Analysis of Sourcing & Procurement Practices: A Cross Industry Framework

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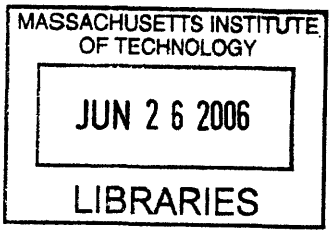

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Abstract

This thesis presents and analyzes the various practises in the functional area of Sourcing and Procurement. The 21 firms that are studied operate in one of the following industries: Aerospace, Apparel/ Footwear, Automotive, Computers, Communications Equipment, Consumer Packaged Goods, Pharmaceuticals, Petroleum and Retail. Those firms have been chosen for their overall supply chain excellence and the research builds on empirical data from case studies, literature survey and interviews with industry experts. By assessing the empirical data and the various practices, a framework is proposed to address the different options that the firms can use relative to the organizational structure of the Procurement Department. These options are based on a combination of the importance of the inputs and the supplier/buyer power differential. Lastly, this thesis identifies the factors that affect these options.

Key Words: Procurement, Sourcing, Organizational Architecture, Corporate Strategy

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1 INTRODUCTION

1.1 Overview

This Research Project is intended to describe the business models and the practices that companies have developed and employ in the functional area of Procurement. Part of the Supply Chain 2020 Project, a multiyear research effort to identify and analyze the factors that are critical to the success of future supply chains, this study maps out innovations that underpin successful supply chains as far into the future as the year 2020. The focus will be in recognizing the practices that best – of – breed organizations use so as to achieve superior competitive advantage.

The SC2020 Project was initiated by the MIT-Zaragoza International Logistics Program, and consists of two advisory councils, the Industry Advisory Council (IAC) and the European Advisory Council (EAC). Both are made up of supply chain executives from leading companies and play a crucial role in helping to shape the work and generate new ideas.

SC2020 research is broken down into three Phases:

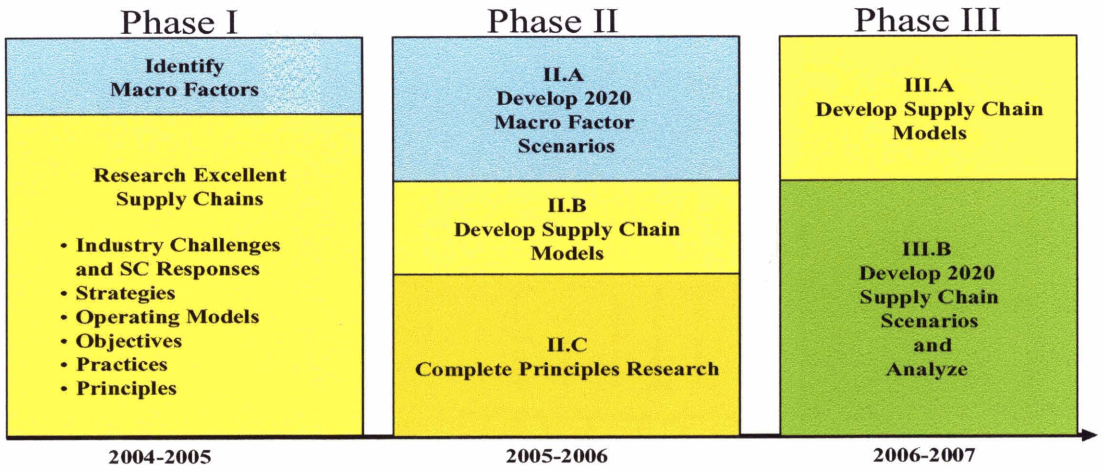

Figure 1 - Phases of the Supply Chain 2020 Project

Phase I: In this Phase effort was made in understanding excellent supply chains. This includes the identification of the macro factors that have shaped the supply chains as well as the industry challenges, the strategies, the operating models and the principles that companies use in designing their supply chains.

Phase II: In Phase II the research aims to develop supply chain principles in the functional areas of supply chain and leverage what is learned during the first phase. The work highlights what actions organizations should take to help ensure supply chain success.

Phase III: In the last Phase of SC2020 the research will focus on developing Supply Chain models and scenarios, analyze them and make recommendations on future trends and best models for corporate action.

Within this framework, 21 Thesis Projects have already been completed and submitted in addition to 3 Working Papers and 8 Conference proceedings for Phase I. As stated before this is an ongoing research to be completed in 2006 – 2007.

1.2 Research Question

As part of the SC2020 Phase IIb, this research is intended to identify the business models and practices that some of the largest (in their sectors) companies use in the area of procurement, i.e. in trying to buy the raw material to produce. More precisely, the research questions that this study answers are:

- What are the different models that thought leaders propose for the functional area of procurement? Identification and categorization with respect to their applicability (academic – business models). Are there any specific principles that are commonly leveraged from companies in order to achieve superior performance?
- What is the relationship the companies have with their suppliers and the depth of this relationship?
- How are firms organized so as to achieve better collaboration with their suppliers?
- How do firms determine the focus of their relationships?
- How do those organizations measure the effectiveness of those relationships?
- What are the technological levers used to support the Procurement Strategy?

All of those questions will have to be analyzed with respect to the specific market each company operates.

Procurement has been a rather neglected area within the organizations. Although the cost of raw material that a company purchases is roughly one of the major contributors to the Cost of Goods Sold, few companies seem to have rationalized their procurement processes especially in the strategic level so as to achieve a competitive cost advantage. Therefore the rationalization of corporate spending has increased awareness among professionals and academicians to find out whether there are models that can be leveraged to improve the corporate procurement strategy. Some organizations have already moved towards this direction and achieved superior performance in terms of streamlining the processes and gaining a cost related advantage.

Furthermore, of particular importance is the identification of links between the corporate strategy and its sub - elements. For example is the cost leadership strategy decision somehow linked with the procurement process, or procurement decisions tend to be independent of that? Understanding the decision making process of organizations and the levers used will help us rationalize those processes and make recommendations for future reference.

1.3 Methodology

Due to the scope, the specific characteristics of this research and the anticipated outcomes, the proposed approach for this research is mainly qualitative. It is divided in three steps which are described below.

The first step is to develop deep understanding of the function of Procurement as well as understanding the current trends and models that are used. For this purpose a detailed research on published material was conducted. The materials include business press, which will give an industry wide insight on this topic as well as academic literature

(including academic journals, previous thesis and books/monographs) which provided the theoretical background. More precisely, the goal of this level is to connect the state of the art practices and concerns with the academic justification in order to provide a theoretical basis.

The next step is to develop a list of practices that are proposed either in the academic literature or in the business press that corporations use for their procurement. These practices have also been identified in interviews with industry experts for their applicability. In this step there were identified patterns / trends / characteristics of the procurement practices and they were linked to specific markets and business models.

The last step was the synthesis of the validation process; an attempt to develop procurement models that are used by the industry leaders and to present those differentiation factors that offer competitive advantage. This step ultimately includes the development of case studies that refer to those models which will enhance the understanding of the functional business models.

The sources of the data come from reviewing business practices and interviewing industry experts. The sample of this research is the 21 partner companies of the Supply Chain 2020 project plus Center for Transportation and Logistics (CTL) contacts. More precisely, the focus of this study is in the Procurement department/groups so contacts and experts in this function where interviewed whenever previous work (Thesis and White Papers) was limited. Bearing in mind the limited time availability effort was made to develop a precise list of practices and structuring the interviews in order to minimize the number of interactions.

1.4 Research focus

The industry focus of this study is presented in Table 1.

Industry	Case Studies - Author	
Aerospace	Boeing	Cizmeci (2005)
	Rolls Royce	Tiwari (2005)
Apparel/ Footwear	Limited Brands	Kumar (2005)
	Zara	Chu (2005)
Automotive	GM	Braese (2005)
	Toyota	Brown (2005)
Computers	Dell	Roy (2005)
	IBM	Roy (2005)
Communications Equipment	Cisco	Boasson (2005)
	Lucent	Boasson (2005)
Consumer Packaged Goods	Gillette	Rah (2005)
	P&G	Rah (2005)
	InBev	Finkelstein (2005)
Pharmaceuticals	Cardinal Health	Singh (2005)
	Lilly	Singh (2005)
	Novartis	Mukherjee (2005)
Petroleum	ExxonMobil	Santos (2005)
	Shell	Röthlisberger (2005)
Retail	WalMart	Chiles, Dau (2005)
	Amazon	Chiles, Dau (2005)
	The Metro Group	Schranz-Whitaker (2005)

Table 1 - Industry Focus

The procurement function of direct spending of products is the focus of this research. For the purposes of cross industry analysis, it is more beneficial to focus on tangible inputs that are directly related to the end product and can lead to patterns. Later on, this study provides the definitions of the direct/indirect material and services.

1.5 Motivation

According to Ballou (1999), "Logistics is the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods and related information from point of origin to point of

consumption for the purpose of conforming to customer requirements". We can understand that the importance of logistics in the modern societies is even greater due to the geographic distance between raw materials and final consumption.

Different industries seem to have different supply chains since the specific characteristics of those industries stress those differences which in turn showcase an effective (or ineffective in some occasions) way of fulfilling the customer needs. The companies have to match the internal capabilities to the external environment so as to gain competitive advantage. In an attempt to improve efficiency, the company has to pay more attention to the procurement organization.

In this context, every reduction in the cost is significant for the end consumer and the sourcing of raw materials might lead to significant cost reduction. A very simple example drawn from the 2005 Council of Supply Chain Management Professionals Annual Conference helps illustrate the impact of sourcing decisions.

	Base Scenario	Scenario 1 Revenue Increase 30%	Scenario 2 Spend Reduction 10%
Revenues	$1,000	$1,300	$1,000
Cost of Goods Sold[1]			
External[2]	$455	$593	$410
Internal	$245	$319	$245
Gross Profit	$300	$391	$346
SG&A[3]	$150	$196	$150
Net Profit	**$150**	**$196**	**$196**

Table 2 - Effect of Spend Reduction and Revenue Increase in Profits. A simple example (Source: 2005 CSCMP Annual Conference)

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[1] Cost of Goods Sold (COGS) is 70% of Revenue

[2] External spending is 65% of COGS

[3] Selling, General & Administrative Expenses: 15% of Revenue

The purpose of this table is to show that the same profit is achieved by either increasing revenue by 30% or by rationalizing and reducing the spending, by 10%. However the effort to reduce spending may be lower than the effort to increase sales and marketing. Conclusively, the motivation of this research stems from the point that a company can improve its cost structure and offer the same product (or service) in a significant lower cost, improve the overall efficiency and gain a competitive advantage.

1.6 Thesis Overview

This thesis starts with an introductory chapter which presents the research, the research question, the methodology and the relevant literature review. The next section presents an overview of the procurement function, the decisions, the various organizational levels of decision making and the processes of procurement and sourcing. Section 3 presents the 9 different industries that are studied throughout this thesis, defines them and describes the supply chains.

Relative to the procurement specific analysis, Section 4 is a cross industry study of the various practices that the firms are using in their procurement function. The following section presents a framework that identifies different organizational architectures based on the characteristics of the inputs and the supplier/buyer power differential. The next section, Section 6, presents the macro – economic trends that affect the procurement practices. Last but not least, section 7 includes some concluding remarks and proposals for extending this research.

1.7 Literature Review

Procurement has been the focus of many organizations attempting to rationalize their spending. Most organizations are trying to use the existing knowledge and experience regarding effective sourcing. Purchasing has been extensively studied in the late 19th and in the 20th century mainly to measure the performance of the administration of an organization (Leenders et. al. 2006). Many articles and academic work has been published in this topic and increased awareness has been drawn especially in purchasing. However, as many authors propose, purchasing is different from procurement, sourcing and more generally supply management, with purchasing involving more operational decisions and the rest focusing on the strategic decisions.

Along these lines, Jain and Laric (1979) suggest a conceptual framework for supplier selection which consists of five steps, namely: measurement of buyer's and seller's strengths, assignment of the parties into strategic strength quadrants, evaluation of purchase need and assignment into relevant field, determination of negotiation strategy and tactics to be followed, incorporation of environmental impact into the matrix, and selection of the most appropriate purchase price. This model is intended to aid price negotiation. It is used mainly for the tactical / operational level and not for the strategic, although the authors suggest that purchasing should be also considered in the strategic level.

Porter (1980) in his innovative work attempted to elevate the procurement function to the strategic level by identifying in his Five Forces Model the power that suppliers pose in the strategy of an organization. This work also attempted to identify the

strategic essence of the relationships between the supplier base of an organization and the organization itself.

Browning et.al. (1983) extended Porter's framework by suggesting a structured model of strategic planning which provides ways to unite purchasing and planning. The planning process is composed of 3 elements: strategic planning, strategic decisions, and operational plans and budgets which in turn include company audit, setting corporate objectives, setting corporate strategies, business unit planning, preparation of a portfolio of consolidated business units and operational planning and budgeting. In this context, Watts et.al. (1992) attempt to link the corporate strategy with the purchase process. The conceptual framework they developed, recognized the connection between competition and customers and suggested that distribution, purchasing and manufacturing are the bottom line levers in developing and sustaining a competitive advantage. However, being a conceptual framework this wasn't validated from the business / industry perspective. Additionally, Reck and Long (1988) proposed a four step process that takes companies to transform their procurement process from a passive / reactive to an active / proactive one. This study mainly suggests the strategic transformation of the purchasing function into procurement.

