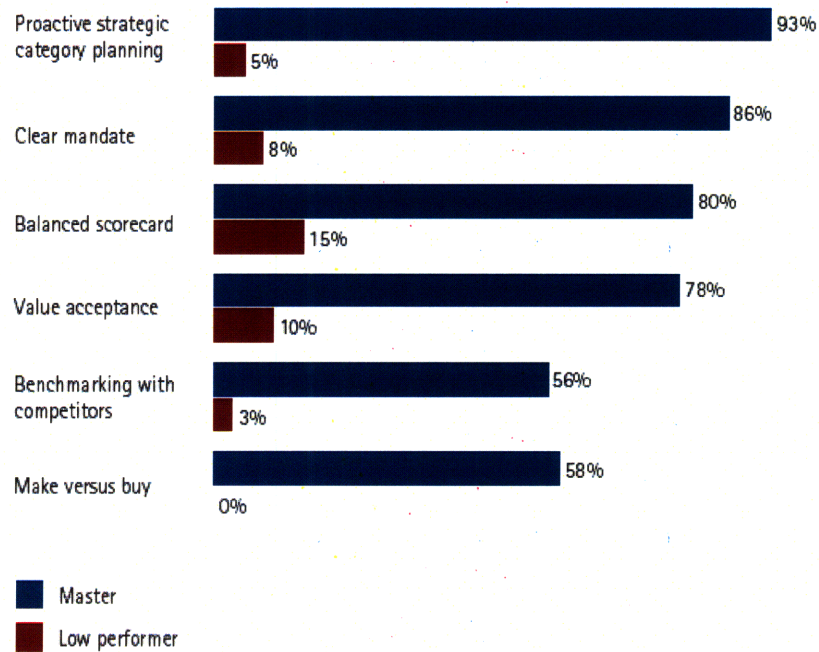


collaborative efforts in process improvement. (Supply Chain Management Viewpoint, Accenture)

Accenture performed a global survey in 2006 of executives from a wide-range of industries centered on procurement. The results logically found that the best procurement companies were the highest performing companies. These companies achieved savings in both spend and the cost of the procurement process. Six characteristics were reviewed: procurement strategy, sourcing and category management, requisition to pay, supplier relationship management, workforce and organization, and technology. These characteristics were measured by the success in five categories: total cost of ownership savings, total controllable spend, total cost of ownership savings/operating cost, new product development, and formally managed suppliers. The best companies performed considerably better in all characteristics. The three most relevant areas that will be reviewed are procurement strategy, supplier relationship management, and technology. (High Performance through Procurement, Accenture)

Procurement strategy is one of the first important steps companies should take when developing their suppliers. Figure 15 shows six areas where the difference between high-achieving companies and low performers is remarkable. The percentages are based on the positive responses from the previously mentioned survey when asked if they perform the steps during the procurement process. As noted in the legend, the blue indicates the response from industry leaders, while the red indicates those companies that are low performers. Great companies have clearly defined procurement strategies that are driven by corporate brass. Three key points translate directly to supplier management: proactive strategic category planning, balanced scorecard, and

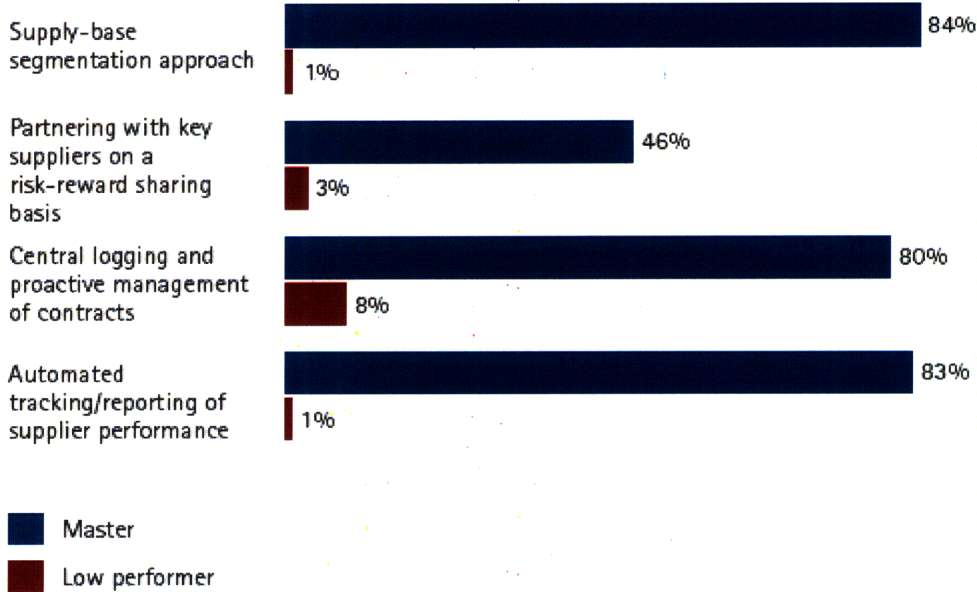
benchmarking. Category planning ensures the company has an organized process to accurately assess spend. For managing suppliers, this area is important to minimize the number of suppliers to maximize company resources. Companies that use the balanced scorecard in their procurement process make better decisions on supplier selection than those that do not. Better suppliers, including second and third-tier, facilitate stronger, lasting relationships that enhance all parties involved. Benchmarking performs the function of constantly verifying the supplier selection remains viable and the supplier's customers keep pace with their competition. (High Performance through Procurement, Accenture)



**Figure 15: Procurement Strategy Differences (High Performance through Procurement, Accenture)**

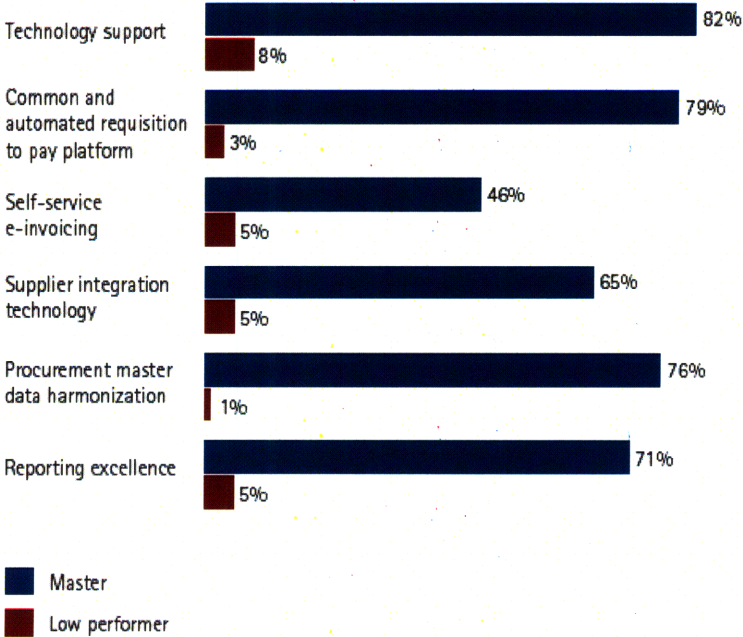
Looking specifically at supplier relationship management, the largest differences between the highest performing companies and lowest exist. Figure 16 illustrates four

specific areas that display these differences in stark detail: Supply-base segmentation approach, partnering with key suppliers on risk-reward sharing basis, central logging and proactive management of contracts, and automated tracking/reporting of supplier performance. Segmentation is critical in determining which suppliers should be actively managed and those that do not warrant the resources. Partnering with key suppliers involves collaboration that can create innovation and cost reductions for both parties. Central logging and proactive management of contracts formalizes supplier relationships. Automation of supplier performance requires a technological investment for both companies. However, the gains can be dramatic as discovering problems early and the timely restoration can minimize long, costly disruptions. Clearly supplier relationship management represents a business game-changer. (High Performance through Procurement, Accenture)



**Figure 16: Supplier Relationship Management Differences (High Performance through Procurement, Accenture)**

Technology use defines leading companies in overall procurement performance. Five areas noted in Figure 17 within the technology category uncovered the greatest disparities: technology support, common and automated requisition to pay platform, self-service e-invoicing, supplier integration technology, procurement master data harmonization, and reporting excellence. The two that best translate into managing suppliers is technology support and supplier integration technology. Technology support is crucial for reliable, accurate data to be received in a timely fashion. Coupled with supplier integration technology, these two aspects allow companies to actively manage their suppliers on a component level. Technology bonds companies with their suppliers and as discussed previously, can greatly minimize supply chain disruptions. (High Performance through Procurement, Accenture)



**Figure 17: Technology Differences (High Performance through Procurement, Accenture)**

The survey results reaffirm the importance of having an organized, systematic SRM program. Although many areas of procurement were addressed, supplier management topics showed the greatest difference in the highest and lowest performing companies. Leaders have proactive category planning programs that incorporate balanced scorecard and benchmarking. High performers segment their suppliers and partner with key suppliers on a risk-reward sharing basis. They proactively manage supplier contracts, and automate supplier performance. To achieve these, they are leaders in technology, particularly with support and supplier integration. (High Performance through Procurement, Accenture)

In 2005, Accenture completed a similar survey to the previous article with industry executives that questioned how procurement leaders successfully used SRM. The results uncovered three SRM leader's differentiators: people and capabilities, processes, and technology. People and capabilities are critical to management in general, and supplier relationship management bears no difference. Quality personnel perform all the standard functions that companies require, and few take the extra steps to achieve greatness. This may come in the form of innovation, improving suppliers' performance, and carrying out additional functions beyond their initial capacity. Processes as shown in the previous two articles are essential for successful companies and leaders naturally perform them better. Whether strategy planning, benchmarking, sourcing, or developing contracts, leaders not only follow well established methods, but work to constantly improve them. As noted extensively in the previous article, leaders incorporate the newest technology such as supplier integration and automation. These results can be broken down into the three major lessons learned: 1) Organizations can reap rewards by

pursuing and successfully implementing supplier relationship management activities, 2) Companies need to adopt a holistic approach to supplier relationship management, and 3) Companies must work collaboratively with those outside the procurement department. (Designed to Differentiate, Accenture)

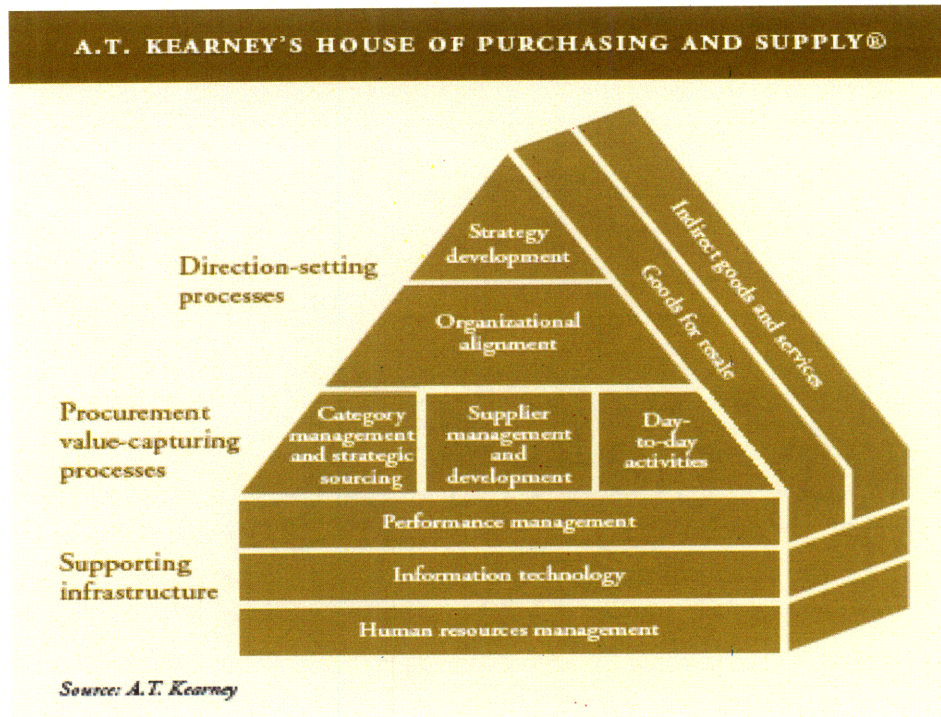
In the third article, Accenture outlined seven specific actions organizations should take to become leaders in supplier relationship management. The following seven actions summarize the important factors researched in all three articles: (Designed to Differentiate, Accenture)

1. “Segment the supplier base.”
2. “Develop specific strategies for each supplier segment.”
3. “Create comprehensive plans and performance monitoring processes to drive and track performance for each segment aligned with sourcing goals.”
4. “Develop robust supplier relationship management processes to consistently deliver quality outputs.”
5. “Develop the organization to include supplier relationship management roles performed by skilled professionals.”
6. “Use technology appropriately to enable supplier relationship management processes and performance management.”
7. “Constantly monitor, assess, and set priorities.” (Designed to Differentiate, Accenture)

### 4.1.3 AT Kearney

AT Kearney research demonstrated the employment of various methodical processes to tackle the issues surrounding supply chain management. Each process navigates companies through the increasingly complex business environment that categorically increases their success. The five articles reviewed were “Making Procurement a Priority,” “Creating Value through Strategic Supply Management,” “Demand Management,” “Hands on? Hands off?,” and “When your Suppliers Talk, Listen.”