A different approach was suggested from Landeros and Monczka (1989) who identify the importance of the collaboration for the firm strategy. In their empirical analysis they attempt to extract useful knowledge on the characteristics that this supplier/customer collaboration may have.

However, the most comprehensive academic study on the area of purchasing has been done by Leenders et.al. (2006), who among other issues they describe the

organizational models companies use for their purchasing departments. They identify three major organizational structures companies employ, namely centralized, decentralized and hybrid. This approach enhances the understanding of where and how the organization really takes procurement decisions. Furthermore, it connects various supply decisions to the procurement sub-organization and the extend they affect it. Two issues arise from their study. The first is the conceptual and academic background. Most of their work is academic and not tested relative to its business applicability. The next issue that has to be examined is the strategic extent of the decisions. The authors have successfully identified purchasing decisions and there is a fundamental difference between purchasing and procurement. Procurement is considered to be the strategic level equivalent of purchasing. Purchasing is the set of operational rules and processes that take place in a daily basis as opposed to Procurement which includes the strategic decision that formulate the future of the organization.

Contemporary research deals with this difference and attempts to formulate ideas regarding the relationships that companies have with their suppliers, the performance metrics of their procurement sub - organizations, the information technology that they use and generally the procurement business models they use.

Ellram (2002) conducted an exploratory study of best practices in strategic cost management. This study answers a series of key questions but its important shortcomings come from both the scope, which is mainly concentrated on cost management rather than on the strategic implications of procurement and second the size of the sample which consists only of five companies. However, of great importance is the determination of the focus of cost management efforts which could be extended in the entire procurement

department. In addition to that, it is imperative to understand beyond that paper the organizational processes that companies utilize to their success.

Carr and Pearson (1999), stress an issue that wasn't studied in that depth before. They attempt to explain the evolution of the buyer – supplier relationship from the operational to the strategic level and the performance measurement implications of this trend. Their analysis however is limited, since it is heavily based on empirical analysis from the operational hierarchy level of the researched organizations.

In this context Benasou (1999) has identified that longer-term collaborative strategic partnerships with external business partners is unjustifiable since they are costly to develop, nurture and maintain and proposes an alternative portfolio of relationships.

In tandem to those studies, most of the business publications propose various alternative procurement models with respect to the relationships, the performance metrics and the technology levers. However, they miss to identify and / or to propose either a single universal model or models that have a clear match for specific markets or specific industries. For example, is the relationship an auto manufacturer develops with its suppliers the same to the relationship a pharmaceutical company develops? Distinctive differences in the markets / products may initiate differences in the procurement models they employ.

Saloner et. al. (2001) described the idea of capturing value. Supplier power stems from the number of suppliers in the market, therefore the competition limits the power. The firm's target is to capture as much value as it can so as to continue operating. The power that the firm exercises in the value chain may come from either the customers that it has (market dominance) or by the large number of suppliers.

This study will attempt to fill this gap in the relevant literature. There are definitely similarities in the practices the companies have developed but the differences that give a distinctive competitive advantage should be studied to obtain meaningful insights.

2 THE FUNCTION OF PROCUREMENT & SOURCING

2.1 Definition

The Procurement and Sourcing function has been used until now interchangeably by the practioners and academicians to refer to the buying process of an organization. In this context, it is implied that the focus is more operational than tactic or even strategic. However, Procurement is the integrated functions within an organization that are necessary to identify a need and specifying the commercial requirements, search, select and agree with the appropriate supplier base, accept the material and/or services, evaluate the performance of the supplier and initiate the payment of the supplier. That said, the Sourcing and Procurement function includes all the material needed for the production, the services as well as the materials needed for the administrative backup of the operations.

As stated before, this set of processes has to be aligned with the general strategy of the company so as to better match the internal logic of the strategy to the external environment. The sourcing and procurement function has interrelations with the warehousing and inventory management function as well as with the transportation function. This is closely related to the holistic approach organizations are following, trying to optimize not each process in isolation but contrary to that trying to "globally" optimize profits with respect to each independent function.

Summing up the processes, Supply Management captures the strategic level to which procurement and sourcing decisions are taken identifying a need, indicating the requirements to fulfill the need which implicitly refers to soliciting with the engineering

departments, identifying potential suppliers and soliciting bids and proposals, evaluating bids and proposals, awarding contracts or purchase orders, tracking delivery progress and ensuring compliance, taking delivery, inspecting and inventorying the deliverable, and paying the supplier.

2.2 Size and Scope of Procurement & Sourcing

One of the most important, yet not realized, cost centers in a company is the procurement department. Leenders et.al. (2006) estimate that the private and public organizations in North America collectively spend over US$ 18 Trillion. This fact has major implications in the financial stability of the firm. Industry experts[4] estimate the supply spending to be between 50% and 80% of the revenues.

From that, it can be easily deduced that the Procurement department is a major contributor to the corporate spending. Furthermore, it is very important to mention that fluctuation in spending has an immediate effect in the financial reports of the firm.

Obviously, the amount spent for procuring varies from industry to industry depending on the specifics of each technology and each business model. However, rationalization is the only way of immediate improvements. This improvement has effect on either the profits or in the Return on Assets (see Appendix A-1).

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[4] Based on interviews conducted during this research.

2.3 Objectives of Procurement

Sourcing & Procurement is all about bringing in the company the right products, in the right quantities, in the right time and in the right place. Having this in mind, the goals include the following:

a. Provide a continuous flow of materials. One of the most important issues in the modern production systems is that any downtime is expensive. Especially if it is unscheduled and due to shortages of raw material, it is even more expensive. Stockouts, late deliveries and shortages due to supplier inefficiency all contribute to the increase of production cost. The continuity of inflow also implies steady and without frictions relationships among the company departments.

b. Improve the competitive advantage. Sourcing effectively can definitely contribute to the cost structure of the firm. Furthermore, being a good player in the global sourcing market (especially for commodities like oil, rubber and the like) increases the capabilities and the learning and experience curves.

c. Achieve and sustain high quality of inbound flow. Achieving a certain level of quality for the inbound material is critical for two reasons. The first is cost related, since it is imperative to get what you have paid for and agreed upon. Second, any shortcoming in the quality might jeopardize the steady production. Towards this also helps identifying the best suppliers. Finding the best suppliers is critical to the quality of the inbound flow.

d. Standardize – modularize components and/or material. Modern production and business models have moved towards standardization of the materials and requirements.

This has a benefit to the forecasting and it also helps to agree on the product specifications.

e. Purchase the materials. The most critical function of procurement is the purchase of the materials. It is very important not only to find the right suppliers for the necessary items but also to buy those products in the least possible cost.

2.4 Focus of the Study

This study focuses on a specific set of products the Sourcing and Procurement departments are dealing with. More specifically, it tries to understand the practices that the studied companies are using relative to the inbound flow of all the material that are used in the production. It will focus neither on the services nor on the side material that companies purchase. The reason for that is that these products represent a small percent in the overall purchasing activity of the department. So when this study refers to products it implies and has in mind those that are used to be transformed and become sellable products of the companies. This is also called direct spending, i.e. all the materials that go into the end product, and contrasts the indirect spending which includes all the products/goods that are necessary to run the organization.

2.5 Organizational Structures

Sourcing and Procurement has a distinct place in the organizational structure of a given company. In order to achieve the highest return though a successful should have the authority to make decisions as well as the knowledge to make such decisions. As the size of the organization grows, so does the complexity of the processes the supply department has to deal with.

2.5.1 Small and Medium Sized Companies

In small and medium sized organizations the procurement and sourcing is delegated to the supply chain management department. It is a secondary responsibility, since most of the companies focus more on the production itself and to the side activities. The activities performed in those organizations are more operational and definitely in most cases they lack the strategic context. What those companies are trying to achieve with similar structures is to match the constraint knowledge the executive have with the necessary flexibility.

The issue for selecting a smaller organization is also an outcome of the smaller size of the organization in general. The main activity that the procurement group performs is the contracting with the suppliers and basically the day-to-day ordering of materials. In some cases the group is trying to hedge so as to profit from the fluctuations in the materials prices but this tends to be the exception rather than the rule.

This study doesn't focus on this type of companies. The primary objective is to understand the practices of large organizations with complex problems and to capture the interrelationships between various departments.

2.5.2 Large Firms

Large firms tend to face many problems that have adverse implications in different departments. Furthermore, the scope being bigger, the large firms have a larger scale of problems to tackle. One of the most prominent issues is the organizational structure the firms are following. There is increased debate over centralized and decentralized models.

Centralized organizational structures are those where the authority, responsibility and the decision making is taken in a single place from a designated group of people. This location generally is in the corporate headquarters or in a nearby location. On the other hand, in decentralized models the authority is dispersed throughout the business units and the geographic locations. The next table summarizes the main advantages of both centralized and decentralized structures.

	Advantages	Disadvantages
Centralized	Strategic Focus	Lack of Business Unit Focus
	Specialization	Less cost assignment focus / visibility
	Better Talent	Long decision making line
	Coordination and control	Un-flexible organization
	Effective & Efficient Planning	Distance from end users
	Proximity to Top Decision Makers	Aggregation adverse effects
	Critical Ordering / Purchasing Mass	Complicated coordination
	Firm Recognition	
Decentralized	Easier coordination with operational department	More difficult communication with headquarters
	Expedited & competitive response	Discourages central planning
	Flexible use of local resources	Local orientation / no global optimization
	Business Unit Autonomy	Maverick buying
	Report line simplicity	Limited expertise
		No standardization / modularization

Table 3 - Potential Advantages of Centralized / Decentralized organizations (Adapted from Global Practices, Price Waterhouse Coopers, http://www.globalbestpractices.com)

As will be analyzed later in this study, a different structure emerges from these two models. Many organizations are moving towards hybrid structures, where they can leverage the advantages from both structures. The term hybrid has many different extends and it is up to the company to decide what decisions are delegated to its decentralized groups and/or departments.

2.6 Business Processes – Activities

The focus of the organizations is to have a robust and resilient process that ensures the continuous production of the firm. This has immediate implications to the supply management activities, since the objective of the company is to optimize all the critical aspects of this process. A critical issue often overlooked is the communication between the key agents in the supply process as well as achieving consensus among the different stakeholders within the firm. It is common to exist friction among the operations department which might need expedited delivery to sustain steady production, the transportation department that is unable to meet this deadline and the finance department that is reluctant to pay the premium. Cases like that often occur as a result of the increased complexity mentioned earlier.

In order to understand the processes that are necessary in sourcing and procuring, it is imperative to understand where Sourcing and Procurement fits in the Supply Chain. As Figure 2 suggests, sourcing and procuring is one of the four essential elements in the production process. Furthermore, it is also closely related with the planning phase as well as with the production phase.

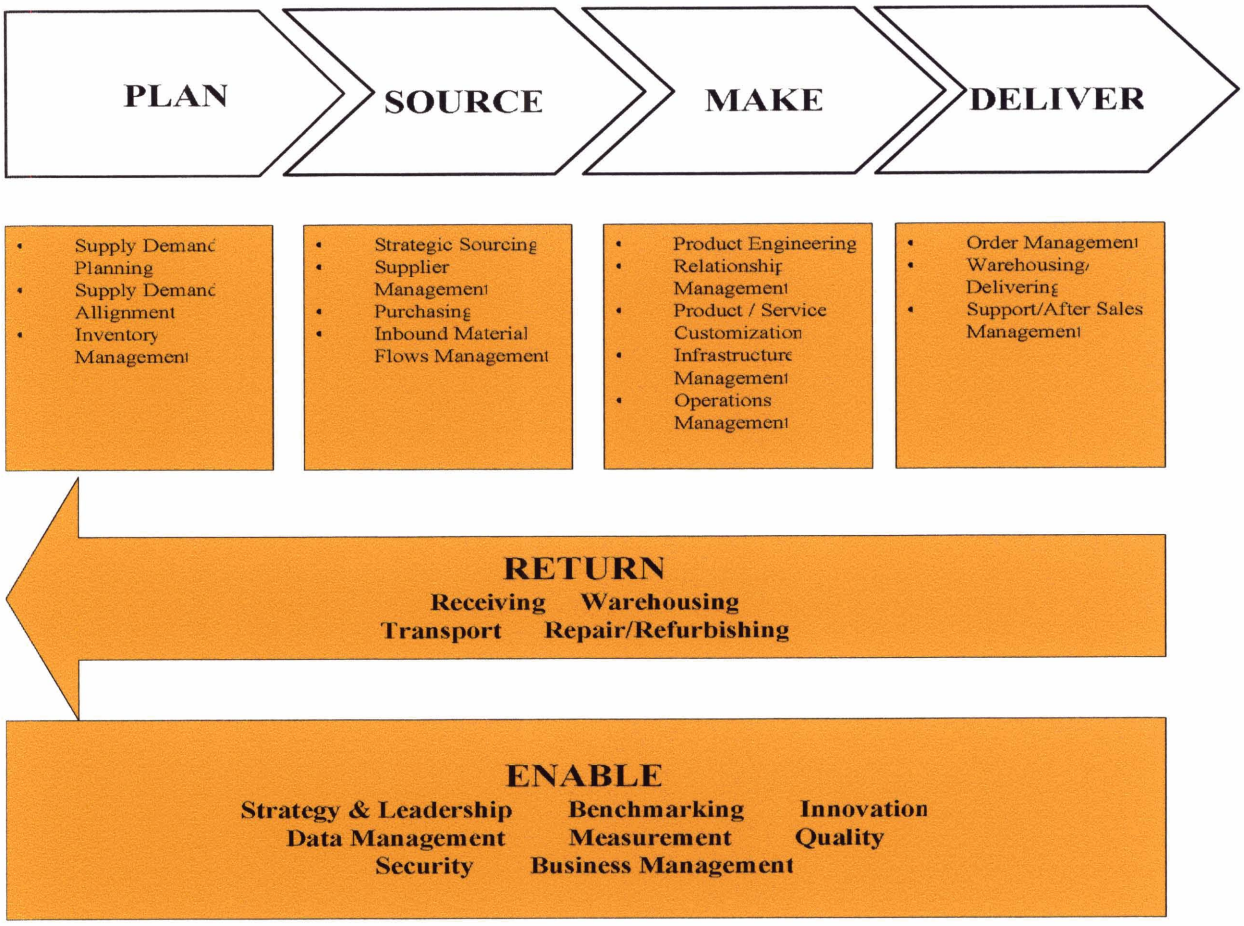

Figure 2 - Sourcing & Procurement role in Supply chain (Adapted from CSCMP 2005 San Diego Conference Handouts)

Relative to the sourcing and procurement activities, Leenders et.al. (2006) classify them into the following areas:

2.6.1 Recognition of need

The first step in acquiring goods in order to initiate production is the recognition of the need. This usually takes place in the operations department of the firm (buyer) where the products are used. Depending on the company policies, the recognition is well in advance or it may be close to the ending of the stock. The latter practice also helps

when there is price volatility and the company can plan ahead so as to take advantage of any hedging opportunities.

2.6.2 Description of Need

The next critical step in the sourcing process is the description of the need. Even when the product is fairly commoditized, there are a lot of characteristics that have to be explicitly defined so as to achieve the quality and the usability of the product. Hence, there has to be an accurate description of what product fits the need. It goes without saying that for more complex systems, the description is essential for the production. The description of the need is solely dependent on the production/cost/profit center of the company that will be the end user of the goods. In describing the need, some companies have very specific procedures (and/or manuals) that accompany the order and ensure that the product will be exactly what they want.

Two issues that arise in this phase are the electronic means to communicate the description of the need and the supplier involvement. Many companies are trying to expedite the lag between identifying the need and describing it within the company itself and with the suppliers. Furthermore, supplier involvement also ensures the accuracy of the understanding of the requested material and it pushes upstream the research and development efforts. Both those issues will be further analyzed in the next chapters of this study.

2.6.3 Identification of Supply sources

Next in the sourcing process comes the identification of potential supply sources. This is not a trivial subject, because the number of potential suppliers has an immediate

effect on the negotiation power of the firm. This step includes not only the localization of the suppliers but also the probability of an effective and efficient relationship.

The identification starts with the issuance of an RFx. RFx stands for Request for Proposal (RFP), Request for Quotation (RFQ), Request for Bid (RFB), Request for Intention (RFI). Typically the RFQ is released when the company has a crystal clear idea of the products that it requests. Often this is the type of supplier identification, when there is some kind of prior relationship with the supplier. The RFP is usually issued in those cases where the need is more complex and the firm wants to advantage from the supplier's expertise. As for the RFB, it involves a competitive bidding for a system that is to be developed from the supplier and the RFI is released in the engineering to order systems.

2.6.4 Supplier selection

This stage involves the grading of the supplier quotations/proposals. The company has to have a clear set of metrics against which it qualifies the suppliers. Typically, cost is among the most important characteristics, especially in commoditized products. However, with the emergence of differentiation strategies and with the attempt of the firms to fill into niche markets, a set of more elaborate criteria has to be used.

2.6.5 Ordering

The company has to be very careful when ordering, because a contractual agreement is the basis of dispute resolution. The company (buyer) usually prepares the contractual agreement with the supplier and then places the order for the agreed quantity.

Depending on the bureaucratic extend of the organization, the order and/or agreement has to be approved by a certain decision making line.

2.6.6 Receipt of goods

After the order is released and the supplier has sent the goods, the buyer has to acknowledge receipt of the goods. The importance of this stage is in that the firm accepts the goods and releases the supplier from any further obligations. Receiving includes

- Confirmation of arrival of the ordered items
- Inspection of the items (condition, quantity,...)
- Place the quantity to the production center
- Initiate the administrative documentation to be sent to the department

Usually, the reason d' entré of this stage is to ensure against quantity and quality shortages, so as to hold accountable the supplier and resolve this discrepancy.

2.6.7 Administrative work

The administrative work includes all the necessary documentation that relates with the previous stages of the procurement process as well as the initiation of the payment to the supplier. Each firm has its own payment procedures and the practices vary by location, culture, legal framework and the like. However, typically the department sends all the required material to the accounting department to continue on with the payment. Lastly, this stage includes the maintenance of the records of the company for future reference. By the term records, we imply not only the formal agreements and the correspondence but also the specifications and the description of the need.

2.6.8 Relationship management

The last stage of a typical procurement process is the handling of the relationships with the suppliers. It is very important for the firm to have a strong basis for a supplier relationship so as to know when to depend on them or not. Furthermore, the Japanese practice (especially in the automotive industry) is to let your suppliers grow with you.

Lastly a sample sourcing and procurement flowchart is presented in Figure 3.

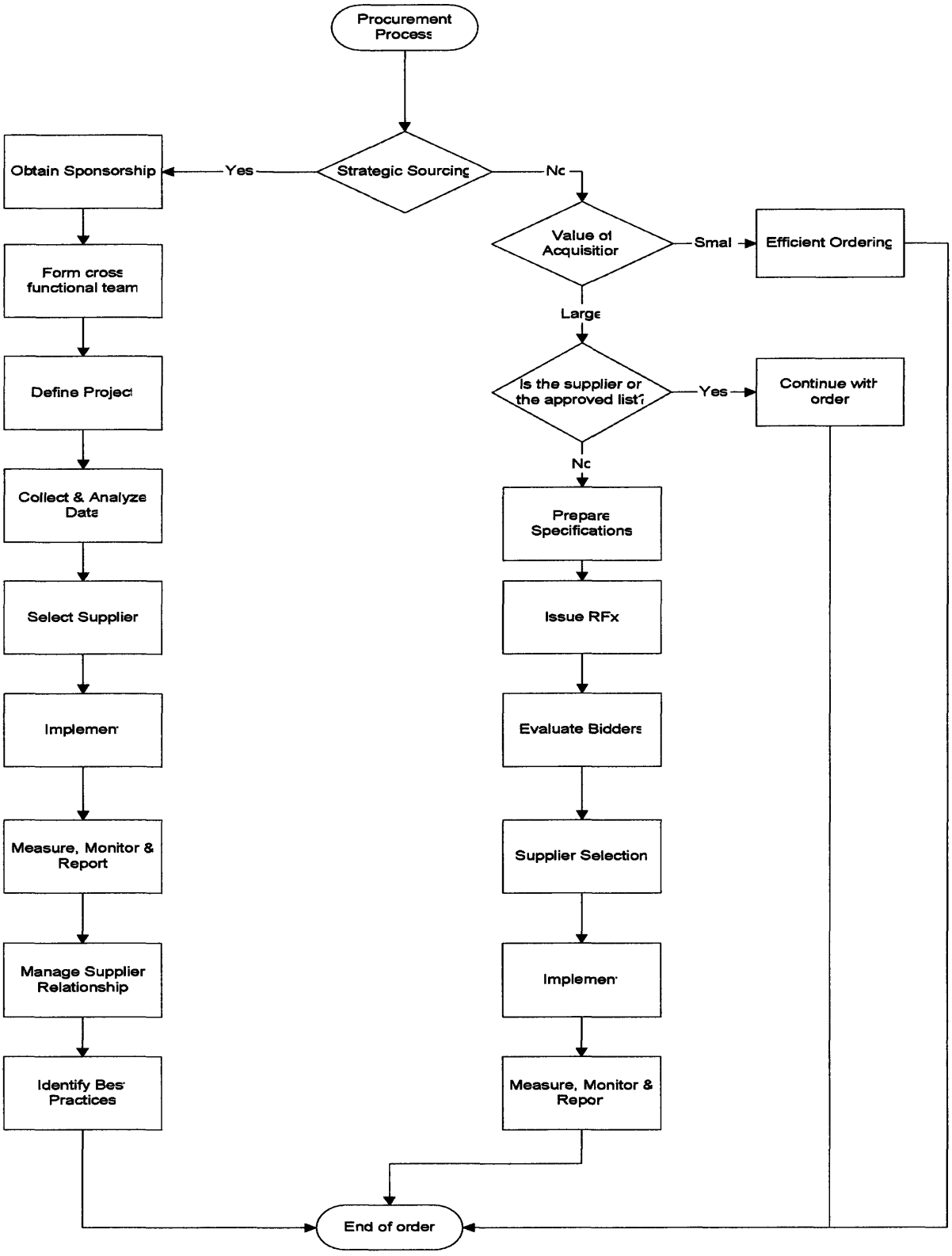

Figure 3 - A sample Procurement & Supply Process (Adapted from: Leenders et.al. 2006)

2.7 Information Technologies

As implied by the previous, sharing information among the various stakeholders is critical. Lenders et.al. (2006) classify the systems according to the level of information they offer. In the strategic level Executive Support Systems (ESS) enable the top executives make decisions. In the managerial level, Management Information Systems (MIS) and Decision Support Systems (DSS) provide that level of information. In the tactical level Knowledge Work Systems (KWS) and Office Automation Systems (OAS) assist daily decisions and lastly in the operational level Transaction Processing Systems (TPS) are used.

The use of Information Technology can help the company in many ways. The expedition of transactions, the continuous flow of information and the seamless data exchange offer important benefits among them:

- Cost reduction and improvement in the efficiency by streamlining the purchasing process
- Improved and efficient access in data and better/speedier decision making
- Speedier communication among stakeholders
- Less time spent on irrelevant/unnecessary processes
- Improved information accuracy
- Integration of knowledge – One Big Firm-wide Knowledge Base
- Better control over spending, more visibility

As for the technologies that are used, there is a big selection from various technologies that offer different improvements. Facsimile machines, e-mails and simple devices/systems that allow communication between remote users are some of the more trivial levers. However, large companies have been more willing to introduce more elaborate remote communication means. Extensible Markup Language (XML) is among them and an attempt of the academic and business world to provide a unified computer language that can connect different systems. Furthermore, e-Marketplaces are a means to release an RFx to a much wider audience and improve the possibilities for lower cost. Lastly, a lot of academics and practitioners have developed cutting edge analytic tools like reverse auctions and the like that take advantage of the buyer power and reduce the quoted prices.

2.8 Issues in selecting suppliers

Although each company has its own scope and vision which translate in different goals in the sourcing and procurement practices, it can be safely said that there are some common issues in selecting their suppliers. The following table presents the business, technical, legal and management issues that arise when selecting a supplier.

Business	Business goals and objectives
	Business/technology forecasting
	The engagement team
	Scope definition
	Facilities, assets and agreements
	Human resources issues
	Contract, project and change management
	Intellectual property issues
	Confidentiality, security and audit rights
	Service levels, performance and business requirements
	Consequences of termination rights

Technical	Technology goals and objectives
	Technology competitive advantage
	Scope of work
	Management of assets and agreements
	Personnel skills, training and resources
	Technology planning
	Service levels and performance standards
	Contract, project and change management
	Software, hardware, systems and services required
	Confidentiality and security
Legal	Background information - goals and objectives of the transaction
	Term of agreement
	Scope of work
	Changes/new work
	Additional work
	Facilities, assets and agreements
	Personnel
	Key vendor and company personnel
	Technology planning
	Right to use third parties
	Constructive termination
	Service levels and performance standards
	Contract, project and change management
	Subcontracting and assignment
	Software and intellectual property
	Confidentiality, security and audit rights
	Charges and payments
	Representations, warranties and covenants
	Dispute resolution
	General provisions
Management	Management goals and objectives
	Technology forecasting
	The team
	Defining the scope of work
	Facilities, assets and agreements
	Human resources issues
	Service levels, performance standards and performance credits
	Contract, project and change management
	Intellectual property rights, responsibilities and value
	Confidentiality, security and audit rights
	Consequences of termination options

Table 4 - Issues in Selecting Suppliers

2.9 Towards a generic Procurement Model

From the previous short analysis we can say that Procurement is a top down process for a firm. The level of decision making is not only operational as it has been treated until now but also tactical and strategic. In the following figure, the three organizational levels at which decisions are taken are presented. Furthermore, this model's contribution is in that it covers in a generic approach what decisions are taken in each level in the company. However, due to the complexity that is in each organization as well as the inherent differences among the organizations, it is difficult to provide a global model for the various decisions.