The first article summarizes the findings of a survey with 45 major retailers conducted in 2003. The goal of the survey was to review a range of companies within their procurement operations. Six major elements categorized the research: strategy development, organizational alignment, category management and strategic sourcing, supplier management and development, day-to-day activities, and performance management. The six elements are integrated in Figure 18 below. While procurement issues drove the survey, supplier management’s importance was one of the major results. (Making Procurement a Priority, AT Kearney)



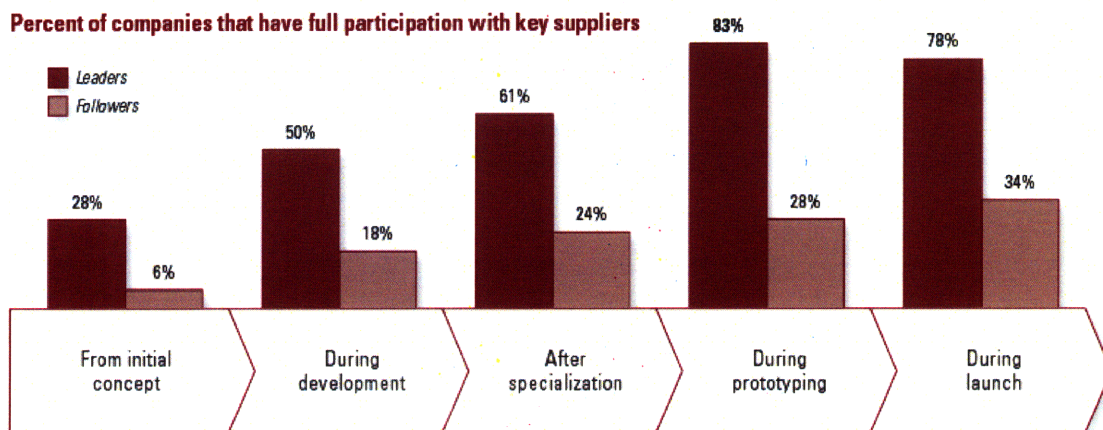
**Figure 18: AT Kearney's House of Purchasing and Supply (Making Procurement a Priority, AT Kearney)**

A supplier management strategy makes a significant difference in the performance of companies. Based on the responses, 73% of the leading retailers had such formal supplier-management programs, with only 30% for the followers. The most common metrics companies used to grade suppliers were standard measurements of financial performance, service-level performance, product quality, and whether or not annual improvement targets were met. The leaders' supplier evaluation additionally incorporates driving revenue growth, such as product design and innovation, risk and reward opportunities, and brand recognition. Supplier involvement also differentiated leaders, as they were included in merchandising strategy, category management, and the supply chain process. Leaders also separate with the inclusion of supplier technology,



such as automated supply chain management processes enhanced performance and growth. (Making Procurement a Priority, AT Kearney)

As an extension of the previous procurement article, AT Kearney completed another benchmarking survey in 2004 with a wide-range of global industries. The industry leaders displayed significant separation in the areas of innovation and growth, value chain optimization, advanced cost-management, and risk management and supply continuity. Particular value has been created by pushing suppliers to innovate, and leaders collaborate with their suppliers early and often. As shown in Figure 19, leaders actively incorporate their suppliers throughout the development process. This strategy will be successful only if trust exists between the company and their suppliers. Along this theme, leaders have strong contractual agreements, not only with development, but also with maintaining supply levels. Supplier segmentation plays a critical role in determining which suppliers should be considered for participation. (Creating Value through Strategic Supply Management, AT Kearney)



Source: A.T. Kearney

**Figure 19: Companies Participation with Suppliers (Creating Value through Strategic Supply Management, AT Kearney)**

Supplier Segmentation is essential for companies working in cost-reduction and advanced sourcing programs. Extended from the supplier segmentation are the following techniques that further drive cost savings: tiered sourcing, mega-supplier strategies, supplier tiering, value-based sourcing, design to cost, collaborative cost reduction, and demand management. As noted in the previous paragraph, product design and collaborative cost reduction requires a great deal of trust with suppliers, and leaders seek early supplier participation. (Creating Value through Strategic Supply Management, AT Kearney)

While risk management and organizational processes are mentioned, IT involvement is critically evaluated as it applies to core areas. Figure 20 outlines how innovation and growth, value chain optimization, advanced cost management, and risk management and supply continuity apply to the following IT tools: product development, strategic sourcing, supply market collaboration, and performance management. This figure outlines a methodology that ensures companies use the appropriate IT tools to achieve their specific goal. While new technology is highly encouraged by nearly all consulting companies, it is important to use only the proper tools to fit the company's needs. (Creating Value through Strategic Supply Management, AT Kearney)

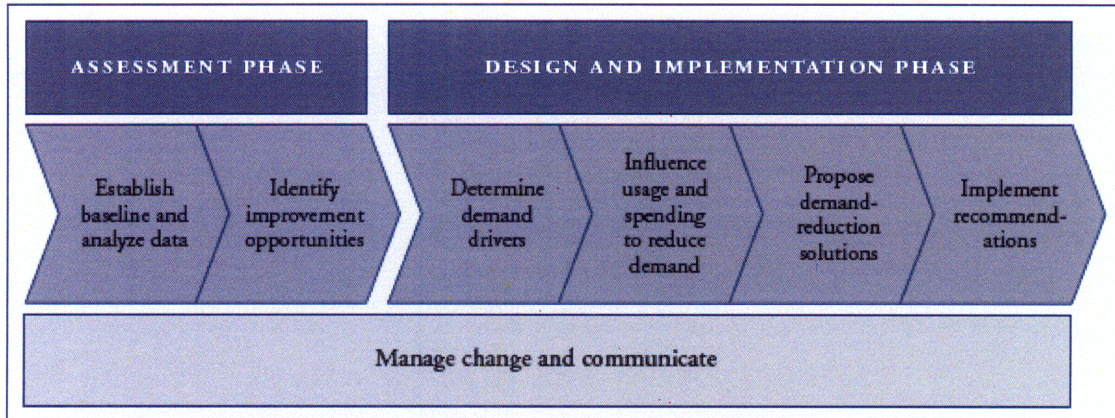
	Product development tools	Strategic sourcing tools	Supply market collaboration tools	Performance management tools
Innovation and growth	●	◐	◐	◐
Value chain optimization	◐	◐	●	◐
Advanced cost management	◐	●	◐	●
Risk management and supply continuity	●	◐	◐	●

Source: A.T. Kearney

Not applicable ○ → ● Highly applicable

**Figure 20: IT Tools Applicability (Creating Value through Strategic Supply Management, AT Kearney)**

In the third article, AT Kearney discusses demand management and its effects on the supply chain management. The article links managing suppliers to controlling internal demand for their products. AT Kearney’s six-step demand management approach is illustrated in Figure 21. The key to the program is company-wide buy-in to reduce waste, redundancy, and inefficiencies. By undertaking a demand management program using the approach given, companies can alter their sourcing program and ultimately their supply needs. Supplier management could potentially be shifted as companies find some suppliers unneeded and others critical to warrant strategic consideration. (Demand Management, AT Kearney)



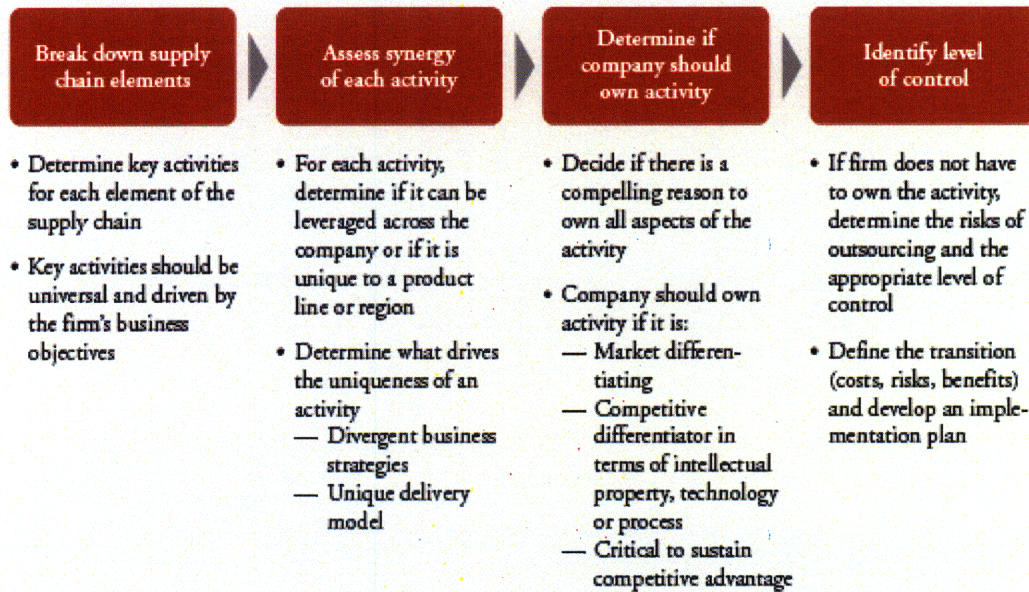
Source: A.T. Kearney

**Figure 21: Demand Management Process (Demand Management, AT Kearney)**

The fourth article from AT Kearney detailed a process to determine how and at what level to manage suppliers. Figure 22 illustrated the process that includes four major steps:

1. First, break down the supply chain elements based on activities and processes.
2. After determining these elements, companies should next assess the synergy of each activity throughout the company and their suppliers.
3. The third step is to determine if the company should own the activity or outsource it. Three reasons a company should own the activity are market differentiating, competitive differentiator in terms of intellectual property, technology or process, and critical to sustain competitive advantage.
4. The final step is to identify the level of control desired. Looking at the possibility of outsourcing, companies should prepare a balanced scorecard that at a minimum looks at cost, benefit, and risk. As the level of control needed is clarified, companies should prepare a detailed plan that identifies alternatives, updates the organization, and executes the new format conversion. This format

allows companies to accurately assess and manage the essentiality of their suppliers in order to improve the efficiency of their limited resources. (Hands On? Hands Off?, AT Kearney)



**Figure 22: Level of Supplier Management (Hands On? Hands Off?, AT Kearney)**

The final article in the AT Kearney section amplifies the importance of communicating with suppliers and gaining their insight. As discussed in previous articles, leaders in business are already encouraging product innovation and development from their suppliers. However, the simple concept of listening to your suppliers and being receptive to their ideas can go further than products. Four major benefits attributed to this notion are building a foundation for future collaboration, reducing time to market for new products, improving economics through better business processes, and increasing efficiency in non-core products and services. Surveys are a recommended medium for

such efforts, which can simultaneously provide free benchmarking. Gaining trust through collaboration enhances the supplier relationship and assists in their management. (When Your Suppliers Talk...Listen, AT Kearney)

The five AT Kearney reviewed articles offer strategic advice in managing suppliers. Directly managing your suppliers through IT programs and contractual agreements is supplemented with indirect methods, such as demand management and supplier segmentation. Strategically planning then implementing strong processes allows companies to systematically work through issues such as risk or supplier selection. Along these lines, planning and processes are also essential to successful supplier management programs.

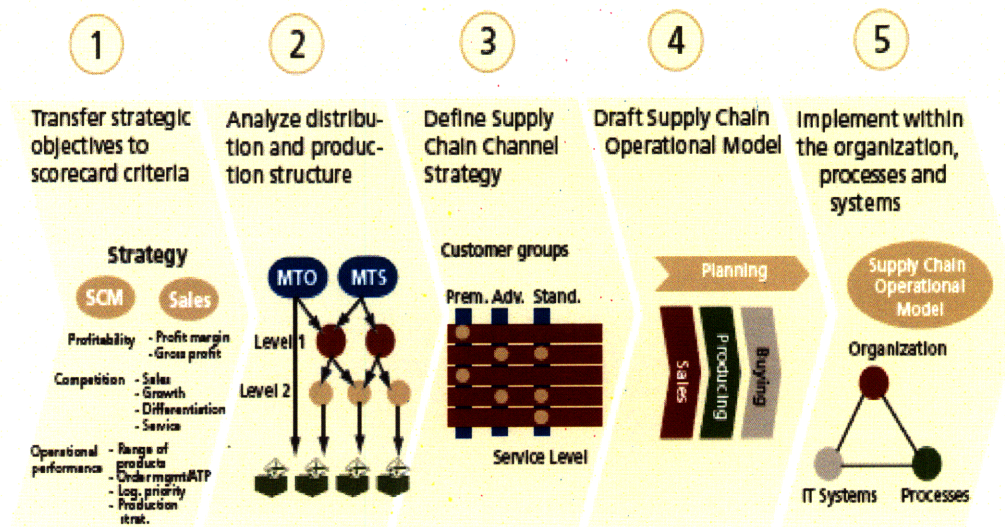
#### 4.1.4 Bearing Point

Bearing Point research provided two articles focusing on two similar aspects of supply chain managing: choosing the best supply chain for your customers and smart sourcing. The first article outlines various methods to design the best customer supply chain, with the most important being the Supply Chain Operating Model. Although not directly related to managing one's upstream supply chain, companies must review their downstream supply chain to ensure their upstream suppliers support it. The second article describes the importance of sourcing and how to effectively increase performance in the area. Before managing second and third-tier suppliers, companies must verify the suppliers are required and aligned with the corporate strategy.

The first Bearing Point article proposes various models when building a supply chain tailored towards the company's specific needs. The first model recommends following the Supply Chain Operating Model (SCOM), as shown below in Figure 23.

This model dictates customer segmentation in the first step, followed by organizing the service needed based on the segmentation. Explained in Chapter 2, the balanced scorecard model incorporated during phase one aids in segmentation. Once service level has been determined, a comprehensive supply chain channel strategy should be formulated. The Supply Chain Operations Reference-(SCOR) model, also described in Chapter 2, details an effective procedure when creating the channel strategy. Planning operational models designed to fit each channel's strategy continues the methodology, finishing with implementation. (The Right Supply Chain For Your Customers, BearingPoint)

#### GENERAL ILLUSTRATION OF THE METHODOLOGY



**Figure 23: SCOM (The Right Supply Chain For Your Customers, BearingPoint)**

As discussed previously, smart sourcing has become a priority for many companies attempting to become more lean and profitable. Spend analysis is critical to achieving these goals and to effectively perform this, companies must honestly ask

themselves: Can we really accurately account for all spend? The answer to this fundamental question more often than not is no. Many barriers to spend analysis exist including multiple sourcing, irrelevant data, inadequate expertise, inefficient analysis, inconsistent supplier names, and dubious credibility. Multiple sourcing occurs as companies fail to centralize all purchases, while irrelevant data must be removed. Inadequate expertise and inefficient analysis are due to companies failing to ensure the necessary buy-in of employees and properly arming them with the needed tools. Inconsistent supplier names and dubious credibility can be attributed to lack of training in standard reporting procedures. (Spend Analysis, BearingPoint)

The majority of these problems exist internally within a company's fragmented organization. Typically companies perform spend analysis based on four models: asking the supplier, purchase order systems, accounts payable, and supplier centric. Each model has noted advantages and correctable weaknesses. However, none of the models are effective unless companies follow common practices that leading companies observe: standard processes, common taxonomy, data capture, granular source data, and automation. Leading companies provide specific, company-wide instructions that employees can and will accurately follow. All spend data is reported down to the lowest level possible using standard terminology with automated programs. The criticality of technology use within this format is stressed throughout the article. Approaching spend analysis is crucial for companies, who must maintain an accurate, structured process for success. (Spend Analysis, BearingPoint)

As discussed in the section, Bearing Point recommends applying the SCOM to organize one's downstream supply strategy and operations. Once a company defines the



needs of the customer's supply chain, it can focus on reviewing their sourcing policies to align with their overall strategy. Performing both analyses will greatly benefit a company's goal of a lean supply chain.