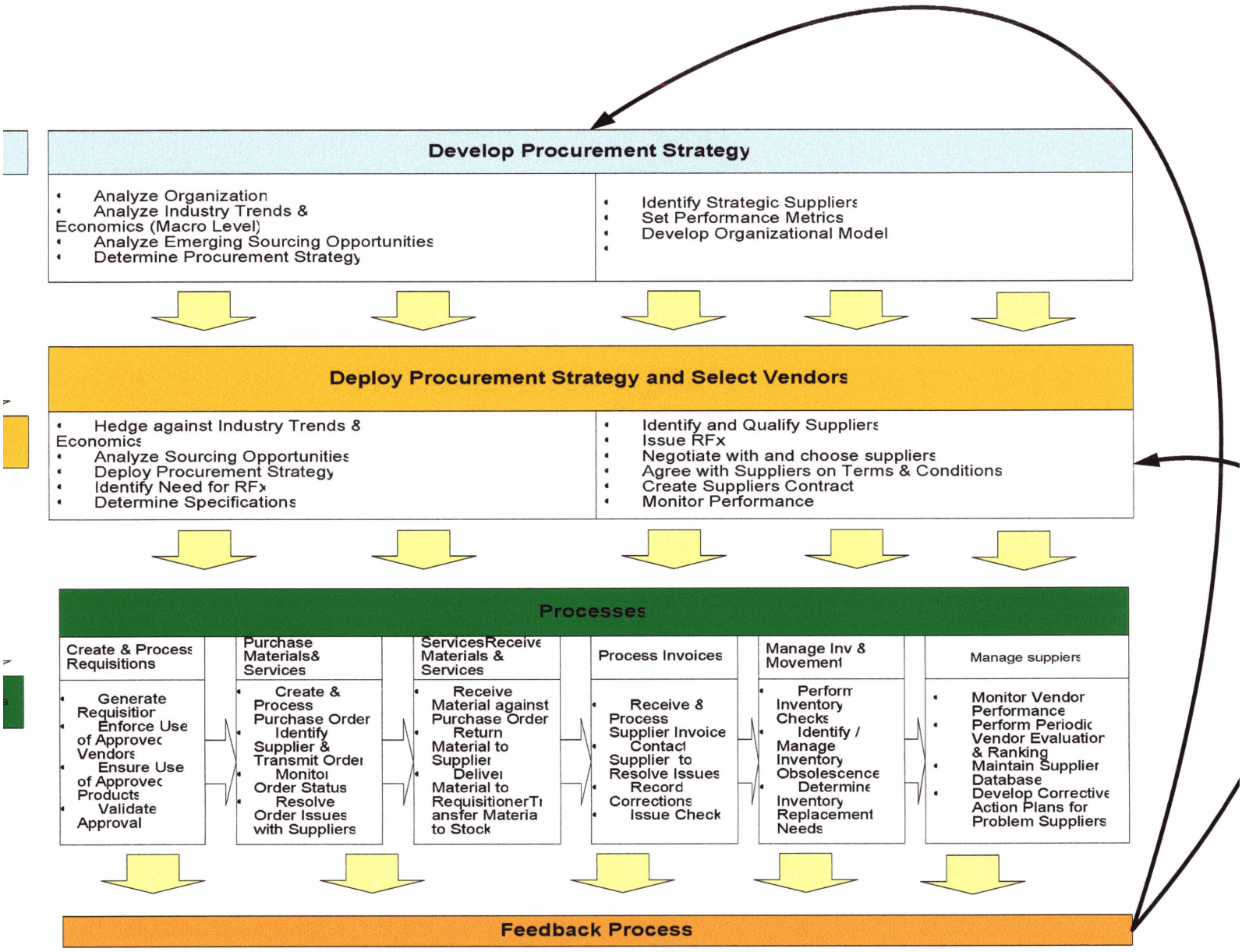

Figure 4 - A Generic Procurement Model (Adapted from CSCMP San Diego 05 Conference Handouts)

3 OVERVIEW OF THE 9 INDUSTRIES

3.1 The Aerospace Industry

3.1.1 Definition

By "aerospace industry" we define the companies that manufacture systems for the air and space transportation. The aerospace industry has three main sectors (Tiwari, 2005), aerostructures, engines and equipment and three product segments, aircraft, missiles and space. (A more detailed profile of the industry is in section A.2i, pp 138)

3.1.2 Aerospace Industry Supply Chain

The Aerospace industry is heavily concentrated into few players, among them Boeing and Airbus. Upstream in the supply chain a large number of geographically dispersed suppliers support their operations. These suppliers include General Electric Aircraft Engines (GEAE), Rolls-Royce, Honeywell and Pratt & Whitney for engines, avionics and generally complex systems. They are referred to as Tier-1 suppliers, since they are important to the operations of the incumbents. Further upstream, there are the tier 2 and tier 3 suppliers who provide fairly commoditized products. Collaboration and/or competition is not unusual in the suppliers. One of the challenges in the Aerospace industry is the improvement in the efficiency of the supply chain. Shrinking profits necessitate the rationalization of the supply chain and lean thinking is becoming the predominant approach in delivering value.

Figure 5 shows the structure of the aerospace supply chain.

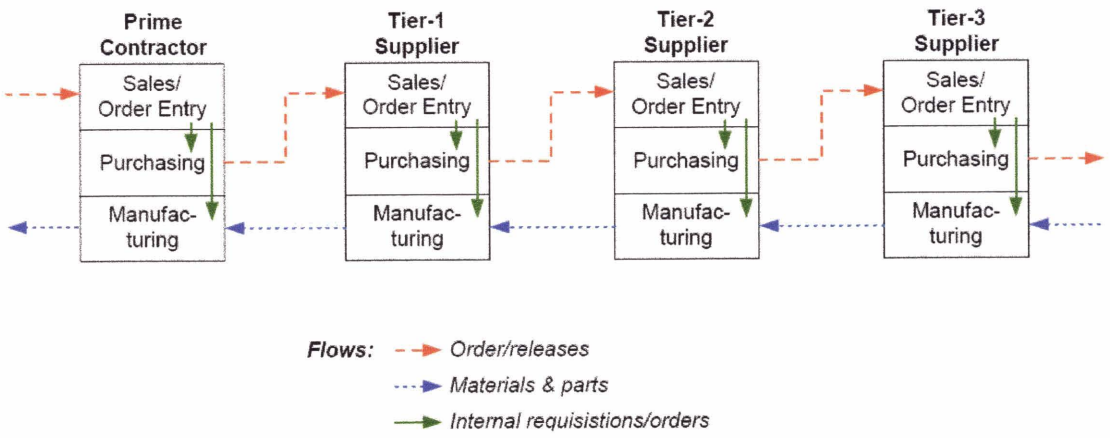

Figure 5 The Aerospace Supply Chain (Tiwari, 2005)

3.2 Apparel / Footwear

3.2.1 Definition

The apparel / footwear industry belongs to the Retail industry and is defined[5] as the set of companies that retail men's, women's, and/or children's clothing and accessories. As such, apparel companies assume all the processes that are necessary in order to transform fabric into clothing, garments and footwear and to provide them to the consumer. (A more detailed profile of the industry is in section A.2ii, pp 139)

3.2.2 Apparel Industry Supply Chain

Figure 6 shows the apparel industry supply chain. We can see that this is a multi-segment industry.

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[5] http://premium.hoovers.com/subscribe/ind/factsheet.xhtml?HICID=1519

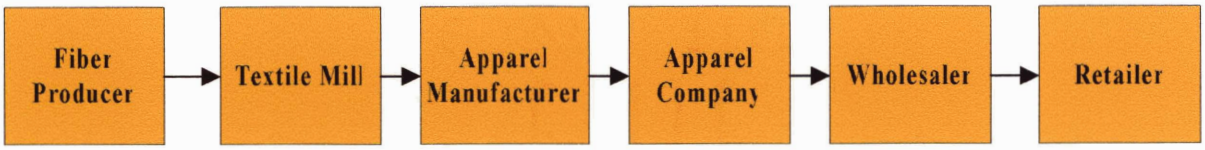

Figure 6 - The Apparel Industry Supply Chain

The agricultural and chemical suppliers provide natural or synthetic fibers, the raw material. The textile mill segment is highly fragmented with the majority of the firms being small – medium – sized enterprises, SMEs (Kumar, 2005). Apparel manufacturers own labor-intensive production, which is characterized of high flexibility and low cost of infrastructure, thus low barriers to entry exist. As an outcome many SMEs also exist. Finished apparel is sold then to wholesalers and/or to retailers.

As stated before, a lot of companies are trying to differentiate their product. In this context they have (Limited Brands being one among them, Kumar 2005) attempted to vertically integrate the segments of this supply chain. Generally, the incumbents as well as the new entrants are trying to differentiate as much as possible their products. This has an immediate effect on their supply chains since the have to be responsive in order to achieve the fashion / high life cycle element of the products, but also efficient to reduce costs and lead time.

Furthermore, the concentration that is observed in the market will also command improved efficiency in the supply chains. However, a side problem that arises is the capacity and the readiness of the supply chain to support spiked operations.

3.3 Automotive

3.3.1 Definition

Hoovers[6] define as automotive industry, all those companies engaging in manufacturing passenger cars, light trucks, and/or light commercial vehicles. As such, companies in the automotive industry perform all those processes, like production, assembly, marketing, research and development that are necessary to make a vehicle and offer it to the end customer. (A more detailed profile of the industry is in section A.2iii, pp 141)

3.3.2 Automotive Industry Supply Chain

The automotive industry supply chain has many echelons as presented in the following figure. Upstream in the supply chain are the raw material and parts suppliers which procure the 2nd tier suppliers. They in turn procure the 1st tier suppliers to produce more complex systems for the Original Equipment Manufacturers (OEMs). Another channel in this chain is the aftermarket channel which procures spare parts to the customers. Manufacturers have tiered the chain upstream to control it better and have a more stable relationship with fewer suppliers.

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[6] http://premium.hoovers.com/subscribe/ind/factsheet.xhtml?HICID=1019

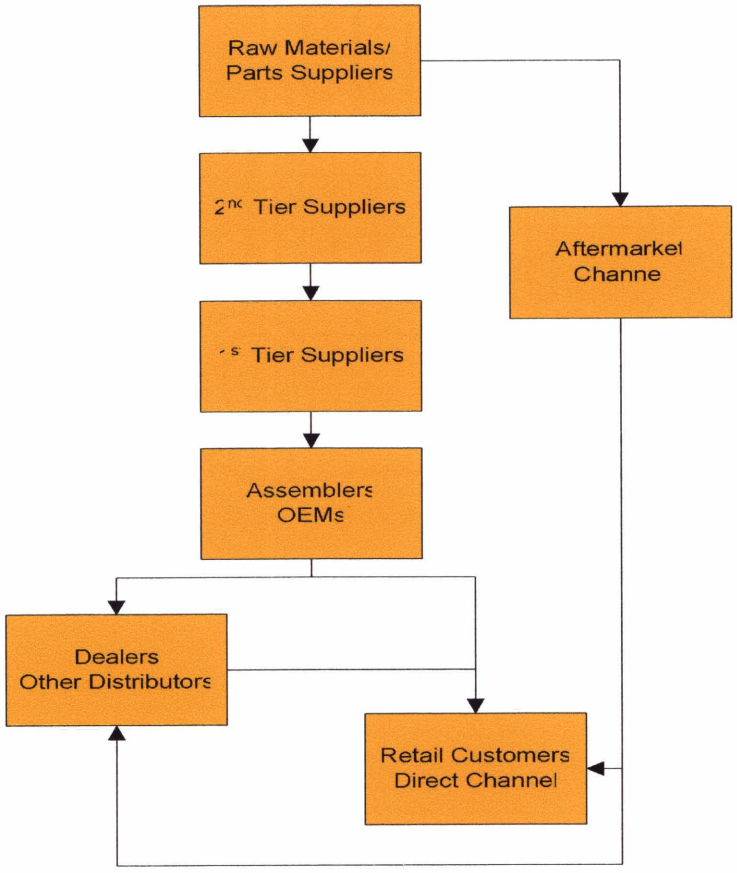

Figure 7 - The Automotive Supply Chain (Source: Braese, 2005)

3.4 Computers

3.4.1 Definition

The computer industry is defined as the set of the firms that manufacture and sell finished computers, but does not include the component manufacturers that supply the OEMs (Roy, 2005). The computer industry comprises three broad groups, the personal computers, the servers and the workstations. (A more detailed profile of the industry is in section A.2iv, pp 143)

3.4.2 Computer Industry Supply Chain

The Computer industry supply chain is presented in Figure 8 .

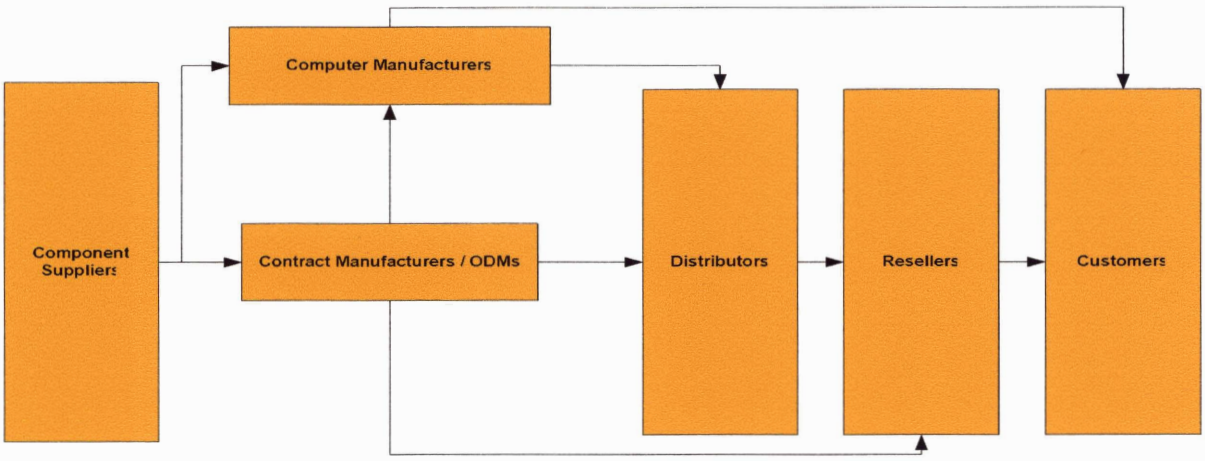

Figure 8 - The Computer Industry Supply Chain (Adapted from Dedrick, 2002)

The computer industry consists of computer and component manufacturers. IBM, Dell and HP are mostly computer manufacturers. Some vertical integration is also apparent in the industry (IBM produces some parts). The Computer manufacturers own the customer base, whereas the component manufacturers are focused on technology and development.

Another trend in the sector is the outsourcing initiative of the Computer manufacturers (OEMs). Under this initiative they give the production to contract manufacturers (mainly in low cost countries) who can better compete in cost than them. The shortening product lifecycle has also pushed the OEMs to outsource high-end services upstream the supply chain to their component manufacturers or downstream, to their distributors.

3.5 Telecommunications Equipment

3.5.1 Definition

The Telecommunications equipment industry is considered[7] to be all the firms that design, manufacture, market, and distribute equipment for long-distance, local, and corporate telecommunications networks. The telecommunications started out from a group of telegraph companies in 1856 and has evolved to become a provider of data, voice, video transfer services. (A more detailed profile of the industry is in section A.2v, pp 146)

3.5.2 Telecommunications Equipment Industry Supply Chain

The telecommunications equipment industry appears to have a similar supply chain to that of the computer industry. This is reasonable, considering the specific characteristics of the product and especially the life cycle. The industry consists of component manufacturers which provide the telecommunication equipment companies (among them Cisco and Lucent) parts that are assembled to more complex systems. Those systems are then marketed through both direct channels as well as from traditional channels. Additionally, there seems to exist an aftersales market. The incumbents (mostly the leaders) are adopting a virtual company model, which has led into the emergence of contract manufacturers that assume manufacturing from the telecommunications companies.

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[7] http://premium.hoovers.com/subscribe/ind/factsheet.xhtml?HICID=1565

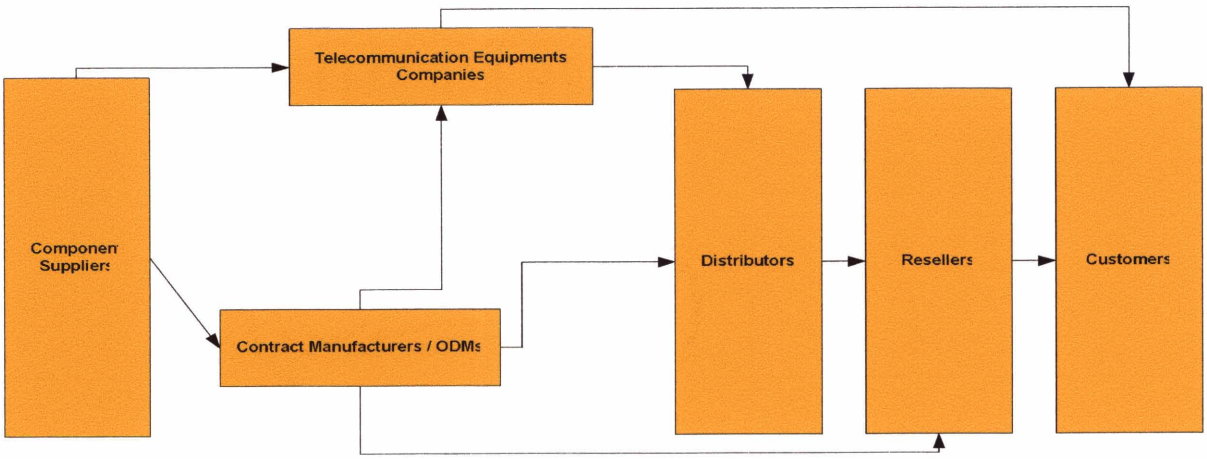

Figure 9 - The Telecommunications Equipment Supply Chain (adapted from Boasson, 2005)

3.6 Consumer Packaged Goods

3.6.1 Definition

The Consumer Packaged Goods Industry includes the companies whose products include Food and Beverage, Footwear and Apparel, Cleaning Products, Consumer Electronics, and Personal Care Products (Rah, 2005). The industry includes nondurable household goods, household products and personal care products, household cleaning substances, laundry detergents and additives, room deodorizers, storage bags, garbage bags, paper plates, cat litter, hair care products, color cosmetics, fragrances, skin care, deodorants, oral care, shaving preparations, sun care products, nail products, and hair colorants. (A more detailed profile of the industry is in section A.2vi, pp 148)

3.6.2 CPG Industry Supply Chain

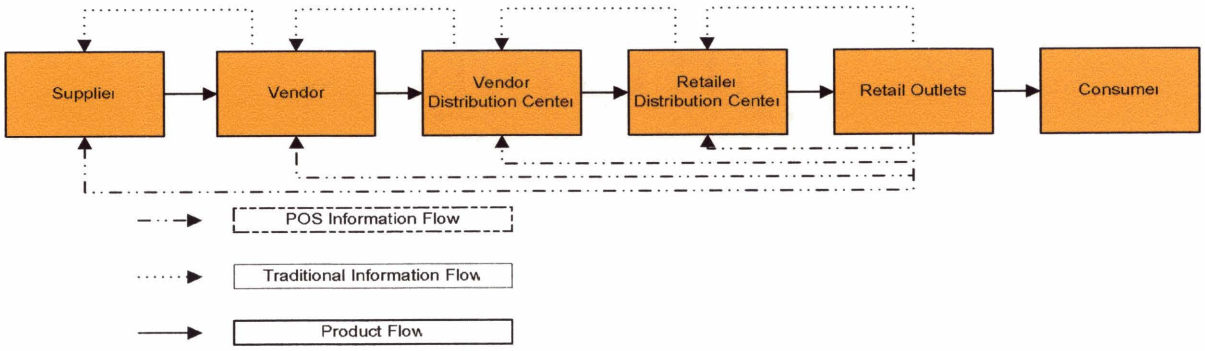

Figure 10 - CPG Supply Chain (Rah, 2005)

Consumer packaged goods are sold through wholesalers, mass merchandisers, grocery stores, membership club stores, and drug stores. Traditional channels are competing discounters and direct sales which are increasing in turnaround. The CPG Supply chain consists of suppliers, vendors, retailers, distribution centers and the end consumers. Typically, CPGs are made-to-forecast and held as inventory until an order is placed. After the initiation of the order, the products are shipped to the customers' distribution centers or directly to the retailers' stores. The companies follow a Safety Stock Inventory Model: once a safety level is hit, production commences.

Currently, the challenge is to provide accurate data throughout the supply chain so as to coordinate production and remove the bull-whip effect.

3.7 Pharmaceuticals Industry

3.7.1 Definition

Hoovers define[8] the Pharmaceuticals Industry as the companies that research, develop, produce, and sell chemical or biological substances for medical or veterinary use. The products include prescription, generic and OTC drugs, vitamins and nutritional supplements, drug delivery systems and diagnostic substances, related products, equipment and lastly services, including distribution and wholesale. (A more detailed profile of the industry is in section A.2vii pp 151)

3.7.2 Pharmaceutical Industry Supply Chain

The pharmaceutical industry is unique in that it operates two very different types of supply chains at all times (Singh, 2005); one that supports the drug development and another one that markets drugs. The capabilities required for each one are obviously very different. The first demands a quick completion of the clinical trials to obtain a quick approval whereas the second requires meeting sales targets.

The Trial Supply Chain is difficult to manage since none can predict the exact amount of resources to be used. Supply chain responsiveness is critical since buffering and stock piling is not an option due to shelf life limitations and cost concerns.

On the other hand, the Pharmaceutical Supply Chain demands availability so as to achieve high replenishment rate. The complexity of the pharmaceutical supply chain rises

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[8] http://premium.hoovers.com/subscribe/ind/factsheet.xhtml?HICID=1486

from the involvement of multiple large independent organizations with diverse objectives (Singh, 2005). In its generic form, the supply chain comprises from government agencies, hospitals, clinics, drug manufacturers, drug distributors, pharmacy chains, retailers, research organizations, and the FDA. It is important to mention that the public authorities regulate this industry, something that increases complexity.

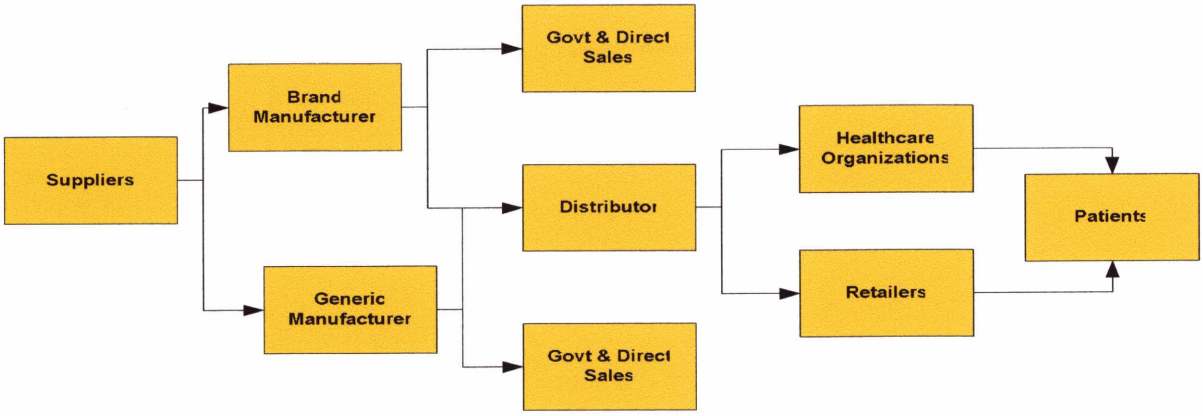

Figure 11 - The Pharmaceutical Supply Chain (Singh, 2005)

3.8 Petroleum Industry

3.8.1 Definition

The Petroleum industry belongs to the Energy and Utilities industry which comprises companies that provide energy products, including crude oil, natural gas, and refined petroleum; utility services, including the generation of electricity, the transmission and distribution of electricity, natural gas, and water; and/or the marketing

and trading of energy commodities (Hoovers' Definition[9]). As such, petroleum companies are concerned with crude oil, petroleum, oil and their sub-products. (A more detailed profile of the industry is in section A.2viii, pp 153)

3.8.2 Petroleum Industry Supply Chain

Figure 12 depicts the petroleum industry in a generic form. It includes the agents that operate in it in addition to some of the logistical activities performed.

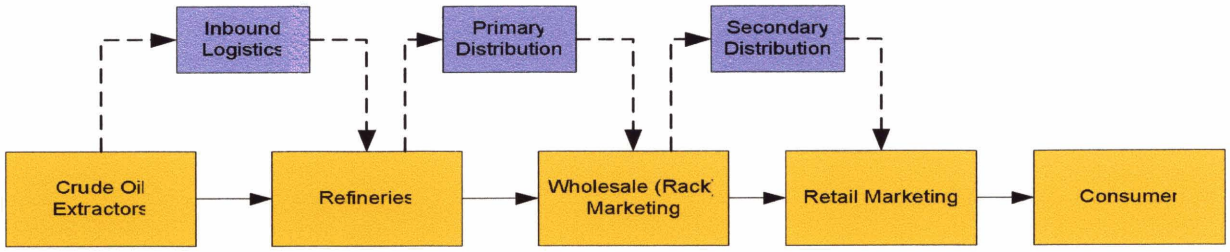

Figure 12 - The Petroleum Industry Supply Chain (Source: Rogers, 2005)

The petroleum industry serves basically two types of customers, i.e. Wholesale customers (which include petrochemical facilities, power plants and big fuel consumers) as well as retail customers. Other agents in the supply chain include the suppliers of crude oil, the refineries, the wholesale and retail marketing and distribution companies and finally the consumers.

3.9 Retail

3.9.1 Definition

Hoovers define[10] the retail industry as the companies that sell consumer goods such as apparel, footwear, food, home furnishings, building supplies, books and videos,

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[9] http://premium.hoovers.com/subscribe/ind/factsheet.xhtml?HICID=1258

toys, housewares, pools and spas as well as other items. The selling means include stores, catalog and internet. (A more detailed profile of the industry is in section A.2ix, pp 155138)

3.9.2 Retail Industry Supply Chain

The Retail industry Supply chain is the same as the CPG Supply Chain. Figure 13 presents the generic retail supply chain.