#### 4.1.5 Deloitte

Supply chain collaboration and risk were the two themes in the three researched Deloitte articles. Both themes have proven crucial to supplier relationship management success. The three articles evaluated are "Greasing the Wheels," "Out of the Shadows," and "More than a Matter of Trust."

The first Deloitte article provides a road map towards successful supply chain collaboration, adding the potential benefits that may result. Five elements that form the basis of collaboration are shared objectives and long-term strategic goals, joint investment of resources and knowledge sharing, alignment of processes, procedures, and technologies, joint performance metrics and leading indicators, and mutual trust and commitment. These elements must incorporate the each component of the supply chain, as shown in Figure 24. By integrating these elements into a collaborated supply chain, companies will achieve process development in the following seven areas: product design and development, sourcing and procurement, logistics and transportation, capacity and production planning/execution, inventory management, demand planning and forecasting, and maintenance, repair, and overhaul (MRO). To realize these gains, Deloitte recommends performing these improvements incrementally, as shown in Figure 25. (Greasing the Wheels, Deloitte)

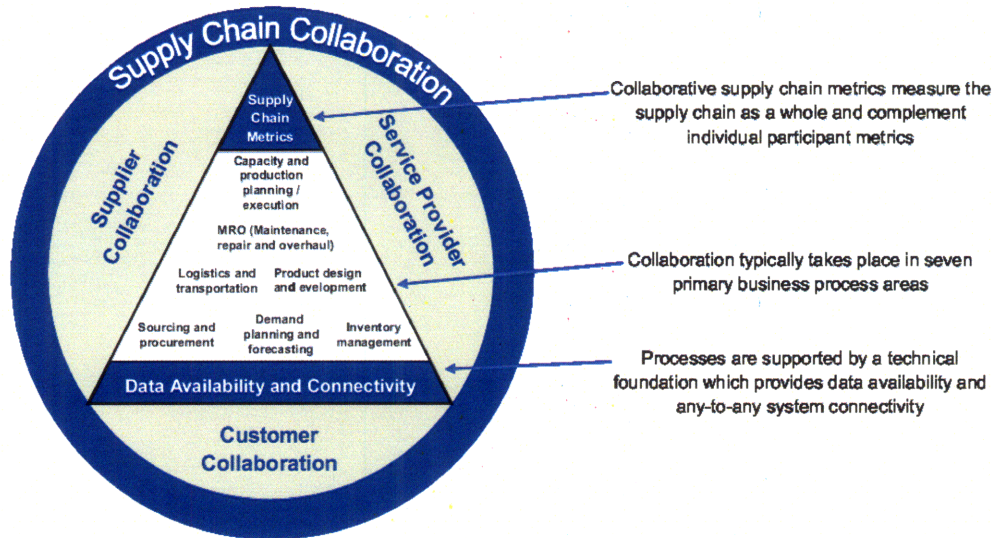


Figure 24: Supply Chain Collaboration (Greasing the Wheels, Deloitte)

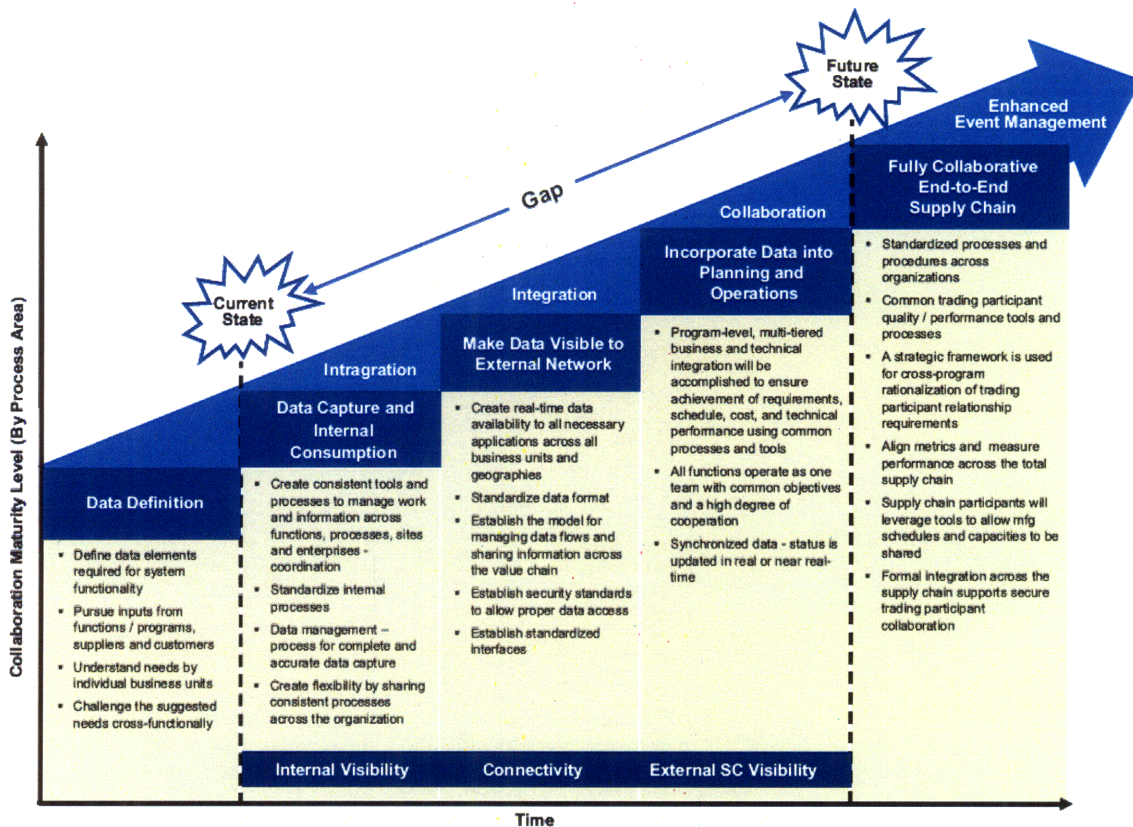
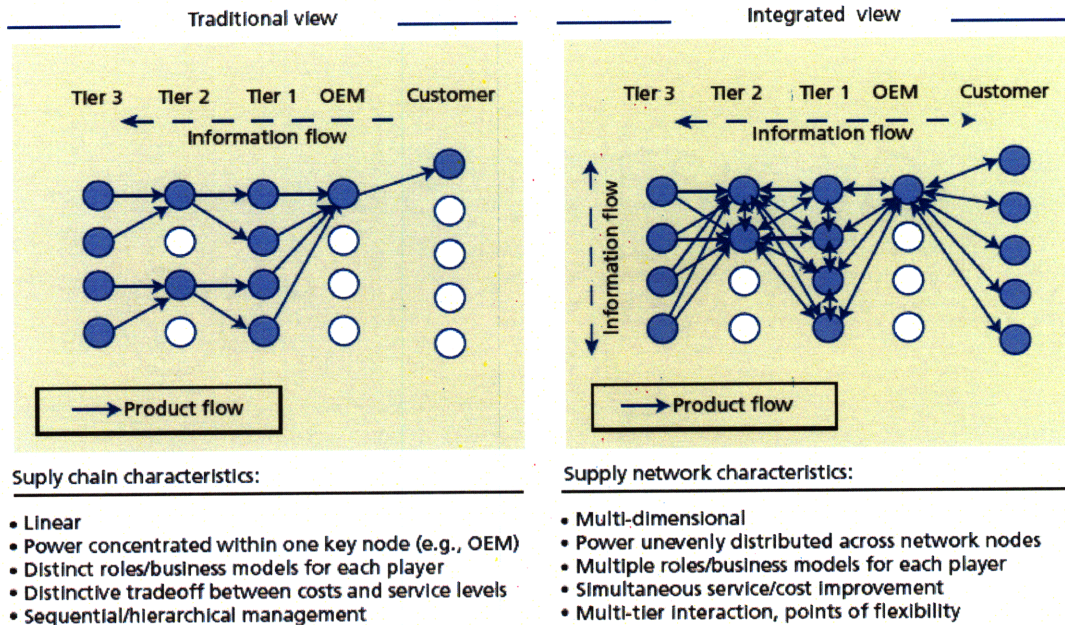


Figure 25: Improvement Process for Supplier Collaboration (Greasing the Wheels, Deloitte)

Deloitte further advises completing the step process guided by the following principles: establish cross-functional ownership and Corporate-level support, set clear

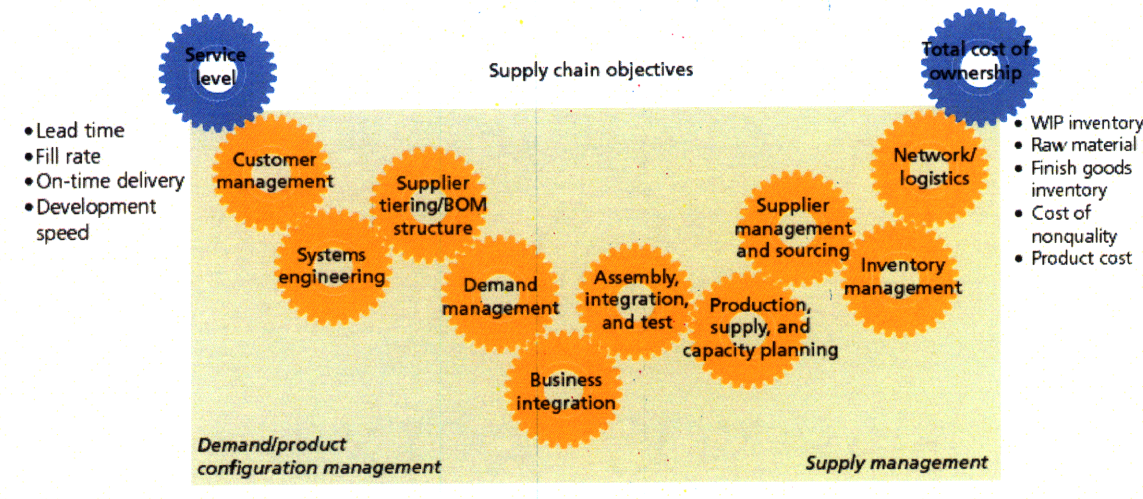
goals, focus on process improvement, integrate your systems, actively manage change, build relationships and trust, and establish rock-solid data security. Utilizing these tools will help encourage effective, sustainable supply chain collaboration. (Greasing the Wheels, Deloitte)

The second article discusses the importance of supply chain strategy in the Aerospace and Defense Industry. Although the article focuses on a niche industry, the principles it espouses transcend all industries. The underlying theme of the article is supply chain risk. Risk has increased as companies push production further upstream, resulting in power shifting from OEM's to lower tiers. As shown in Figure 26, the traditional linear view of supply chain has transitioned to an integrated view. Based on this shift, Deloitte suggest the following five techniques to enhance performance: Driving alignment of supply chain and business strategy, integrating multiple supply networks, aligning and integrating supply chain planning, strategically managing the supply network, and mitigating tiering risks. While the first four are common areas of concern, the final technique has received more recent attention due to the power shift from the OEMs. In this article, Deloitte views actively managing second and third-tiers as way to reduce risk and enhance performance. (Out of the Shadows, Deloitte)



**Figure 26: Integrated View of the Supply Network (Out of the Shadows, Deloitte)**

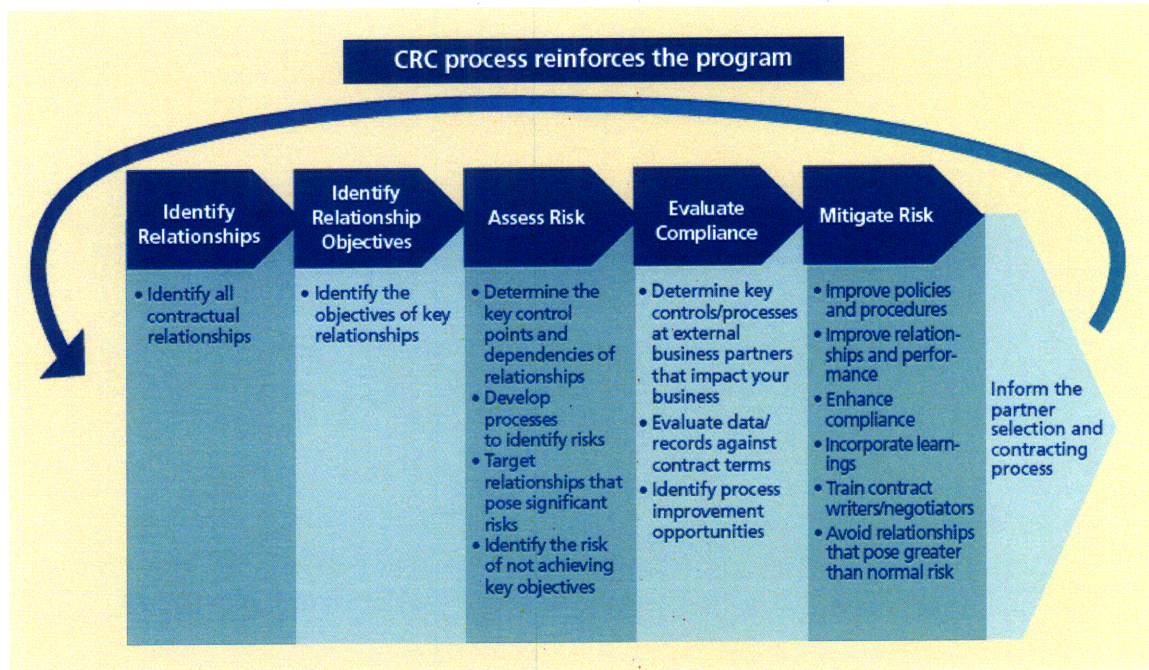
The conclusion of this article stresses the importance of planning throughout the entire supply chain. Each aspect should be reviewed to assess their ability to integrate with the company's supply chain system. As shown in Figure 27, the demand/product configuration management aspects are on the left, and the supply management aspects are on the right. Every component's performance affects the performance of the entire chain as they are all linked within the supply chain system. Related to suppliers, prominent in the figure are supplier tiering and supplier management and sourcing. (Out of the Shadows, Deloitte)



**Figure 27: Supply Chain Objectives (Out of the Shadows, Deloitte)**

The final Deloitte article's topic was business risk. There exists great concern in the business world over risk, specifically in the areas of outsourcing and supplier relationships. In addition, supplier contracts have increasingly been proven inaccurate and incomplete. Based on this trend, companies began instituting Contract Risk and Compliance (CRC) programs to control these problems. At the same time, trust between companies cannot be negatively affected as relationships are becoming more dependent. Without an active CRC program, companies expose themselves to many risks, including revenue leakage, inadequate inventory controls, distribution of products to unauthorized parties, and damage to reputation and brands. Figure 28 illustrates the CRC process and a step procedure that methodically assesses supplier contract risks. Six factors that should be reviewed before commencing the process are business objectives, complexity of contractual relationship, company culture, business partner compliance program owner, relationship between business partners and future expectations, and timing renewals. By completing the CRC process, companies will benefit through optimized revenues, reduced operational expenses, improved metrics, cost containment,

transparency of controls/controls enhancement, asset integrity, and relationship enhancement. The CRC process mitigates potential risks, increases business performance, and will ultimately lead to more transparent, trustful supplier relationships. (More than a Matter of Trust, Deloitte)



**Figure 28: CRC Process (More than a Matter of Trust, Deloitte)**

Deloitte’s articles address concerns with supplier collaboration and the growing supplier risks that companies are facing. For optimal supply chain collaboration, Deloitte recommends following their incremental step procedure found in Figure 25. To mitigate risk, Deloitte suggests identifying the potential risks, properly planning for the worst case scenario, and using the CRC approach.

#### 4.1.6 McKinsey

Our McKinsey Consulting Company research focused primarily on risk management. The conclusions the company found were based on two global surveys conducted in 2006 and 2008. These surveys exposed fears executives had with how their companies were assessing and mitigating their supply chain risks.

The first survey was conducted in September 2006 with responses from over 3000 executives from a wide-range of both public and private companies. One of the major results of the survey was the increased supply chain risk companies were experiencing, and the concerns companies had in dealing with them. The top five risks companies expressed were labor issues, regulatory concerns, reliability of suppliers, commodity fluctuations, and foreign exchange rates. Executives shared concerns over their company's ability to mitigate these risks and many felt they were unprepared. McKinsey recommended companies spend more resources developing a unified strategy to deal with these risks. Risk assessments adapted to their unique situations would greatly aid companies in mitigating their risks. (Managing Global Supply Chains, McKinsey)

McKinsey completed the second survey in June 2008 with similar results. Rising risk was again the dominate theme, with the top five risks shifted based on the different global business climate. These five were increasing complexity of products/services, rising energy prices, increased financial volatility, labor concerns, and shifting industry structures. While risk received more corporate attention compared to the previous survey, executives still expressed concern with risk mitigation. The survey also requested respondents to state their future challenges to their global supply chains. The top three challenges were total resources required to manage supply chain, recruitment and retention of sufficient local talent, and integration of IT systems between our

company and vendors. (Understanding Supply Chain Risk: A McKinsey Global Survey, McKinsey)

The two McKinsey reports carried a major theme that deal directly to our thesis: risk assessment and management. Risk is one of the primary concerns for companies dealing with their second and third-tier suppliers. Major areas of risk include the complexity of products/services and labor concerns. To effecting combat risk, companies must have a formal risk assessment program with devoted resources in place that create strategies to mitigate the company's exposure to risk.

#### 4.1.7 Conclusion

The research from the five consulting companies provided insight into how they address supplier management issues. All firms conducted surveys to reveal opinions and trends in industries. The results were similar as were their recommendations. The major issues with supplier management were risk, segmentation, sourcing, integrating technology, and supplier development. Conclusions from the various consulting firms included executing one of their unique process models, stimulating greater supplier involvement and trust, and performing thorough strategic sourcing. Risk assessment, analysis, and mitigation were continually stressed in virtually every article reviewed. Commonality with the consulting companies' recommendations proved advantageous as we answered our thesis question.



## *4.2 Technology Providers*

This section is divided into two sub-sections: software companies and Business-to-Business (B2B). In attempting to answer the research question, four different software companies' approaches to handle supplier relationship management (SRM) issues were reviewed: Oracle, Emptoris, SAP, and Ariba. While applications introduced by these companies share the same kind of features and functionalities, some are unique and innovative. We learned what software companies provide in dealing with this issue and what the applications have to offer for customers in organizations to achieve business goals. For the B2B section, we looked at emerging concepts in B2B as well as researched a B2B provider company to learn their specific in-depth implementation.

### 4.2.1 Software companies

#### 4.2.1.1 Oracle Applications

Oracle's two applications; PeopleSoft Enterprise Supplier Relationship Management (SRM) and JD Edwards EnterpriseOne Procurement & Subcontract Management open up a new era of procurement and supplier relationship management by introducing features and functionalities that help organizations solve issues regarding managing suppliers across supply chain management. By looking at what type of applications software companies, such as Oracle introduce and what features they provide, organizations can have a better sense of potential issues and how they resolve upcoming challenges in today's complex business.

##### 4.2.1.1.1 PeopleSoft Enterprise SRM

PeopleSoft Enterprise SRM is one of the applications in Oracle's PeopleSoft Enterprise product line which is a procurement application that helps reduce supply management costs. In addition, the application also streamlines the procurement-to-

payment processes and ensures that the user's corporate policies are in compliance. The application is modularized meaning that customers who purchase the application are able to deploy only the components that fit their specific. Within the family of PeopleSoft Enterprise SRM, there are 10 applications: Catalog Management, Collaborative Supply Management, eProcurement, eSupplier Connection, Purchasing, Services Procurement, Strategic Sourcing, Supplier Contract Management, Supplier Rating System, and Supply Chain Warehouse. In addition to these ten is the new PeopleSoft Enterprise SRM 9.0. (PeopleSoft Enterprise Supplier Relationship Management, Oracle)

### Catalog Management

Catalog Management's advantage is defined as following. "The application enables you to minimize the time required to load and refresh catalogs, share responsibility with your suppliers for managing their catalogs, ensure high-quality content of the catalog by automating content acquisition and cleansing, and reduce the overhead costs of maintaining and updating catalogs." (Catalog Management, Oracle)

Catalog Management is a web-based application to access and integrate the catalog content. Through the use of this application, organizations can import and update supplier information, configure the catalog structure, and categorize products automatically. Additionally, this tool helps develop successful supplier relationships by enabling suppliers to import and update their catalog content and manage item-specific for their customers. The application further enables suppliers to add their updated attributes to the content so that they differentiate themselves from other suppliers in the market. (Catalog Management, Oracle)

### Collaborative Supply Management

This application provides strategic planning, inventory, and replenishment information from Enterprise Resource Planning (ERP) systems. This also enables buyers and sellers to interact online by sharing the same view of data across the internet, improve collaboration, advance customer service from suppliers, and to optimize cost across the supply chain. “Organizations gain improved business collaboration, supplier response capability, and employee productivity.” (Collaborative Supply Management, Oracle) With the proper use of this application, companies can reduce the time required to interact with suppliers which would eventually increase efficiency and accuracy of orders.

### eProcurement

In order to streamline the procurement processes, the eProcurement application gives employees the ability to control requisitioning from searching for right items, submitting requisitions, tracking status, to changing requisitions. This automated self-service requisitioning is essential to make the procurement processes effective. (PeopleSoft Enterprise Supplier Relationship Management, Oracle) In addition, the application enables organizations to provide a single source for employees in terms of ordering products, to use the catalog to find the exact item that employees are looking for, and to accelerate the self-service requisitioning by the use of simple 3-step requisitioning processes. (PeopleSoft eProcurement, Oracle) This application lets organizations have a real-time access to integrated systems across the enterprise by having the most updated information on suppliers' status.

### eSupplier Connection

eSupplier Connection enables buyers and suppliers to collaborate, suppliers to become responsive, and employees to be productive. These three factors help improve cost optimization across the supply chain. The application allows buyers to give information to suppliers with the expectation that those suppliers will give the same amount of information back to those buyers. The following are examples of the type of information exchanged: purchase orders, purchase order acknowledgement, advance shipment notice, schedules, Request For Quotes (RFQs), payments and receipts, invoices, account balances, contacts and addresses, and supplier performance metrics. (eSupplier Connection, Oracle) Overall, sharing information between buyers and suppliers can enable both parties to make faster and more accurate decisions.

### Purchasing

The Purchasing application is for professional sourcing agents. It helps streamline purchase order processing as well as strengthens policy compliance. It manages purchasing activities online and offers extra features such as multi-language, multi-currency, and multiple tax methods. The application also provides several functionalities and features such as sharing vendor information across business units, tracking and monitoring historical vendor performance, keeping the comprehensive item information, analyzing and modifying sourcing results online, and capturing the total cost of procurement. (PeopleSoft Purchasing, Oracle)

### Services Procurement

The Services Procurement application helps manage the control of all the services which are the non-material equivalent of a good in economics and marketing, enhances

supplier relationships, and reduces costs. Monitoring of service spend is as important as keeping track of the flow of actual products, and services procurement is the key component of Oracle's PeopleSoft Enterprise SRM solution. (PeopleSoft Services Procurement, Oracle) The application enables you to enter, route, and approve requisitions for resource and deliverable-based services, decide your own preferred suppliers based on pricing or their competencies, configure vendor selections based on location, category, status, and requested role type, generate terms and conditions of the project automatically, and finally use tools to collaborate with suppliers in service businesses. (PeopleSoft Services Procurement, Oracle)

### Strategic Sourcing

The Strategic Sourcing application is introduced in the hope of improving online collaboration and negotiation processes that are essential for reducing costs across the supply chains. Strategic sourcing refers to "the process of determining the best suppliers for needed goods or services, and the conditions under which you award them business." (PeopleSoft Strategic Sourcing, Oracle) This internet-based portal technology offers reverse auction capabilities and analysis tools to add value to organizations. In addition to reverse auction capability, it also offers selling in forward auctions, thus providing both buying and selling capability. The following are functionalities of the application: open a purchasing event to the general public, invite suppliers to participate, leverage knowledge from internal experts through online collaboration, perform what-if analysis, and facilitate collaboration between buyers and sellers through the internet. (PeopleSoft Strategic Sourcing, Oracle)

## Supplier Contract Management

Supplier Contract Management creates better supplier contracts throughout the contract's lifecycle of authoring, collaboration, negotiation, status tracking, and compliance. In summary, the application enables a customer to standardize contract processes, reduce time-to-contract, and drive contract compliance. In the effort to standardize contract processes, the application keeps track of contract changes in the clause library, constantly updating changes to terms and conditions. Secondly, in order to reduce time-to-contract, contract cycle times are cut with flexible workflow, parallel negotiation, and formal amendment processing. Organizations also should not underestimate the importance of keeping the centralized contract repository to offer full visibility to all major parties. (PeopleSoft Supplier Contract Management, Oracle)

## Supplier Rating System

The Supplier Rating System, "collects critical data from across the enterprise to provide a complete view of your suppliers' performance. With this information, you can select the best suppliers, reduce supply variability and disruption, negotiate better contracts, and confidently modify sourcing strategies as business needs change." (PeopleSoft Enterprise Supplier Relationship Management, Oracle) The advantage of online Supplier Rating System is to allow suppliers to view how companies measure their performance, and giving them opportunities to adjust their service. The application also provides the supplier rating model that lets you group key measures of supplier performance into different categories. It also creates different KPIs to monitor collaboratively with suppliers online how well they perform. (Supplier Rating System, Oracle)

## Supply Chain Warehouse

The tenth component of Oracle's PeopleSoft Enterprise SRM is Supply Chain Warehouse which helps run the efficient supply chain, adapt to changing customer needs, and maximize supplier relationships. Some of the functionalities include monitoring performance using business-relevant measures, complex derived metrics, and analysis and reporting templates specifically tailored to individual roles, functions, and industries, analyzing historical and current data, implementing close-loop communication of critical information to the operational system, and integrating with other applications such as PeopleSoft Enterprise, JD Edwards EnterpriseOne, and JD Edwards World. (PeopleSoft Supply Chain Warehouse, Oracle)

## PeopleSoft Enterprise SRM 9.0

PeopleSoft Enterprise SRM 9.0 was released in 2006 and introduced new features to several products. In PeopleSoft Enterprise Supplier Contract Management, key enhancements include new document types, a configurator selector wizard, clause import, document import, wizard enhancements, search improvements, copy document, and contract agreement management functionality. Additionally, eProcurement, Purchasing, Services Procurement, and Strategic Sourcing had new features introduced to make it more convenient for users within the organizations. On top of these changes, integration to Supplier Contract Management in PeopleSoft Enterprise Strategic Sourcing provides more options for users to suit their specific business needs when making procurement decisions or forming contracts. (What's New in PeopleSoft Enterprise SRM 9.0, Oracle)

A press release mentions that the new version of PeopleSoft Enterprise SRM "streamlines business processes, strengthens supplier relationships, and simplifies

regulatory compliance.” (Oracle Press Release, Oracle) With the new release, the application has an advantage of measuring supplier performance thus giving organizations opportunities to improve supplier relationships based on an objective analysis. Also, the application provides key performance indicator dashboard for rating suppliers’ performance based on their job functions and other criteria as well as functionalities to track spending.

Based on different components of Oracle’s PeopleSoft Enterprise SRM application, it enables collaboration between buyers and suppliers, reduces costs across supply chain, increases the response speed from suppliers, evaluates supplier’s performance with a systematic approach with a designed matrix, improves accuracy, and increases visibility across the enterprise. The combination of these components can be utilized in managing multi-tiered suppliers effectively and accurately.