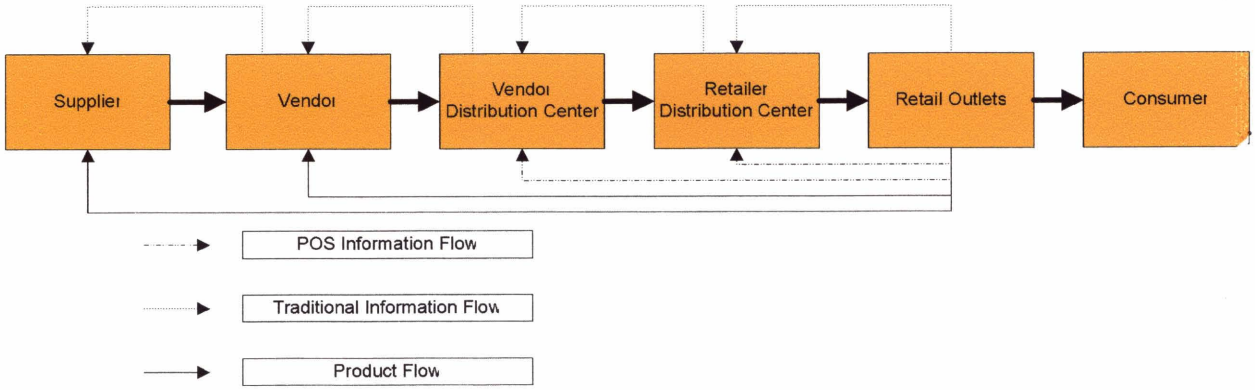

Figure 13 - Retail Industry Supply Chain (Source: Chiles & Dau, 2005)

Retail supply chains vary in complexity whereas the model varies in the number of manufacturers, vendors, distribution centers, and retail locations. As presented in the generic model, a retail supply chain consists of vendors that supply various products, distribution centers that receive the products and retail outlets. The incumbents use different operational models as for the targeted customers and the practices that use for the inventory storage, handling and dispatching.

[10] http://premium.hoovers.com/subscribe/ind/factsheet.xhtml?HICID=1518

4 CROSS – INDUSTRY ANALYSIS

In the following pages, the study is devoted in analyzing the practices that some of the thought leader companies are using relative to their Procurement and Sourcing. It is commonplace to suggest that each company tries to use different practices than the rest of the competition so as to achieve a greater competitive advantage. As stated before, this function has started being professionally studied and all incumbents are trying to pay the necessary attention to the levers/tools that can be used both in the operational and in the tactical and strategic level to reduce the cost structure and/or improve quality.

4.1 Introduction

The first step to understand the practices that offer a distinctive competitive advantage to the best companies is to devise a framework that compares the practices industry-wide. The value of this framework is the simplicity of its approach as well as because it includes the main practices that are commonly used by the industry leaders. Although the firms use different systems and different tools (relative to each case's specifics), the study attempted to categorize the different applications and group them into similar practices.

The logic of the framework is to incorporate the basic analysis of PIE + 4 Slices (Saloner et.al. 2001) which adds up to Porter's Five Forces Model, so as to understand the internal and external environment and attempt to link the Procurement and Sourcing practices with the specific characteristics of the industry and the product. This process is difficult in that the participating companies don't have cognitive procurement practices

and the causality between improved cost structure and explicit organizational models and analytic tools is ambiguous.

4.2 Value Creation vs Value Capturing

Saloner et.al. (2001) present an approach which separates creating from capturing value, in other words understanding the industry dynamics. The idea behind this approach is that the incumbents could only capture as much value as the potential industry earnings in a value chain which are affected by the demand, the opportunity cost and substitutes, compliments regarding the value creation. Relative to the value capturing, this approach examines the buyer and supplier power (upstream or downstream division of value), competition and barriers to entry. The PIE +4 framework holds a central position in analyzing an industry. It tests how the internal characteristics of the market fit into the external environment and furthermore, how the incumbents and the agents affect the dynamics. The following two figures enclose the different levers that shape the industry dynamics.

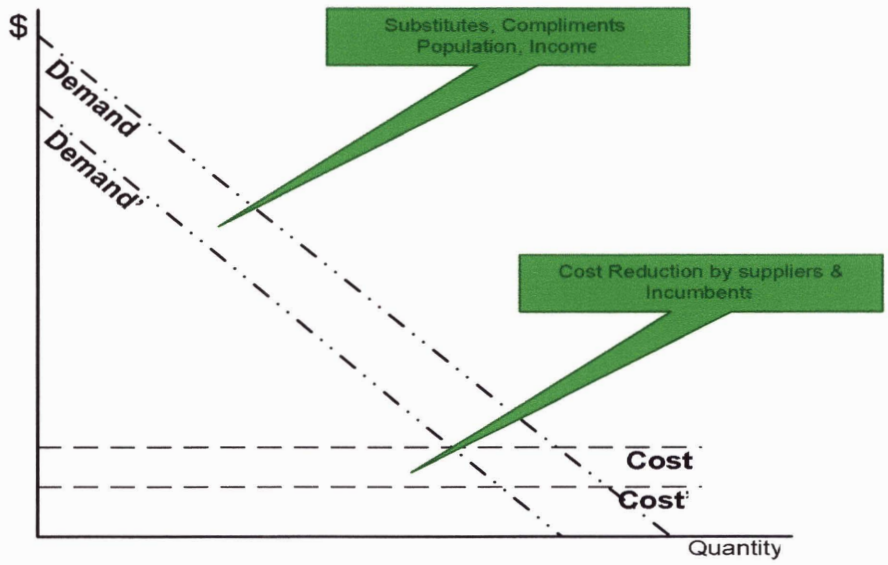

Figure 14 - Potential Industry Earnings (Source: Saloner et.al. 2001)

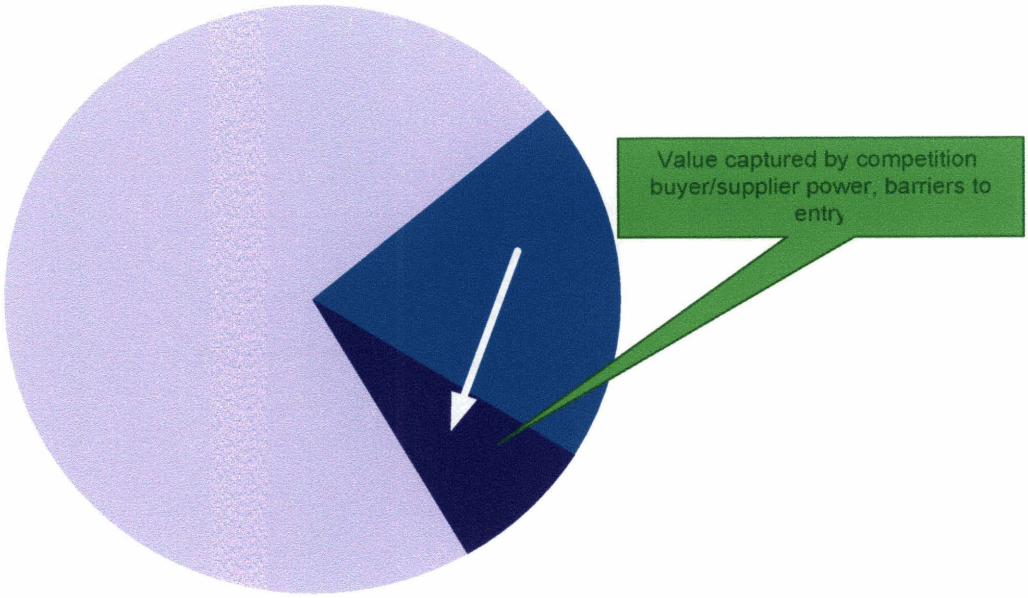

Figure 15 - Value Capture (Source: Saloner et.al. 2001)

The previous theoretical background is of value to this study because it enables us to understand what influences the vertical interrelationships in the industry. More specifically, the power that the suppliers have will be somehow exerted to the buyers so as to capture more value in that industry or if the buyers are more powerful, they will try to exercise their power on the suppliers.

4.3 Comparison Framework

The following section describes the framework that is used to compare the different practices across the nine industries. This comparison framework follows the previous analysis. It consists of the internal and external dimension and of the structure of the procurement organization. Each dimension has a set of values that are analyzed. Considerable effort was drawn in analyzing the different firms. As well understood, most of the firms are either competing in more than one industries or carrying products with different characteristics. Wal*Mart for example offers both canned soup and television

sets. These products are different and this study addresses this issue by choosing the product that is more closely related to the company's image. This is important to distinct, since most if the companies select different supply chains and different procurement practices for products with different characteristics. This is also logical and is exactly what this research is trying to capture: how different characteristics of the products match with the current supply practices.

Table 5 presents the comparison framework that was devised for this analysis. The dimensions that are analyzed are grouped into three types, namely internal, external and procurement practice.

	Dimensions	Values
Internal	**Inputs**	▪ Raw Materials ▪ Finished Goods ▪ WIP/Components
	Switching Costs	▪ Low ▪ Medium ▪ High
	life Cycle of Input	▪ Extended ▪ Brief ▪ Perishable
	Life Cycle of Product	▪ Extended ▪ Brief ▪ Perishable
External	**Number of Buyers**	▪ Large ▪ Small
	Bargaining power of suppliers	▪ High ▪ Medium ▪ Low / None
	Number of Suppliers in the Market	▪ Large ▪ Small
Procurement Structure	**Number of Suppliers Per Input/Product Line**	▪ Single ▪ Dual ▪ Multi
	Supplier Relationships	▪ Arms-Length ▪ Collaborative ▪ Spot market
	Segmentation	▪ Tierization ▪ Geographical ▪ Cost ▪ Performance
	Buyer Strategy	▪ Cost Leadership ▪ Differentiator ▪ Focus
	IT	▪ Yes ▪ No
	Organizational Structure	▪ Centralized ▪ De-Centralized

Table 5 - Comparison framework

4.3.1 Internal Dimension

The internal dimension of this framework addresses the characteristics that the firm has as well as the product characteristics. More specifically it consists of the following.

- *Inputs* or the goods that are bought from the company in order to transform them or include them in them in the production process so as to create sellable products. The values for the inputs are:
    - Raw Materials which are first extracted and/or harvested from the earth and divided into a transportable form. For example raw materials are water, cotton, cloths, steel. We can easily deduce that raw materials are fairly commoditized goods.
    - Work in Process/Components (WIP) are those products that are used in the production process in order to further transform raw materials and/or to be further transformed to produce Finished Goods.
    - Finished Goods are those products that are ready for consumption. Although this is a rather ambiguous definition, it is used here because it implies that the consumption benefits somehow the user (including the work in process), Finished Goods (FG) are meant to be ready for the end consumer in the value/supply chain.
- *Switching Cost*s are the costs that are associated with changing to another supplier. This element has an immediate cost, that of searching for new suppliers and qualifying them but also indirect costs that include the costs related with

training the supplier and reaching the relationship to a desired level. The values for this dimension are Low/Medium/High. Generally it is more difficult to change a supplier with whom the company has close relationship and share information and proprietary knowledge.

- *Life Cycle of the Input and of the Product* refer to the length the goods/products will be marketed from their conception to the final removal from the self. The values are Extended/Brief/Perishable.

4.3.2 External Dimension

The external dimension of this framework studies the business environment in which the company operates. It is comprised from:

- *Number of Buyers* with values Large /Small. This dimension implicitly tests the buyer power in the industry. A large number of buyers tends to alleviate the power the firms have in contrast to a small number which in accordance to the size of the buyer concludes much power.
- *The Number of Suppliers in the Market,* tests how many suppliers are in the market. Its values are Large/Small.
- *Bargaining power of suppliers:* with values High/Medium/Low-None.

4.3.3 Procurement Organization

The final element of this framework is the Procurement and Sourcing Organization itself. This is the assessment element of the framework that attempts to link

the logic of the strategy with the product characteristics and the external environment. Its dimensions are the following:

- *Number of Suppliers Per Input/Product Line.* It focuses on the number of suppliers the buyer has for each input and/or product. This is consulted from industry experts. The values it takes are Single/Dual/Multi.
- *Supplier Relationships* describe the type of the relationship the firm has established. It's values are Collaborative/Arms-Length/Spot market. The spot market relationship stands for no relationship whatsoever. Arms length represents the relationship where the supplier has typical relationship with his suppliers. Collaborative relationship is defined as the close affiliation that the buyer has with his suppliers and the integration up to a certain extent of the operations. More analysis on this topic goes beyond the scope of this analysis, however Lambert et.al. (1996) have studied this field more in depth.
- *Segmentation* refers to the partitioning of the supplier base in smaller groups relative to the Geographical/Cost /Performance/Tierization characteristics each one has. This process has nothing to do with the number of suppliers the company does business but with how it qualifies its suppliers.
- *The Buyer Strategy element* refers to the strategy the company has selected to pursue in its industry/market. The elements are Cost Leadership / Differentiator / Focus. The cost leadership strategy emphasizes in efficiency. By producing high volumes of standardized products, the firm takes advantage of economies of scale and experience curve effects. Market share advantage or preferential access to raw materials, components, labor, or some other important input are essential for this

strategy. Differentiation strategy is all about providing a product that is perceived as unique. The uniqueness is translated to superior value for the customer and is related with low price elasticity products. This also provides protection from competition. Lastly, in the focus strategy the firm concentrates on a select few target markets so as to better meet the needs of that target market. This strategy is all about effectiveness rather than efficiency.