#### *4.2.1.1.2 JD Edwards EnterpriseOne Procurement & Subcontract Management*

Many businesses today outsource the manufacturing of non-core components of products or services. Procurement & Subcontract Management from the family application of JD Edwards EnterpriseOne enhances improvement of subcontract processes by helping with selection of subcontractors, management of their work, management of changes, and subcontractor payment. What the application offers is not limited to subcontract management, but extends its functionalities to maximizing margins, optimizing inventory levels, and minimizing supply chain disruptions. (JD Edwards EnterpriseOne Procurement & Subcontract Management, Oracle)

Today, roles and responsibilities of buyers change significantly from merely going through deals and purchasing to strategically collaborating with suppliers to



achieve more efficient supplier relationships. Automated processes give advantages in bidding and non-bidding events by generating purchase orders immediately. When items do require a bidding process, the application combines requisitioned items on a single quote request, and decides which suppliers can have the opportunity to participate in the bidding process. This opportunity is based on the record from the supplier performance ratings. Additionally, the application prints quote requests, tracks status of open quotes and bids to a particular supplier or buyer for procurement decisions, tracks all changes made to purchase orders, and applies rebates automatically. (JD Edwards EnterpriseOne Procurement & Subcontracts Management, Oracle)

With the application, organizations can also consolidate partnerships to those suppliers who maintained the best performance over time. The system helps monitor the supplier's delivery, quality, and price and enables you to choose the preferred supplier category when carrying out procurement processes. The tool provides necessary information for you to effectively verify compliance with contract terms, identify existing trouble spots, provide information so that the partner can also implement operational and service improvement, and relate performance to future contract negotiation. (JD Edwards EnterpriseOne Procurement & Subcontracts Management, Oracle)

The Procurement & Subcontract Management tool not only helps manage procurement processes such as bidding, managing orders, and pricing from suppliers, but also provides features in managing subcontractors when suppliers want to further outsource to third parties. It enables customers to take advantage of easy-to-use subcontract entry to manage details of contracts all on a real-time basis. The complexity of the business environment with multi-tiered suppliers increases and the application can

provide solutions to help speed up the process accurately and efficiently while reducing the costs.

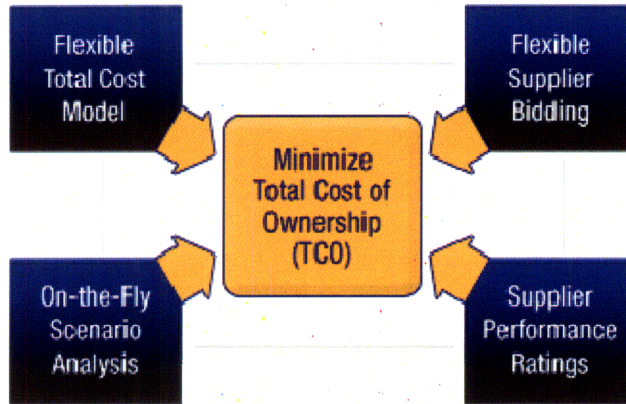
Companies' objectives in managing suppliers are not just focused on reducing costs across the supply chain, but also emphasize better collaboration, flexibility, speed, and efficiency matched with accuracy. Oracle's aid with technology will help achieve goals in today's business that moves towards situations between buyers and suppliers where both parties benefit from the solution. It also highlights on the importance of information sharing, integrated technology, and visibility throughout the procurement processes.

#### 4.2.1.2 Emptoris

Emptoris introduces two different applications, Emptoris Sourcing and Emptoris Supplier Performance Management in striving to achieve the minimization of the total cost of ownership (TCO) as well as to establish an effective supply base by increasing suppliers' performance and reduce their management risk.

##### 4.2.1.2.1 *Emptoris Sourcing*

Emptoris, one of the technology providers in the area of Supplier Relationship Management (SRM), developed Emptoris Sourcing, a software solution which helps organizations minimize the TCO by balancing the proposals from suppliers with the requirements of internal stakeholders of the company. (Strategic Sourcing Best Value, Emptoris) There are four factors that give rise to the least TCO possible; Flexible total cost model, Flexible supplier bidding, Supplier performance ratings, and On-the-fly scenario analysis as shown in Figure 29 below.



**Figure 29: Total Cost of Ownership (Strategic Sourcing Best Value, Emptoris)**

Flexible Total Cost Model

Between buyer and supplier, negotiations are not focused exclusively on price; suppliers are not forced to make themselves attractive just based on the margins but rather, have chances to differentiate themselves as shown in Figure 30 below. For example, suppliers could make themselves stand out by increasing quality, differentiating payment terms, and having flexible delivery locations. It also enhances a better collaboration between buyer and the supplier within the organization.

Decision Factors	Traditional Sourcing	RFX with Flexible Bidding
Item mix and lots	Fixed	Flexible
Volume commitment	Fixed	Flexible
Consumption pattern	Fixed	Flexible
Payment terms	Fixed	Flexible
Contract length	Fixed	Flexible
Quality	Fixed	Flexible
Delivery locations	Fixed	Flexible
Supplier pricing	Flexible	Flexible

**Figure 30: Flexible Cost Modeling (Strategic Sourcing Best Value, Emptoris)**

### Flexible Supplier Bidding

It is important for suppliers to be able to show their strengths and capabilities during their negotiation process and the Emptoris Sourcing application enables suppliers to express the competitive advantages to make the overall procedure more flexible. (Strategic Sourcing Best Value, Emptoris) Throughout this process, buyers benefit through unit volume discounts, suggested substitutions, and offered business volume discounts. This also helps make the whole negotiation process more transparent, furthering collaboration between buyer and supplier.

### Supplier Performance Ratings

This application can help improve a company's perspective on total cost by using in conjunction with Emptoris Supplier Performance Management software which rates suppliers based on their performances using different criteria. Companies will be able to establish a solid supply base based on the suppliers' performance metrics to determine how each of them was rated in terms of different criteria.

### On-the-fly Scenario Analysis

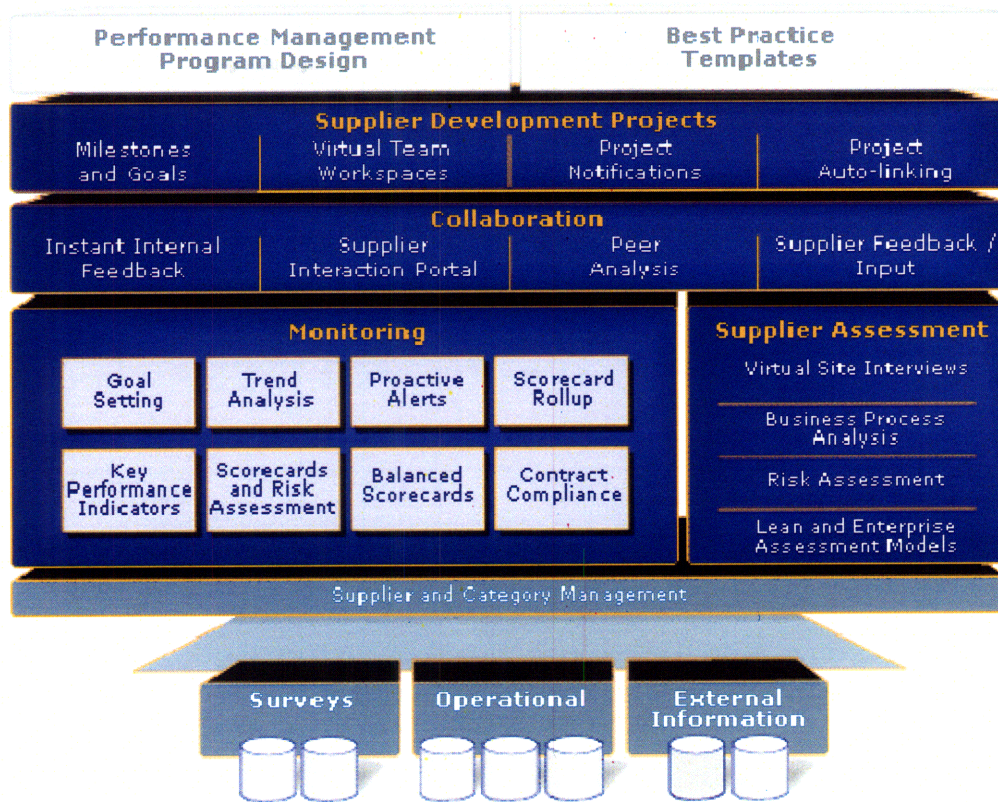
On-the-fly Scenario Analysis helps buyers integrate business constraints and purchasing strategies into their analysis in a timely manner with easy-to-use software. From the company's standpoint, having an ability to analyze strengths and weaknesses of the purchasing process is crucial to be successful in today's business.

In a recession, effective sourcing is crucial in order to interact and negotiate with suppliers online. Working with software companies such as Emptoris provides advantages by automating the sourcing process, learning how to work with suppliers through the internet, and combining greater transparency with better optimized analysis

of complex bids. This process presents buyers greater savings in comparison to traditional manual methods. (Jones, 2009)

#### 4.2.1.2 Emptoris Supplier Performance Management

Measuring supplier's performance enables establishing a solid supply base and ensures a well-functioning supply chain. Emptoris introduced Supplier Performance Management solution in the hope of increasing supplier performance, effectively managing supplier risk, and developing the most advantageous supply base. As shown in Figure 31 below, there are four key components that help companies manage their supply base: supplier development projects, collaboration, monitoring, and supplier assessment. (Emptoris Supplier Performance Management Product Offering, Emptoris)



**Figure 31: Emptoris Supplier Performance Management**

## Monitoring

The monitoring component provides a number of functionalities, including integration with Spend Analysis, key performance indicators (KPIs) to track specific metrics of suppliers' performance, global visibility across categories, and supplier scorecard or trend reports to monitor suppliers' performance. The program sets goals using KPIs to evaluate suppliers' performance, then tracks the scores and reports what the potential supply base could be. (Emptoris Supplier Performance Management Product Offering, Emptoris)

## Supplier Self Assessment

The main function of this component provides a risk assessment of suppliers to help organizations find problems before they make the decision to establish a supply base. It also helps determine the root cause of poor performance, as well as providing support to suppliers to solve the problems. Overall, this component enables companies to search for qualified suppliers by evaluating their performance. (Emptoris Supplier Performance Management Product Offering, Emptoris)

## Collaboration

This component provides a place for suppliers to interact with buyers to improve on their performance by giving them real-time feedback. When both parties interact, buyers can evaluate their suppliers on-site so that suppliers have opportunities to improve themselves on a real-time basis. Recommendations are provided to suppliers not only based on the quantitative results such as metrics and KPIs, but also on the qualitative suggestions that can be put into action immediately. (Emptoris Supplier Performance Management Product Offering, Emptoris)

## Supplier Development Projects

This module provides project management to develop suppliers. It makes sure that the trends are not too far from the initially set goals, which ensures the supplier development program is moving in the right direction. More importantly, Supplier Development Projects confirms that the evaluation of suppliers and metrics results are incorporated into making sourcing decisions as supplier performance is factored into purchase decisions. (Emptoris Supplier Performance Management Product Offering, Emptoris)

Having the right supplier is critical in achieving an effective supply chain. Driving continuous supplier improvement is the key to minimizing potential risks with a supply base. Today, the manufacturing process consists of numerous suppliers and goes further upstream by striving to choose the most profitable and effective suppliers. Those suppliers that contribute to the overall improvement of business processes by performing their job effectively can help minimize the risks that are associated with managing multi-tiered suppliers.

### **4.2.1.3 SAP's SRM applications**

SAP offers a number of SRM applications in order to effectively work with suppliers, set up contract processes, and enable an efficient business processes with the help of technology. Organizations today may not be able to achieve their goals accurately if they rely only on manual and paper-based processes. Thus, SAP's created three applications to enhance the business process: Plan-Driven Procurement, E-Sourcing, and Contract Lifecycle Management (CLM).

#### *4.2.1.3.1 Plan-Driven Procurement*

One of the core applications from mySAP SRM, Plan-Driven Procurement supplies the necessary products and services automatically to ensure optimal operations of manufacturing units. According to a white paper written by SAP, “Plan-Driven Procurement enables you to purchase goods or services that are a planned part of your operations.” (Plan-Driven Procurement with mySAP SRM, SAP) Plan-Driven Procurement also helps provide an automated and centralized environment where companies can procure online from a number of suppliers more efficiently and accurately.

##### Create and process the requisition

Plan-Driven Procurement creates a requisition based on the requirements of different components such as plant maintenance, project system, production planning, and SAP planning and execution systems. Once the requirements are taken in the form of purchase requisitions, the processing stage takes place with the cooperation of the SAP Enterprise Buyer Component (also known as the e-procurement system). The E-procurement system carries out an automatic procurement for the required item and creates a purchase order based on the type of products. (Plan-Driven Procurement with mySAP SRM, SAP)

##### Determine the source of suppliers

Identifying the right source of suppliers is the main task for Plan-Driven Procurement. With the use of multiple functionalities to optimize purchasing, the application provides a relevant vendor list for purchasing decisions. One example of such functionality is the strategic-sourcing component. Plan-Driven Procurement views the requirements, connects available vendors, and provides the optimal solution to fulfill



that requisite. Multiple contracts are available, and the most favorable contract is assigned to the particular item in the requisition. Another interesting approach that Plan-Driven Procurement provides is to allow suppliers to bid online. (Plan-Driven Procurement with mySAP SRM, SAP)

### Order

With the appropriate source of supplier, the application creates a purchase order. There are two ways to deploy the Plan-Driven Procurement; using it as a stand-alone application by having all the documents residing in mySAP SRM or using it as an extended classic deployment where documents in mySAP SRM are replicated to the back-end system, which is the mainframe of the computer. For the latter type of deployment, whatever changes are made to mySAP SRM is updated accordingly in the back-end system. (Plan-Driven Procurement with mySAP SRM, SAP)

### Confirmation and Invoice handling

When goods are received, the confirmation is created. The plant engineer from the buyer side then has to approve it. The company can either hold for further processing at a later date or choose to confirm and move on. Invoices can be entered while the confirmation is made and in Plan-Driven Procurement, one usually enters invoices with reference to a purchase order which may be more convenient. (Plan-Driven Procurement with mySAP SRM, SAP)

Plan-Driven Procurement also supports the Evaluated Receipts Settlement (ERS) process, an automatic procedure based on confirmations. Purchasing organizations must coordinate with suppliers so that the suppliers do not create invoices for each order without purchasing confirmation. Different from past processes, the system actually

generates invoices based on the purchase orders and confirmations, and then sends back the invoices to the supplier automatically. This procedure helps speed up the process and eliminates communication errors. (Plan-Driven Procurement with mySAP SRM, SAP)

#### Payment and third parties

Once the invoice is approved, accounts payable takes place in the back-end system with the payment information transferred to the accounts payable or general ledger system. In the event that the suppliers want to send goods and services directly to the buyer's customers, Plan-Driven Procurement accounts for this. Suppliers can use the information on purchase orders to ship to customers. If the customer's sales system from SAP is integrated with mySAP SRM, suppliers will be able to get this information as well as the sales order. (Plan-Driven Procurement with mySAP SRM, SAP)

#### Related mySAP SRM functionalities

mySAP SRM with Plan-Driven Procurement provides other functionalities such as strategic sourcing and supplier connectivity. With the strategic sourcing functionality, the following tasks can be enabled.

1. "Creation of contracts in the back-end system via the purchaser's sourcing application in the mySAP SRM."
2. "Creation of bid invitations automatically for requirements coming from different sources for which no sources of supply have yet been assigned."
3. "Creation of purchase orders in the back-end system from a bid via mySAP SRM."

(Plan-Driven Procurement with mySAP SRM, SAP)

The materials management functionality from mySAP ERP can be used for procurement of goods in which it is directly integrated with the SAP Supplier Self-Service component, and part of the supplier enablement functionalities of mySAP SRM. SAP Supplier Self-Service provides a web-based interface for small and mid-size suppliers. (Plan-Driven Procurement with mySAP SRM, SAP) Mainly suitable for procurement of goods, MRP generates requirements that are fulfilled by the processes of mySAP SRM, taking advantage of the reduction in supply lead time since suppliers are already connected. The automatic generation of purchase orders follows this process. (Plan-Driven Procurement with mySAP SRM, SAP)

This Plan-Driven Procurement application from mySAP SRM helps companies reduce costs associated with procurement processes and maximize the efficiency of business operations. Given that companies in certain industries have the freedom of choosing suppliers from their standpoint, this application will be beneficial in terms of finding the right supplier based on the requirements of manufacturing certain components. This application also may be implemented for companies which look for upstream suppliers because this gives them advantages of having a standardized process of sourcing suppliers based on the requirements of goods and services. Eventually, the automated processes of sourcing, creating purchase orders, and invoices will be able to affect how suppliers are managed.

#### *4.2.1.3.2 SAP E-Sourcing*

In today's business environment, cost and quality should not be the only competitive advantages of companies when dealing with supplier management related issues. Rather, they should move towards achieving innovation, speed, and flexibility.

The E-sourcing application can help companies maximize cost savings through fast, flexible, and sustainable sourcing while at the same time addressing the supplier relationship management needs of companies. SAP E-Sourcing helps automate and streamline strategic sourcing by enabling processes such as collaborative project management, online bidding, and contract negotiation and management. (SAP E-Sourcing: Fast, Flexible, and Sustainable Sourcing, SAP)

The application helps organizations establish a qualified supply base that is the most relevant to manufacture specific products, eventually delivering the best value to the company. It also reaches further into other departments by sharing the procurement decisions and collaborating with business units to achieve cost savings.

The following are some of the functionalities and features of the application. First, the application enables a “comprehensive reporting and analysis as well as allowing organizations to create specific templates, reports, page views, user-access rights and roles, and new data fields to capture information that is suitable for specific organizations.” (SAP E-Sourcing: Fast, Flexible, and Sustainable Sourcing, SAP) Second, the application links all the sourcing activities so that it is easy for companies to track results and key points over the course of the project period. It also allows companies to monitor the status of the projects. Third, it “analyzes bids using collaborative scoring, weighted scoring for multiple attributes, total cost calculations, side-by-side comparisons, and pricing and savings reports.” (SAP E-Sourcing: Fast, Flexible, and Sustainable Sourcing, SAP) Fourth, in terms of contract life-cycle management, it uses a single contract repository to generate, negotiate, and manage contracts with different types of suppliers. It creates a list of standardized contract

processes to enforce the organization's legal standards during the contract-generation process. In addition, it automates "all the contract activities such as rebidding, auditing, renewing, and renegotiating prior to expiration." (SAP E-Sourcing: Fast, Flexible, and Sustainable Sourcing, SAP) Lastly, it creates a single repository for suppliers to interact with each other by having them register, giving them the ability to modify and update their own profiles, to participate in the collaborative discussions, and to view active contracts and sourcing events. Overall, the application helps ensure the right suppliers are competing for one's business and each business has a complete supplier portfolio. It also defines metrics for supplier performance scorecards which may be useful for organizations to monitor how satisfactory suppliers are and how their relationships should improve. (SAP E-Sourcing: Fast, Flexible, and Sustainable Sourcing, SAP)

With the help of technology, SAP E-Sourcing is able to help organizations achieve their competitive advantages along with the cost savings in an efficient manner. Once accepted as an effective tool to manage suppliers in an organization, E-Sourcing will be able to gain a long-term reputation from the organization. With the fact that it helps generate greater savings and value, enables visibility across the organization, streamlines collaboration with suppliers, and tailors sourcing processes to specific business needs, this tool can be an asset for managing multi-tiered suppliers in the high-tech industry.

#### *4.2.1.3.3 Contract Lifecycle Management (CLM)*

Most businesses outsource their non-core functions while keeping the core products or services. As the number of sourcing events increase, maintaining the lifecycle of contracts that are created between businesses becomes a critical task within

the organizations. SAP's Contract Lifecycle Management (CLM) application not only automates the contract creation but also ensures its visibility throughout the organization, and that the pricing, terms, and agreements are complied accordingly. (SAP Contract Lifecycle Management: Features & Functions, SAP)

CLM accomplishes the following tasks with a defined procedure. First, it helps creating the contracts with available standardized contract templates and a workspace that captures all the contract overview information. It also aids in managing the contracting tasks. Second, it creates legal agreements regarding contracts by utilizing the standardized processes in a library of information. Third, it provides standard document management tools such as check in / check out, comments capture, versioning, secure third-party document access, and review and approval workflows. This helps improve the collaboration among buyers and suppliers when they go through the contract processes. Fourth, within the operational contracts, this tool allows companies to establish the item and pricing, as well as discount structures to ease the process. Fifth, SAP CLM reviews supplier's performances by performing the audit activities and creates milestone tracking to follow the performance's quality. In addition, the tool helps create the contracts in the back-end system directly from the contract workspace so that organizations better manage contract processes. Sixth, it has a search functionality that enables companies to control access to the entire contract repository. Lastly, the application provides users convenient ways of viewing information on a daily basis such as updated reports, daily work tasks, contract repository, contract expirations, performance alerts, and non-compliance reports. This not only speeds up the tasks but

also limits contract-related risks. (SAP Contract Lifecycle Management: Features & Functions, SAP)

Using automating contract creation optimizes the contract lifecycle and eliminates the possibility of creating risks that are involved in the process. Although an automated process may create problems regarding technical issues, we think that this is the advantage of having a systematic approach of handling contracts. Thus, companies can utilize this application when setting up relationships with suppliers in the initial phase of procurement in order to have a solid collaboration with them.

#### 4.2.1.4 Ariba

Ariba's solution philosophy is embodied in this quote from its website: "Ariba is the only provider that combines leading spend management and contract management solutions with global consulting and category expertise – and gives you the flexibility to deploy, pay, and scale to fit your company's unique needs and budget." (Spend Management and Contract Management Software, Ariba) Ariba offers a number of solutions regarding SRM to achieve better collaboration with suppliers. The solutions with some of the features and functionalities described are Sourcing, Contract Management, and Supplier Management.

##### Sourcing

Successful sourcing can be a challenging task, but if performed using the relevant resources and technology documented, can greatly impact cost, quality, and performance of the supply chain. Ariba helps organizations overcome this problem by providing a sourcing roadmap with access to a global network of suppliers and negotiation

technology. The roadmap develops strategy, sources and negotiates, and monitors and manages. Using this roadmap, Ariba combines a comprehensive sourcing software platform, strategic sourcing and category expertise, with a global network of suppliers.

The procedure initially performs a spend analysis to identify sourcing opportunities and developing strategies using category expertise. It then moves to qualify supplier sources by accessing the Ariba Supplier Network to search through more than 250,000 global suppliers. It manages collaborative projects and shares information across the sourcing lifecycle while executing negotiations such as reverse auctions, forward auctions, total cost auctions, and sealed envelope auctions. After analysis, implementation, and savings tracking, the solution develops a record of qualified suppliers while continuously managing vendor performance and corrective action programs for suppliers. Ariba's Sourcing solution not only helps minimize supply risk and negotiates valuable supply agreements, but also optimizes and aligns sourcing decisions with strategic business objectives. (Sourcing, Strategic Sourcing Software, Ariba)

### Contract Management

Many companies tend to rely on traditional contract management thinking where shifting regulations make it difficult to create value added systems that can maximize profits and minimize risks. Ariba Contract Management provides full visibility into contracts, enhances compliance and reporting, and features online authoring and negotiation.

The solution provides collaborative contract creation by using standardized templates for improving accuracy and eliminating risks. Full electronic signature



functions are available through integration with eSignature provider DocuSign. In addition, the solution offers a comprehensive contract repository where suppliers and organizations can search necessary clauses and documents. Finally, it provides automatic tracking to verify all contract related documents comply with regulations and requirements. (Contract Management Software, Contract Management, Ariba)

### Supplier Management

The Supplier Management solution helps organizations identify and assess new supply sources as well as providing supplier information and supplier performance information. It supports collaboration capabilities required to drive continuous improvements across the supply chain. Ariba's solution enables an effective way of locating the best suppliers suitable for certain products or services, and ensuring the relevant supplier selection, measurement, risk, and performance management. (Supplier Management Solutions, Ariba)

Ariba's solution provides many features to support a complete supplier management lifecycle. The Supplier Management solution enables the self-register of suppliers to manage their own profiles and relevant documents in case changes need to be made when marketing their capabilities to buyers. This function also includes the solution's ability to route suppliers' information automatically and send out to organizational stakeholders for audit, review, and approval. When suppliers are selected and reviewed, Ariba's Supplier Network can be utilized to access the information of more than 250,000 suppliers' profiles, ratings, and assessment. The solution additionally provides features of allowing organizations to systematically track information, certifications, and documentations in order to mitigate risk and provide up-to-date

information of available suppliers. When suppliers are not performing at the required level, the solution alerts customers with early detections, allowing potentially debilitating disruptions to be prevented. Lastly, Ariba's Supplier Management offers global services for supplier performance assessment and risk management. It reduces the burden of supplier discovery, cost, and time, while at the same time offers efficient supplier assessment and protects against supply disruptions. (Supplier Management Solutions, Ariba)

The increase of globalization affects the way organizations operate and manage suppliers and businesses. Ariba's Supplier Management enables more efficient interaction between buyer and supplier, and more effective ways of evaluating suppliers' performance, thus improving the relationships with suppliers in the long run. Ariba's innovative technology along with its network of suppliers helps organizations better manage their suppliers and make the enterprise supply chain more visible.

## 4.2.2 Business-to-Business (B2B)

### 4.2.2.1 GXS

Many companies today do business with other companies in moving goods and services while striving to cut costs and provide supply chain visibility. This aspect of looking at B2B enables us to better understand how companies use electronic media to collaborate with suppliers and eventually how this can generate more convenient and structured processes. GXS, a provider of B2B e-commerce products, delivers on-demand services such as optimizing product launches, automating warehouse receiving, and managing electronic payments. These value services are provided using EDI Outsourcing, B2B Consolidation, and Global Community Enablement. Two major

product packages that incorporate many of these features are Managed Services and Global Network Consolidation Solution. (Rizza, 2009)

### GXS Managed Services

According to Bobby Patrick, senior vice president of marketing at GXS, the product's customers all have unique B2B networks and business challenges, yet they all recognize the cost, time, and resource allocation advantages of outsourcing the management of their B2B e-commerce operations to GXS. (GXS Managed Services Growth Continues with 30 New Customers in 2008, GXS)

With the product's growth of 25% from 2007 to 2008, GXS announced a methodology for identifying total cost of ownership (TCO) of B2B programs in-house versus outsourced options. The TCO tool helps give companies an understanding of B2B analysis both internally and externally. Additionally, it also helps reduce the overall cost of the supply chain process by extending the capabilities of B2B. The methodology provides an understanding of B2B projects to customers, giving awareness GXS's ability to help companies streamline business processes and focus on cost savings through the use of B2B Managed Services Product.

GXS Managed Services focuses companies on their competitive advantage by relying on GXS to take care of technical and support solutions. Managed Services manages B2B programs for organizations by performing daily management of technical infrastructure, including systems health monitoring, data backup, network management, systems administration, database management, and application support. (Simplify and Streamline Your B2B Network Management, GXS) Along with other services and

benefits, Managed Services can help companies move forward in achieving strategic relationships with suppliers in more convenient and faster ways.

#### Global Network Consolidation Solution

Despite the fact that telecommunication cost is decreasing, many companies struggle to minimize costs and manage their networks. This may be affected as more companies are becoming decentralized by having regional leaders make independent decisions on network providers, or by mergers and acquisitions such that combined companies “result in a multiplicity of vendors performing similar functions” (Simplify and Streamline Your B2B Network Management, GXS) In order to streamline the network management and reduce the cost in B2B transactions, GXS introduced Global Network Consolidation Solution. GXS interacts with a number of organizations to centralize and standardize the process, thus minimize the cost. In the past, different business units had their own service provider which had the challenge of managing different skill sets. However, GXS’s product provides the benefit of helping to reduce costs by having just one global consolidated provider. It also has features that integrate with SAP, Oracle, or PeopleSoft systems so that it can map their information. (Simplify and Streamline Your B2B Network Management, GXS)

Some of the many features of GXS Global Network Consolidation Solution include service-delivery capabilities throughout the U.S., Asia-Pacific, and Europe to enable companies to connect through the internet via regional access points in the three geographic areas. Additional features include technical support available both as a single point of contact worldwide and through locally responsible contacts, migration and implementation such as indentifying document flows, key milestones, and change

management procedures, map consolidation to reduce the complexity of document maps, and specialized pricing and contracts. The last feature mentioned is helpful in managing suppliers because consolidation of B2B traffic into a single network provider enables companies to maximize their spending with one vendor. A single provider makes it easy for companies to manage at a lower cost. It also helps lower the internal costs of the company with the reduction of overhead created by managing multiple vendors, and increase the quality of service by being more available and concentrated, ultimately creating a greater strategic relationship with a single vendor. (Simplify and Streamline Your B2B Network Management, GXS)

Global Network Consolidation designs consistent global protocol and documents, eliminates unnecessary procedures by centralizing the infrastructure of B2B, and consolidates three B2B providers across Europe, Asia, and the U.S. When companies face issues such as managing different tiers of suppliers, they can take advantage of consolidated B2B providers to eliminate the concern of high overhead costs with managing multiple vendors and achieve a more effective collaboration with suppliers.