- *Information Technology* represents the use of high technology hardware and/software. This dimension intends to represent all the means that help either expedite decision making and/or communications. As stated before, having better information quicker is very important to gaining a competitive advantage in the current fast paced economic context. The values for this are Yes/No.

- *Organizational Structure* is where the decision making takes place. Currently companies have either Centralized or De-Centralized structures. In the former case, the decisions regarding procurement and the selection are taken in a central place, usually the Corporate Headquarters. The latter case stands for the cases that Business Units or corporate satellites have complete freedom to select not only when to purchase but also from where to purchase. Table 3 presented the benefits and shortcoming of both structures. In lieu of this reality, companies are now adapting and moving towards hybrid models so as to capture more benefits. For example the centralized organization selects the suppliers and exercises power derived from larger quantities and gives the flexibility to the decentralized organizations when to buy and from which specific supplier.

4.4 Comparison of different practices

The following part of this research is devoted to identifying the different practices across the 9 industries and comparing them. More precisely, Table 6, Table 7 and Table 8 summarize the findings of this framework from the participating companies.

		COMPANIES					
		Wal*Mart	Metro	Amazon	Novartis	Boeing	Rolls Royce
	Dimensions						
Internal	Inputs	FG (Canned Food)	FG (Canned Food)	FG (books)	Raw Material	Wip/ Components (engines)	Wip/ Components (engines)
	Switching Costs	Medium	Medium	High	Low	High	High
	Life Cycle of Input	Brief	Brief	Extended	Extended	Extended	Extended
	Life Cycle of Product	Brief	Brief	Extended	Medium	Extended	Extended
External	Number of Buyers	Large	Large	Medium	Small	Small	Small
	Bargaining power of suppliers	Low	Low	Medium	None	Medium	Medium
	Number of Suppliers in the Market	Large	Large	Small	Large	Medium	Large
Procurement Structure	Number of Suppliers Per Input/Product Line	Multi	Multi	Multi	Multi	Multi	Multi
	Supplier Relationships	Collaborative	Collaborative	Collaborative	Arms Length	Collaborative	Collaborative
	Segmentation	Geo / Cost	Geo / Cost	Cost	Cost	Tierization	Tierization
	Buyer Strategy	Cost	Cost	Cost	Focus	Differentiator	Focus
	IT	Y	Y	Y	Y	Y	Y
	Organizational Structure	Hybrid (Operational)	Hybrid – (Operational)	Central	Decentralized	Centralized	Centralized

Table 6 - Comparison Framework I

		COMPANIES					
		ExxonMobile	Shell	Limited	Zara	INBEV	DIAGEO
	Dimensions						
Internal	Inputs	RM	RM	RM	RM	RM	RM
	Switching Costs	Low	Low	Low	Low	Low	Low
	Life Cycle of Input	Extended	Extended	Extended	Extended	Extended	Extended
	Life Cycle of Product	Extended	Extended	Brief	Brief	Medium	Extended
External	Number of Buyers	Medium	Medium	Large	Large	Small	Large
	Bargaining power of suppliers	High	High	Low	Low	Medium	Medium
	Number of Suppliers in the Market	Medium	Low	Large	Large	Medium	Medium
Procurement Structure	Number of Suppliers Per Input/Product Line	Multi	Multi	Multi	Multi	Multi	Multi
	Supplier Relationships	Spot	Spot	Collaborative	Collaborative	Collaborative	Collaborative
	Segmentation	None	None	Geo / Capabilities / Cost /Performance	Geo/Cost	Cost/performance	Tierization
	Buyer Strategy	Cost	Cost	Cost	Differentiator	Differentiator	Differentiator
	IT	Y	Y	Y	Y	Y	Y
	Organizational Structure	Centralized	Centralized	Centralized	Centralized	Decentralized	Decentralized

Table 7 - Comparison Framework II

		COMPANIES						
		CISCO	Lucent	GM	Toyota	Dell	IBM	Gillette
	Dimensions							
Internal	Inputs	FG	FG	Wip/Components	Wip/Components	WIP	WIP	RM
	Switching Costs	High	High	Medium	High	Medium	Medium	Medium
	Life Cycle of Input	Small	Small	Medium	Medium	Low	Low	Extended
	Life Cycle of Product	Small	Small	Medium	Medium	Low	Low	Extended
External	Number of Buyers	Medium	Medium	Medium	Medium	Medium	Medium	Large
	Bargaining power of suppliers	Medium	Medium	Medium	Large	Medium	Medium	Small
	Number of Suppliers in the Market	Medium	Medium	Large	Large	Large	Large	Large
Procurement Structure	Number of Suppliers Per Input/Product Line	Multi (4)	Multi	Multi	Multi	Multi	Multi	Multi
	Supplier Relationships	Collaborative	Collaborative	Close	Close / Collaborative	Collaborative	Collaborative	Collaborative
	Segmentation	Cost/Capacity	Cost/Diversity/ Quality/Capabilities	Tierization/ Cost	Cost/Cap/Tier	Cost	Differentiator	Cost/Geo
	Buyer Strategy	Differentiator	Differentiator	Differentiator	Cost	Cost	Differentiator	Differentiator
	IT	Y	Y	Y	Y	Y	Y	Y
	Organizational Structure	Centralized	Centralized	Centralized	Hybrid (Strategic)	Centralized	Centralized	Centralized

Table 8 - Comparison Framework III

4.4.1 Aerospace

In the aerospace industry, two are the key practices for the Supply Management. The incumbents are trying to improve efficiency and effectiveness of their supply chains and this comes through the supplier management. This study focused on the Work in Process and the components and more precisely on the engines (complex sub-systems) as for the inputs. Because of the capital intensity, the companies are trying to push upstream

the Research and Development and the Inventory Control so as to be more flexible in the various business cycles in addition to reducing the development risk. The complexity of the inputs has also driven companies to segment their suppliers (tierization) so as to distinct the important ones and improve the relationship with them. The small number of suppliers and the criticality of the inputs have demanded channel collaboration. Last but not least, both the studied firms have centralized architectures for their procurement groups.

The following sections (4.4.1.1 and 4.4.1.2) present the main procurement practices the Boeing and Rolls – Royce have and Table 6 (pp 66) presents the data for these two firms.

4.4.1.1 Boeing

For the purposes of this study, Boeing's supplier base is considered to be those companies that supply complex systems. Such systems are aerostructures, avionics and engines (WIP/Engines). The aerostructures have separate supply chains and are integrated into the aircraft after the main components of the aircraft are assembled. Boeing contracts out a portion of its aerostructures needs. The qualified suppliers have adequate capital, design, manufacturing expertise, labor force and are government approved to produce these parts or subassemblies. The aerostructures suppliers together with the large commercial aircraft manufacturers comprise one of three supplier tier-systems in the aircraft segment, the other two being engines and avionics. The upstream suppliers sell integrated and complex assemblies to the aircraft manufacturers at high prices due to the bargaining power they have (derived from Barriers To Entry and specifically from

knowledge barriers). Lower tier suppliers either sell simpler sub-assemblies or parts or serve as a supplier to the higher-tier suppliers.

Switching costs for Boeing are relatively high due to the costs that relate to developing the relationship and integrating operations. Additionally we have to consider that the life cycle of the input and of the end product are both high since most airplanes are operational for more than 20 years. Boeing has substantial avionics manufacturing capacity (primarily to use it as a bargaining tool to reduce supplier power). A distinctive issue is that the suppliers are bidding for business from Boeing as well as its competitor Airbus. This is an attempt to bypass the Duopoly Power, but the size and the scope if this industry doesn't leave much margin, in addition to the medium number of suppliers in the market which reduces their power.

The low cost sourcing trend has also affected this industry and many suppliers along with the incumbents are trying to find their way through low cost countries, mainly in Eastern Europe and South East Asia. Boeing exercises this policy to obtain an advantage from better technology in Asia along with access to Asian national airlines in exchange for outsourced manufacturing for the aircrafts.

Relative to the engines Boeing sources these products from four suppliers, namely Rolls-Royce, Pratt & Whitney, CFMI and General Electric (Cizmeci, 2005). Also in the engine supply there are significant barriers to entry which increase the supplier power. As for the Avionics, Boeing has substantial avionics manufacturing capabilities which considers among its competitive advantages and uses as a negotiations lever. Boeing engineers 50% of the avionics on its commercial aircraft, while the remaining 50% is provided by customer selected suppliers (Cizmeci, 2005).

The Sourcing and Procurement Processes Boeing uses can be characterized innovative. The LESAT (Lean Enterprise Self Assessment Tool) is a tool developed by the MIT - Lean Aerospace Initiative to facilitate the transformation to lean management. The importance of this framework as translated to the supply management is the understanding of the long-term sustainability, the acquisition of competitive advantage and the satisfaction of stakeholders. This framework is a value centric one and as such, the selection of the suppliers as well as the relationship that the company has affects its overall result[11].

Lastly, lean manufacturing practices drive the supplier selection criteria and operational flexibility and efficiency are mandatory for the supplier. However, the functions and assemblies that Boeing considers core competencies are performed inhouse. The process of sourcing comprises of a budget for the component followed by the supplier working with Boeing to design the component to exact specifications within the given budget. All these distinctive characteristics give Boeing the flexibility to adapt to business cycles and avoid unnecessary capital expenditure but for the core functions.

4.4.1.2 Rolls Royce

Rolls-Royce's distinctive sourcing characteristics are two: first it has a global supplier base and second it shares this supply base with its competition. Rolls Royce doesn't have dedicated suppliers although the supplier base has been reduced and is expected to reach 30 Tier 1 suppliers (Tiwari, 2005). Royce collaborates with its primary

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[11] For more information: Lean Enterprise Self-Assessment Tool (Lesat) V. 1.0 August 2001. MIT-LAI. http://lean.mit.edu/blind/products/lesat/PRD_LESAT_tool.pdf

suppliers to finance and together co-develop new products. The suppliers invest capital in Research and Development (human and working capital) which benefits Rolls Royce twofold, by reducing the investment and by reducing the critical development time.

Relative to Procurement, this research focuses in the WIP/Engines. Rolls-Royce categorizes items depending on their value as A, B or C items. C-class items (less than US$100 of value) are outsourced (Tiwari, 2005). Furthermore, Rolls-Royce has developed Exostar, an online portal, to reduce ordering time and improve efficiency. Moving processes into the electronic age is a primary target for Rolls – Royce because it ultimately provides real-time visibility to all stakeholders. Additionally, Rolls Royce uses SAP as a backbone system to run the supply processes.

As a closing remark, by establishing a Supplier Council, Rolls Royce forges management level relationships and invites and shares suggestions for supply chain improvements. This is an effort to reduce costs, complexity and improve supply chain efficiency.

4.4.2 Apparel/ Footwear

In the apparel industry the dominant practice is to centrally direct sourcing so as to better use the buyer power that the two studied firms have. The companies attempt to capitalize on the power differential in the value chain and set up the business terms. There is a large number of suppliers in the industry and this reduces their negotiations power and respectively increases the buyer power (along with the barriers to entry that the buyers have set through exclusive ownership of the distribution channels).

Additionally, both firms segment their suppliers based not only on cost but also on their capabilities to provide the requested quality as well as new products. Another common characteristic is the use of IT not only to better forecast but mainly to expedite the communication between suppliers and the buyers. This is critical considering the life cycle of their products and the impact miscommunication might have on the revenue stream. Although the input is Raw Material (cloths and fabrics) which in many cases has extended life cycle, the products have a very brief life cycle. Table 7 (pp 67) presents the aggregated data for the two firms, Limited and Zara.

4.4.2.1 Limited Brands

Limited Brands has a distinctive characteristic relative to its sourcing and procurement practice. It owns a separate organization, called MAST which handles 80% of the merchandise. It is easily understood that Limited follows a centralized organizational structure. Mast is an active part of Limited and its CEO is also the Senior Vice President of Production and Sourcing for Limited Brands. Mast also acts as an independent business unit on behalf of external companies. The sourcing is carried in the strategic level has four elements. The process is initiated by the business units (brands), in consideration of the corporate strategy. The group considers various events so as to provide resilient plans at an operational level. Then the primary suppliers are selected and lastly the worldwide trade situation is considered to provide any hedge opportunities.

This industry has a special characteristic, that of high volatility and uncertainty in demand. Mast develops strategic plans from sales forecasts and allocates manufacturing to different factories. This is an effort made cross functionally within the firm. Mast also has the operational overview of the production and decides upon the critical path.

Furthermore, Mast constantly explores opportunities to achieve lower cost in different countries. This takes place not only for all the products but also for sub-products. Limited builds collaborative relations with its suppliers. Manufacturing of finished intimate apparel is typically multiple sourced, fabrics are dual sourced, and raw materials are single sourced within one geographical site (Kumar 2005).