#### 4.2.2.2 Hosted Supply Chain

Hosted Supply Chain is an important B2B concept that is emerging as B2B initiatives are unsuccessful without supplier enablement. Hosted Supply Chain is an online, hosted platform in which multiple suppliers perform cross-enterprise supply chain management processes. The main goal of a hosted supply chain is to enable extended supply chain processes given that today's trends are geared towards extending the contexts for planning and contract manufacturing. Consequently, the primary objective of this application is to achieve an extended supply chain competency by taking

advantage of shared information that ultimately leads to reduction of inventory, labor, and transportation costs; all attractive to senior supply chain and material management. (Ferrari, 2001)

In the high-tech and automotive industries, most of the customers want end-to-end flow of planning, execution, and information control across the extended supply chain. Companies like Dell have shown initiative for achieving supplier collaboration and connectivity through sharing information among different suppliers. Customers would like to have a single view provided across the supply side and buyer side of processes to achieve a more transparent supply chain. The hosted supply chain has emerged from the needs of tier 1 suppliers and other tiered suppliers in that the application will provide the whole view of supply chain processes with the aid of technology and IT infrastructure. (Ferrari, 2001)

The interests in hosted supply chain as well as in an application that integrates among tiered extensions of its supplier network are not limited to the United States market. European-based companies such as Ericsson, Ikea, Volvo, and Absolute Vodka have been using services provided by Sweden-based vendor called PipeChain. Similar to U.S. applications that are provided by major providers, PipeChain supports real-time integration of extended supply chain processes into a flexible event-driven network. (Ferrari, 2001) European-based companies are interested in further addressing the challenges of continued global extensions of supply chains with the focus on outsourced business processes; problems that are associated with multi-tiered suppliers.

Companies can make better decisions on how to manage different types of suppliers, when to manage only the first tier suppliers, and when to extend relationships

to all upstream tiers by using available software applications that are emerging in B2B e-commerce. We feel that visibility in the supply chain across different suppliers can enable organizations to plan ahead for risk management, supplier relationship management, and eventually understand suppliers' performance.

### *4.3 Analysts Firms*

#### **4.3.1 Performance-Driven Outsourcing**

Today, many companies tend to focus mainly on cost savings by taking advantage of offshore resources, technology, and improved processes to remain profitable in the current economy. However, they forget to appreciate the importance in the long run of investing in higher quality, higher-end skills, and scarce talent. According to the article from AMR Research, the cost cannot be the primary focus of Performance-driven Business Network (PBN) sourcing or outsourcing. Rather, they would need to have the capability of recognizing the right supplier from diverse selections. (Stiffler & Fersht, 2008)

PBN is committed to bring people across different companies and locations to work together to create an integrated environment. Among the network of different people, the original goal was to increase investment in innovation and capability for long term development; however, they tend revisit their cost savings issue. This eventually leads to a lack of effort in investment which could potentially affect the creation of business models and solutions towards collaboration between supplier and buyer.

As companies open up to create value networks among suppliers, contract manufacturers, distributors, logistics providers, and IT and business process outsourcers,

sourcing focus should shift from pure cost and actual transactions to strategic business building. It is no longer a viable strategy to have a company find solutions alone while ignoring further investments in outsourcing, sourcing, and partner management skills. The latter three should become core tasks within organizations.

#### 4.3.2 Sourcing Strategy

Finding a complete solution to value creation and cost reduction from suppliers is never a simple process. It is obligatory for companies to understand both sourcing strategy and suppliers' strategic behaviors in industries. The article, "Sourcing Strategy – The Brain Behind the Game," states that it is imperative for companies to understand the buyer/seller market dynamics, locations of the vital points in the supply chain, and who retains the power over those pivotal points. When considering situations dealing with multi-tiered suppliers, this understanding will be helpful to effectively source suppliers and to determine how deep the relationship with suppliers should be. (Smock & Rudzki, 2007)

Effective sourcing requires a very dynamic strategy. There is no such thing as a perfect solution that addresses this issue. However, having the knowledge of different types of supplier situations is definitely necessary for companies to strategically face the challenges. According to the Cox consulting group, one of the tools they provided called the Oraculix Power Positioning Tool helps supply managers analyze the relative power between the firm and selected suppliers. (Smock & Rudzki, 2007) The software enhances the analysis of the balance of power between buyer and each potential supplier to ease the comparison among different suppliers from the buyer's perspective. The below five topics are the major points.



- “Relative importance of the product to the buyer.”
- “Nature of the demand and supply flow.”
- “Power attributes of the buyer.”
- “Importance of the buyer to the seller.”
- “Power attributes of the seller.” (Smock & Rudzki, 2007)

This tool not only gives buyers opportunity to compare different suppliers and move on to take more optimal solutions but also it encourages suppliers to do the same from their side. According to the author of the article, the Oraculix is certainly resource-intensive but it drives in-depth thinking and an analysis process to make critical sourcing decisions.

Sourcing strategy becomes effective when it has the right people with expertise and the right process. Expertise as well as the appropriate analytical skills develops a value-creating strategy in dealing with the suppliers. Most organizations today face these types of challenges equally and what distinguishes the leading organization from the rest is the ability to find the right solution to further aid in their strategic sourcing process.

## 5. Experts Opinions

### *5.1 Bose*

Bose, a market leader in electronic sound products and technology, has a distinct method of managing different suppliers in the area of procurement. A past employee’s perspective on this electronics company, abbreviated J, discussed her experience at Bose in her role as a purchasing manager. According to J, Bose established its supplier management and supplier quality process during the initial phase of product

development. Their method resulted in a more efficient supply chain, reduced cost, and improved supplier management.

### 5.1.1 Supplier selection

In terms of deciding at which stage the supplier tiers are chosen, opinions vary greatly from company to company. At high-tech companies such as Bose and Dell, selection is carried out during the development stage by the group designing the product. At Bose, they tend to narrow down to three possible suppliers after visiting their factories and evaluating suppliers' historical performance thoroughly. In addition, J explained that it is critical to share the design with suppliers so that they can choose the right supplier. Rather than focusing only on financial contracts and costs, Bose values a long-term commitment when dealing with their suppliers.

### 5.1.2 Multi-tier management

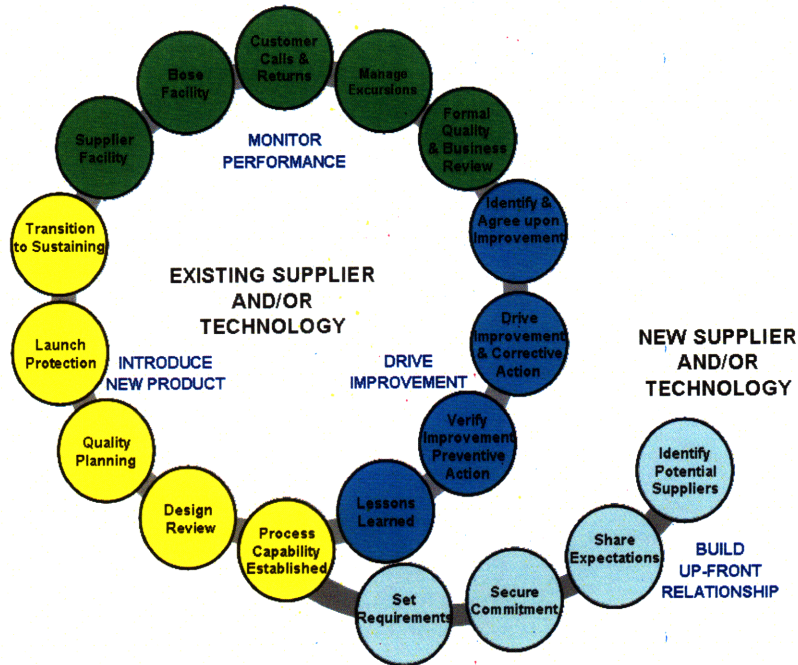
At Bose, employees tend to work with first-tier suppliers to manage their upstream suppliers. If the issues are complex, they sometimes accompany first-tier suppliers when working with second-tier suppliers. Bose trains suppliers during the design stage, providing the capabilities to their supplier to fix potential problems. Although employee turn-over rate is generally high with upstream suppliers, process engineering employees tend to stay at one company for a long time while operators or managers shift more frequently. Therefore, training engineers at contract manufacturers is very beneficial. Bose outlines specific expectations when selecting suppliers, ensuring suppliers understand their expectations in the long run while supplying components to Bose.

Material engineers who manage suppliers tend to focus more on receiving the right product from suppliers rather than making sure that they get the supplier quality agreement. In addition, material engineers usually do not have time to think about tools needed to mitigate risks because they are overly focused on receiving products on-time while achieving cost savings; they are normally less interested in setting up suppliers in the beginning. Bose began this shift to early structured supplier quality agreements and has subsequently improved quality and reliability.

### 5.1.3 Bose's strategy

At Bose, employees are careful not to outsource any unique design to other suppliers and never outsource intellectual property to the third parties. They outsource components where they are found more expensive to produce internally, and contact second or third-tier suppliers directly to speed up the process. Overall, Bose wants to minimize the number of suppliers by increasing the capabilities of their most reliable suppliers. The goal is to pick the right suppliers and commit the resources to their first-tier suppliers, reducing resources needed for future products. Auditing suppliers can be a good way to keep track of their performance such as shown in Figure 32 labeled as 'Supplier Management Mission at Bose'. To further explain the Q model at Bose, Bose tries to establish a new up-front relationship with suppliers by identifying potential suppliers, sharing expectations, securing commitment, and setting requirements prior to the New Product Introduction (NPI) stage when they actually start interacting with

suppliers in the designing phase. Thus, the new supplier technology aims for a secure supply base, information sharing, and defined expectations.



**Figure 32: Supplier Management Mission at Bose**

Consequently, we learned that Bose values setting up a strategy or plan to evaluate suppliers' performance prior to supplier selection so that they can establish a solid supply base during the design phase. With the additional process of setting up expectations for suppliers from Bose, as well as training first-tier suppliers to demand higher quality and service, Bose is streamlining their supply chain. Based on J's interview, the faster companies interact with potential suppliers by sharing expectations, securing commitments, and setting requirements, the more effective supplier relationship management programs are established.

## 5.2 CAPS

A director of benchmarking programs at CAPS (Center for Advanced Procurement and Supply) Research, Steven Wade shared his perspective on the issue of managing multi-tiered suppliers. CAPS Research is a global research organization jointly sponsored by the W.P. Carey School of Business at Arizona State University, and the Institute for Supply Management. Steven's first comment on the research question was that there is no single answer to this problem; it would always depend on the industry, the type of company, and the product.

### 5.2.1 Visibility and alignment

According to Steven, globalization has significantly impacted the management of tiered supply chains. When examining the whole supply chain, any organization that performs all assembly work internally or buys pre-assembled components and then completes final assembly must depend on their supply chain for survival. Steven believes that it is important to refine the tools that allow visibility to the entire supply base; cost management, cost benefit of maintaining and understanding the whole supply chain, and safety issues lead to greater visibility and improve opportunity.

Operations and production must align with procurement. From a strategic point of view, more organizations have a better understanding of the capabilities of their tier two and tier three suppliers. For example, when purchasing electronics equipment, the customer must know whether components from five different suppliers passed the quality inspection as well as the screening process during the qualification stage. Companies must be able to trace down to their second or third-tier suppliers to verify quality control enforcement of essential components and to mitigate problems when they arise.

### 5.2.2 Supplier selection

When choosing the right supplier, it must be clearly understood and appreciated what parts are needed. The first-tier suppliers may have their own thoughts on a qualified supplier for the process, which should be taken into account. However, these second or third-tier suppliers also have to be certified by the parent company, which can make the final selection of their key suppliers. As potential suppliers successfully complete the certification process, the parent company ultimately benefits. Therefore, the first-tier suppliers' job is to stimulate and win the competition so that they are fully certified to become a potential supplier for the company.

From his perspective in managing suppliers, Steven Wade concluded that there is no single solution to solve the issue. However, companies should be able to trace down to any tier of suppliers to effectively and efficiently face challenges involved in different types of products to stay competitive. From the suppliers' standpoint, they need to win the competition with other suppliers to be certified by the company so that they can sell their components. Steven also values the importance of allowing first tier suppliers to freely decide their sub-tiered suppliers, although all of their capabilities and qualifications need to be certified by the customer company. This interview reinforced the idea that more than a single framework can be developed in forming the supplier relationships, and categorizing different situations based on supplier's capability may help solve this issue.

## 6. The Roadmap

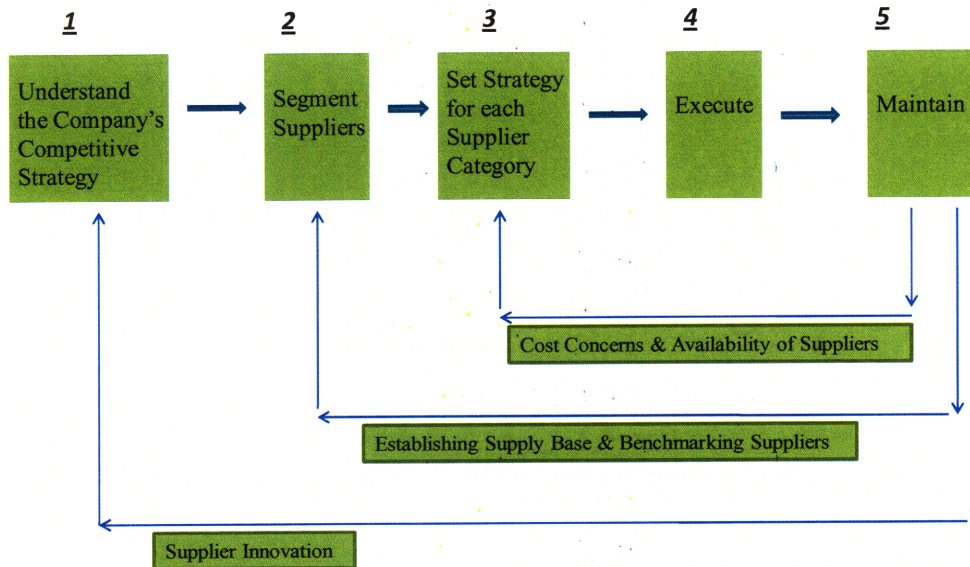
We begin with the question, "How should a company manage its multi-tiered suppliers in high-tech industry?" However, our research raised more questions as we searched for its answer. "At what point should companies make that decision?" "What

criteria should be reviewed prior to it and considered when making this type of decision?” “Once a strategy has been defined, how should you monitor suppliers?”

What we found from our research was that there is no single right answer to any of these questions. The recommendations would be different depending on whom you are talking to and what type of strategy the company implements. To answer our thesis question accurately, one must answer all the questions in the previous paragraph based on the individual company’s situation. After synthesizing all of our sources, we developed a five-step process for companies to systematically approach these questions:

1. Understand the Company’s Competitive Strategy
2. Segment Suppliers
3. Set Strategy for each Supplier Segment
4. Execute
5. Maintain

Using this methodology as illustrated in Figure 33 will ensure companies are building their supply base to follow their unique competitive strategy. Forming their supply base into segmented elements will enable the company to develop distinct strategies to optimize each element. Companies then execute initially through sourcing and only then work on maintaining their strategy. While most companies begin to manage their suppliers at this final maintaining stage, we feel companies must begin the process with the first step of understanding their own competitive strategy. Only then should they continue subsequent steps to forming and managing their supplier base.



**Figure 33: The Roadmap**

1. Understand the Company's Competitive Strategy

Understanding the company's competitive strategy is the first and most critical step in our procedure. Companies must objectively assess their competitive strategy and evaluate how to use suppliers to fulfill their needs. For example, if their strength is in marketing the highest quality products in their industry, they need to work with the highest quality suppliers. Meanwhile if low-cost pricing is what they compete on then working with lower quality suppliers might suffice. Once a company is aware of their strengths and weaknesses, it must decide on its core-competencies. These core-competencies may include marketing, specific component designs, or intellectual property. For example, intellectual property is unique to companies and it's crucial to retain in-house to maintain their competitive advantage. Product design is also



imperative for companies as they must fully understand the components that make up the products and their criticality to the process. Managing suppliers in relation to intellectual properties or specific component design becomes extremely important as companies segment their suppliers and subsequently work on developing a strategy for each supplier segment.

Based on a company's core-competencies, a formal competitive strategy must be developed. Depending on the type of industry or type of products a company manufactures, the core strategy forms the building blocks of an effective and efficient supply chain. Part of this strategy will include outsourcing of non-core competencies when available. The foundation of supplier relationship management occurs during this first step.

## 2. Segment Suppliers

Based on a firmly established company strategy, the planning phase continues as potential suppliers are segmented through an in-depth analysis of their characteristics. These characteristics will likely involve aspects of the balanced scorecard, including financial performance, customer service response, reliability, and quality assurance among others chosen by the company. Previous suppliers have their characteristics measured as a result of monitoring suppliers' performance using metrics or rating systems internal to the company. New suppliers are added to the supply base through benchmarking and other research techniques. As information on suppliers is collected, the company will incorporate the data to create an approved supplier list. These suppliers from this potential supplier base must fit into the company's competitive strategy defined in the previous step.

After companies form their potential supplier base from the list of approved suppliers, it becomes imperative to clarify the relationship between the company and a particular supplier. This aspect of the segmentation step should include identifying the type of components the company is procuring from the supplier, in addition to the criticality of those components to the overall competitive strategy. Further segmenting takes place as the company should integrate the supplier's criticality into the Power Matrix as specified in Chapter 2. Does the supplier depend on the company for most of its businesses, or does the company depend on the supplier for their specific product? Do neither party need the other, or do both parties form a mutually dependent relationship? The answers place suppliers into one of the four quadrants of the Power Matrix. Understanding a supplier's quadrant facilitates segmentation, validates each party's position in the market, and aids in developing the company's strategy for each supplier segment.

### 3. Set Strategy for each Supplier Category

The planning phase is finalized with structuring a strategy for each supplier category segmented from the previous step. Now that we know the company's competitive strategy, and relationship with potential suppliers based on the characteristics described, companies must develop a distinct strategy for each supplier category.

After segmenting the suppliers, companies should understand the characteristics of components that the supplier segments produce and sell in relation to the competitive strategy. Companies then must perform a detailed risk assessment that incorporates cost as they form their category strategy. The risks should be company-specific, but may include supplier reliability, financial viability of the supplier, quality assurance, and

potential disruptions in the supply chain among a host of others. The strategies' objective is minimizing risk with minimum cost encompassing the potential life of the supplier's interaction with the company.

For example, the company may decide, based on the supplier's category, to delegate the managing of second- and third-tier suppliers to the first tier suppliers. Involved with the risk assessment, the company must first understand the capability of the first tier supplier, specifically their technical expertise, resources, and knowledge of industry regulations. They must also understand the components characteristics: Are they standardized? Are they complex? How critical are they? Depending on the criticality of component, the company may need to expend a great deal of company resources to train the first-tier supplier in quality assurance, reliability, and company expectations. Does the company have the resources to do this? While not only looking at the risks associated with this option, companies must determine if the extra resources needed for training are worth the cost of performing these function themselves, as well as the risk giving the first-tier such responsibility. Consequently, companies should weigh the cost and risk versus the rewards in terms of reducing management when deciding which strategy to assign for each supplier category.

Some companies take advantage of mitigating risks in supplier costs. One illustration of this concept assumes a company outsources certain components to supplier A, who in turn outsources subcomponents to supplier B. Knowing the characteristics of both supplier A and B, and the criticality of the subcomponent, the company directly contacts the supplier B to negotiate both cost and transportation based on its position of power. In this case, the company manages two-tiers upstream in the supply chain to

control cost and ensure delivery from its suppliers, realizing the risk of these factors in their overall profit margin. By reducing the risk of shortages and cost growth, the company improves their visibility of the supply chain and reinforces supplier A's position to provide the speed, quality, and cost the company expects. Overall, the company prevented potential risks by developing a strategy to manage this specific supplier segment.

The ability to define comprehensive strategies for supplier categories perpetuates a successful and smooth transition to the next step of execution. Execution starts the potentially long relationship with the company and its supply base.

#### 4. Execute

After spending the last three steps on planning, the company is ready to execute their strategy. In this step, the company focuses on strategic sourcing. As the company plans for their sourcing events, it must look internally and perform a demand management assessment. The company will determine the precise amount of product they need to source in this step. With the right strategy and the known company demand, the company moves to strategic sourcing that incorporates the appropriate technology and the needed level of collaboration.

Strategic sourcing provides the company many options based on their supplier segment strategy. If the company has an array of similar choices, it may decide to perform a reverse auction, where the winner submits the lowest bid. If there is only one viable supplier, the company will begin a deliberate negotiation. Again, the company will decide which method to use based on their segment strategy. Strategic sourcing will also involve technology or web-based systems to facilitate managing the procurement

steps as well as establishing supplier relationship management. Part of this process is using technology-based programs to perform these auctions or negotiations. Another part is drafting suitable contracts.

As an example of technology incorporation, Oracle's Supplier Contract Management from PeopleSoft Enterprise SRM features an application that supports enabling customers to standardize contract processes through their library of contract clauses, greatly increasing efficiency by reducing time-to-contract. Additionally, SAP's Contract Lifecycle Management (CLM) application automates contract creation, ensures organization-wide visibility, and helps verify compliance of pricing and terms. Maintaining the contract lifecycle begins with the contract's origin, and is critical as more companies outsource their non-core sectors to other suppliers. The use of technology with contract construction will increase time efficiency, reduce errors, and provide greater visibility.

Collaboration with suppliers becomes critical during this step. Companies will begin formal relationships with their sourced suppliers. Formal training with suppliers will commence, as expectations are discussed. The integration of technology in the form of automated catalogs, service procurement systems, inventory management, and performance monitoring should follow. These programs will increase efficiency in the supply chain, reduce costs, provide feedback to the suppliers, and allow both the customer and supplier to actively monitor the relationship. In addition, the company will decide if the first-tier suppliers will manage their upstream suppliers, or if the company manages the upstream suppliers.

If the company delegates managing the upstream suppliers to the first-tier suppliers, the company must boost the first-tier supplier's capability of handling potential issues that may arise from the upstream suppliers. This may include tighter interactions with the first-tier, acting as a liaison between different supplier tiers, and extensive quality assurance training with multiple suppliers, especially the first-tier. As discussed previously, companies must take a careful look at what the real financial costs of this endeavor are, the risk cost associated with the loss of control, and if the savings are really worth the total cost.

On the other hand, if the company decides to manage all supplier tiers, it should treat all suppliers as one supply base. The company would likely make this decision for only critical components, if the first-tier supplier is incapable of managing their suppliers, or risks associated with delegating management to first tier-suppliers were too great. Treating all suppliers as one supply base should entail performing many of the same actions previously associated with first-tier suppliers: technology integration, extensive training, and active monitoring.

In the execution phase, strategic sourcing occurs; this requires new supplier introductions, clarified responsibilities, documented expectations, and drafting contracts. Companies must incorporate technology throughout the process, using software and systems to automate processes, improve collaboration, and increase visibility. Each company's position in managing multi-tiered suppliers should be clearly defined and understood by all parties. Finally, as suppliers begin shipping products at the end of the execution step, companies must continue to maintain their new supplier relationships.

## 5. Maintain

Our final roadmap step is Maintain supplier relationships. Many companies postpone actively engaged discussions on managing multi-tiered suppliers until this step of the roadmap. However, our research has shown that strategy development for supplier segments must include supplier relationship management planning, and execution must lay the foundation by starting supplier relationship management. One of the biggest aspects of supplier relationship management is critically evaluating suppliers' performance. The use of technology aids in this activity using performance metrics, supplier performance ratings, and providing instant feedback for supplier improvement. Benchmarking is another tool that if effectively used, measures suppliers' performance against their competition. Continuously observing suppliers' results can be reapplied to step two, ensuring supplier segmentation is updated accurately and regularly. Supplier monitoring should be fed back to the suppliers, driving improvements and motivating innovation. Feedback must go both ways; as suppliers strive for innovation and development, companies must listen to their ideas and incorporate improvements to their own business model. Improvements in business models should compel companies to re-evaluate their competitive strategy in establishing a solid supply base for future tasks of segmenting suppliers.

Benchmarking, supplier assessments, and industry "best practices" will likely expose additional strengths and weaknesses of suppliers. This new information can be feedback to step two: Segment Suppliers. New risks in cost or reliability of supplier that were uncovered from these assessments may motivate companies to reach beyond their first-tier and negotiate with upstream suppliers, as discussed earlier. This action provides

feedback to step three: Set Strategy for each supplier. Again, companies are able to reduce the overall risk of the supply chain through their constant feedback.

Many companies operate in this final step reactively. Our research has found that the most successful companies are extremely proactive in their supplier relationship management. Being proactive includes driving suppliers toward innovation, continuous monitoring of their performance, aggressively repairing disruptions, and installing industry learned best practices. Taking these steps and using the knowledge gained, successful companies feedback the information into their early planning phases to reinforce their supplier segments and strategies, or force a reevaluation of their position. As an example, supplier innovation that provides dramatic improvements to the business may force the company to review their entire strategy, spending feedback to step one: Understand the Company's Competitive Strategy. The roadmap is a continuous, cyclical process that is constantly striving for improvement and growth.

### Conclusion

In answering our research question, it is critical to perform each step of the roadmap carefully for success in managing multi-tiered supply chains. Companies must thoroughly understand their core competencies and outline a competitive strategy. Using tools such as the Power Matrix and balanced scorecard, suppliers must be segmented based on criticality and the company's competitive strategy. Formal strategies to manage the supplier segments must be developed to mitigate risks and maximize benefits. Execution of these strategies will follow to include strategic sourcing and beginning supplier relationship management that incorporates technology and collaboration. Finally, companies must continue supplier relationship management through monitoring



suppliers, being proactive with problems, and encouraging supplier innovation. During this step, companies must continue to provide feedback to the earlier steps through benchmarking and performance metrics. Consequently, the flow does not stop at the maintaining step, but remains cyclical as continuous improvements to the supply chain process are incorporated. Our roadmap is not a linear procedure; successful companies can use this roadmap to develop and redevelop their competitive strategy, and improve their supply chain strategy, and thus, effectively manage their suppliers.

## 7. Future Research

Our research presented a roadmap for companies to follow as they manage supplier relationships. However, there are two important topics which we feel merit further study: criticality of components and risk management. As discussed, the criticality of components is crucial throughout the entire roadmap, specifically during the supplier segmentation step and the category strategy development. We think companies would greatly benefit from a framework that distinguishes the company's critical components from the non-vital parts. This framework could be in the same mold as the balanced scorecard, providing metrics and aiding companies as they define their core-competencies. Most companies have some internal framework in place, but this takes resources to develop and may not use a credible, analytical approach when devised. An important corollary to not understanding the components' criticality is failing to properly define risk. Although there are a number of articles concerning risk, we have found most are generic and ambiguous. Recently a great deal of research has gone into the study of risk and risk management, and hopefully this will provide future tools that companies

will use to gauge their risk. Our recommendation is to develop these tools into another analytical framework that companies can accurately, and quickly assess their risk to various business ventures; most notably, selecting suppliers. We feel that companies would greatly benefit from empirically proven, user-friendly frameworks to measure both component criticality and company risk.

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