Limited segments its suppliers based on their capabilities as either Launch / No-Launch suppliers depending on their experience, their technological and innovation capabilities and their speed (Kumar 2005). Limited has a multiple sourcing practice for finished goods in order to better react to uncertainty and quantity differences. Another characteristic is the 4-week replenishment cycle that Limited demands (Kumar 2005).

Relative to the geographic segmentation, Mast identifies China and Sri Lanka as important long term players, and India as a strategic backup location for Sri Lankan production (Kumar 2005). Mast has three levels of cooperation based on the volume, primary with 90-100% capacity utilization, secondary with 50% utilization and tertiary with 10-20% utilization (Kumar, 2005). Generally, Limited pursues a risk averse strategy by having a large supplier base and additionally achieves innovations by collaborating with more that one supplier. Lastly, regarding information technologies, Limited uses heavily information technologies to reduce communication time and to improve efficiency.

4.4.2.2 Zara

Zara has three different sourcing options, either makes the garments in house, outsources the production locally or outsources the production to a low cost region (Chu,

2005). This decision depends on the time sensitivity and price elasticity of each product. Usually critical items are outsourced to Asia due to longer life cycles. Zara sources its garments from more than 200 manufacturers in Portugal, Spain, North Africa and other parts of Europe (for shorter lead times). Inditex, which has assumed the logistics function, sources the products all over the world so as to achieve smaller lead times and take advantage of the seasonality as well as of the capabilities of the suppliers. The products with the smaller lead time are allocated to the Far East/South East Asia while the more fashionable items are allocated to closer/ local suppliers. Relative to the number of suppliers, Zara products are produced by 20 manufacturers (Chu 2005). By comprising the largest production share, Zara becomes critical for the supplier and this gives unique buyer power to Zara. This is also intensified by the large number of supplier in the industry and generally the intense competition among the incumbents.

Both the outsourced items and the internally manufactured ones have a similar characteristic. From the input point of view they are fairly commoditized and don't represent a critical product for the supply chain. Again for these items Zara sources the inputs mainly from Spain, Portugal, Italy, Germany, or Asia (Turkey, India, China).

One issue in procuring inputs is the postponement strategy Zara follows, which aggregates products and increases its buying power.

Zara collaborates closely with its partners and provides technology, logistics, and financial support. By this strategy it lets those companies grow along but also in a controllable way. Furthermore, it can take advantage of co-designing and co-developing garments and products and reducing the uncertainty and the risk.

Zara is heavily dependent in exchanging information and uses technology to ensure that departments and outlets around the world know what is needed and where. In addition to that, Zara also leverages technology not only to forecast demand and improve internal efficiency but also to improve external efficiency by exchanging information with its partners.

4.4.3 Automotive

In the automotive industry, the current trend is to centralize procurement so as to leverage the buyer power and achieve better prices and quality. However, the level of centralization varies between the companies with GM being heavily centralized and Toyota having mainly the strategic decision making centralized. Both GM and Toyota are heavily using IT so as to make leaner the function and improve communication between the various stakeholders.

The supplier relationship is collaborative and close. Although GM used another model during 90s, both of them now have very close relationship with their suppliers so as to take advantage of the knowledge of their suppliers and improve the development cycle time and the characteristics of their products. The main driver for selecting this model is the medium length of the input as well as the product and the long lead time in developing new products. Furthermore, due to the closer and lengthier relationship that Toyota has developed, it is more difficult for it to switch suppliers. Although both firms are operating in the same industry, Toyota's organizational architecture is more decentralized than GM's so as to be more flexible and capture better and faster the customer's quality perception. This is also a practice followed by British Airways with

some of its suppliers, e.g. seats suppliers, so as to extend the company's knowledge by incorporating the knowledge that its suppliers have.

Lastly, Table 8 (pp 68) presents the data for both Toyota and GM.

4.4.3.1 GM

The introduction of modularity into the automotive industry is forcing a change in this supply chain. The predominant trend is the consolidation of the suppliers so as to reduce complexity and decrease volatility. Towards this result is the attempt for channel collaboration not only in marginalization but especially in R&D co-development.

Relative to GM's Procurement Practices, these fall within the 360 Platform concept (Figure 16). Upstream in the value chain GM has its own metal fabrication and powertrain manufacturing operations. The more than 2000 remaining parts and modules are sourced from about 200-300 Tier 1 suppliers (Braese, 2005).

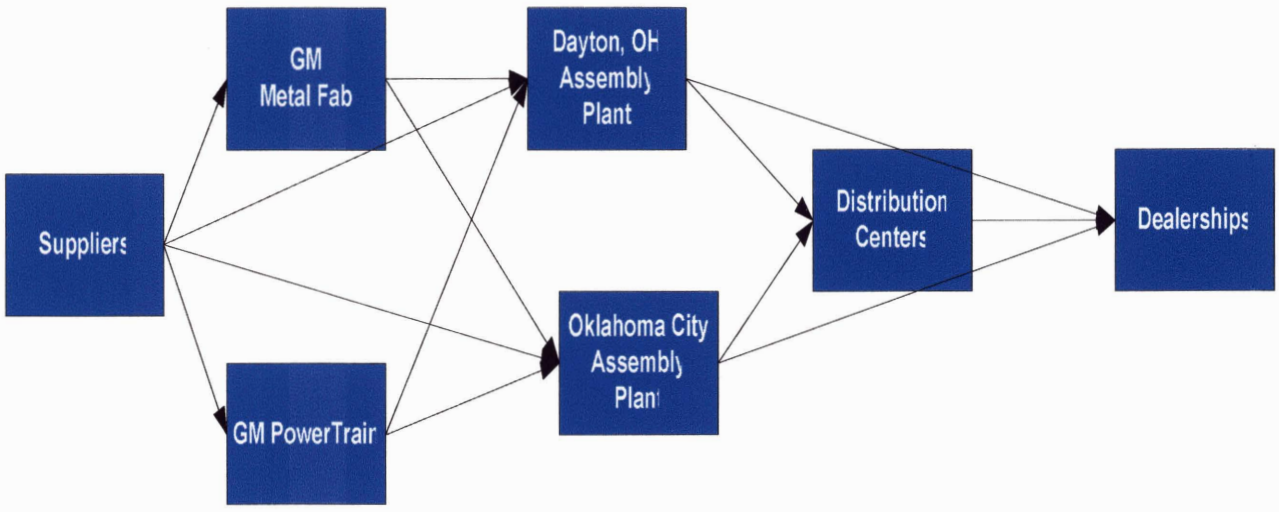

Figure 16 - GM's 360 Platform (Braese, 2005)

The Global Purchasing Organization at GM is responsible for selecting suppliers and has four qualification criteria. Moving forward into a just in time supply process GM has set accordingly the criteria, which are quality, service, technology, and price. Supplier efficiency is critical in the production, since every defect results in downtime of capital intensive equipment. After the Global Purchasing Organization has chosen a supplier or approved a part, the Supply Chain, Quality, and Engineering departments assess this decision before any business is commenced. Additionally suppliers are primarily segmented by commodity type and then by quality, service, technology, and price.

Regarding the supplier management practices, GM has performance measurements of its suppliers and the Advanced Quality Planning Process (APQP) indicates the terms of the relationship with each supplier (Braese, 2005). GM also has close ties with its suppliers so as to collaboratively develop parts. This relationship also involves risk management practices that measure the performance of its suppliers.

GM has also selected a centralized procurement organization. This organization provides the suppliers with short term forecasts for the operational scheduling and planning and with long term forecasts for capacity planning. Procurement is aligned with GM's vision (Braese, 2005) and is made at the Strategic level.

Relative to the Information Technology, GM uses Electronic Data Interchange (EDI) in the replenishment process. This practice reduces lead time and improves the efficiency of ordering as well as the cost of ordering. Furthermore, it gives full visibility over the suppliers' performance since it keeps detailed records. Additionally, IT also facilitates the auctioning process that GM has established for fairly commoditized products. Lately, GM has introduced a portal that integrates all the supply processes and

expedites the communication with the suppliers. Another important element is the inventory management. GM pushes upstream the inventory and demands from its suppliers to hold inventory which is drawn at GM's discretion.

Commenting on GM's manufacturing capacity, GM maintains part of production for two reasons. The first reason is because this gives GM a distinctive competitive advantage from leveraging its core competencies. Secondly, GM uses its production capabilities as negotiations leverage. Lastly, all plants use the Materials Global Organization (MGO) to break orders up into their bill-of-materials and to send out order signals to the suppliers. The supplier has to be able to accept these order signals and work with them.

4.4.3.2 Toyota

Toyota is the best example of close supplier collaboration. Toyota's strategy is to be close with its suppliers and to grow along with them. Toyota tries to jointly develop with its suppliers various parts and this is a result of the will to leverage the experience curves of its suppliers so as to offer better quality and improve the cost structure of its products.

Relative to the organizational structure of the procurement department, Toyota has a centralized system, which is responsible for the strategy as well as for the purchasing. The reason is twofold. First, Toyota leverages its buying power to achieve better pricing from the increased volume. The second reason is that Toyota has few suppliers and this central organization is better monitoring their performance and it develops better products.

Toyota is also trying to source from low cost countries with India being one of the targeted in this attempt. This is an outcome of the decreasing profit margins and the overall corporate strategy Toyota follows. Toyota's strategy is to be the cost leader in the market segments it serves. Lower than average cost products are critical components of this strategy.

Relative to the supplier segmentation, Toyota's practice is to divide them by tiers and then by cost/quality and the capabilities they have for research and development. Another issue is that Toyota has started collaborating with Tier 2 suppliers too. This comes from the understanding that they also present a critical role in the supply chain and their criticality reflects on the lean operation of Toyota manufacturing facilities. The criteria Toyota sets for selecting a supplier are four, namely Quality (defect rates, built in quality), cost, delivery, and technological capabilities. All those criteria are relevant to the Toyota's strategy to offer value to the consumers.

Last but not least, Toyota relies heavily to information technologies. IT helps the communication between Toyota and its suppliers by minimizing the time and reducing errors and it also helps Toyota to keep detailed records for the performance of its suppliers.

4.4.4 Computers

The computers industry is following the general trend of having very close relationships with the suppliers and to share information so as to reduce the bullwhip effect and improve the cost structure of the products. Both Dell and IBM consider the procurement to be strategic for their operations since it represents a high ratio to their

revenues. By using IT and collaborating with their suppliers they are trying to improve the communication, reduce cycle time and improve the costs.

Both IBM and Dell have very centralized departments. This is mainly attributed to the brief life cycle of the inputs and the products. Additionally, the volatility of the market and the uncertainty of demand oblige this type of department so as to better forecast, aggregate demand, consolidate buyer power and expedite decision making.

Table 8 (pp 68) presents these data for IBM and Dell and sections 4.4.4.1 and 4.4.4.2 describe the different cases.

4.4.4.1 Dell

Dell has a centralized procurement organization led by two Senior VPs and a Chief Procurement Officer. Dell has well understood the importance of procurement thus the decision making is initiated from the strategic level. In the strategic level, cross functional teams set the strategy of the firm. Usually the horizon is 3 to 5 years.

Dell chooses to collaborate closely with few suppliers. The top 20 suppliers comprise 75% of total dollar value of procurement (Roy, 2005). The relationship is very close, top-down hierarchical level relationship. The criteria Dell uses to select its suppliers are mainly technological capabilities, quality, cost and service.

Dell has a well defined process of sharing information not only within the various internal departments but also with its suppliers so as to facilitate improved planning. Dell requires its suppliers to place close their inventory facilities to Dell's facilities. Dell has suppliers for both standardized and non standardized products. For the standardized products, the suppliers may conduct business with Dell's competitors too. Dell

collaborates closely not only with the Tier 1 suppliers but also with Tier 2 suppliers so as to decrease uncertainty in its supply chain.

Interestingly, Dell has started postponing the location (facility) orders to until one week before delivery, something that will give more flexibility. Furthermore, due to the high volatility in demand, Dell has formed a group which deals with shortages. In case one appears, then this group's task is to come up with contingency plans.

Relative to the information technology, Dell uses IT to expedite communication between the various stakeholders so as to streamline its operations.

4.4.4.2 IBM

The Procurement organization is one of the four major groups in the Integrated Supply Chain Group along with Global Logistics, Manufacturing and Customer Fulfilment. It is a centralized organization and runs all of the spending processes. IBM has also a matrix organization with three teams besides those groups (Operations, Strategy and Talent team) that compliment the different subgroups of ISC. IBM has a geographically dispersed supplier base. Its 600 suppliers are located 212 different sites (Roy, 2005). IBM is also trying to improve its cost structure and procurement is one of the levers for this along with IT improvements.

IBM sources the standardized low cost, low technology and undifferentiated components to a few selectively chosen suppliers. IBM has long term collaborative relationships with these suppliers. Relative to the geographic location of IBM's suppliers, most of them are located in Asia mainly due to both the cost advantage and the technological capabilities that have been developed. A challenging issue in IBM's

procurement strategy is the requirement that the suppliers have to manage inventory close to IBM's manufacturing facilities at their own cost. IBM takes ownership of the inventory when it is used. Relative to the IT, the supplier's IT systems need to comply with IBM's systems and to be fully integrated.

The characteristics of the components drive IBM to have close and proprietary relationships with its suppliers and its collaborative relationships extend to co-development. For some of the more standardized components, IBM relies on less proprietary/close relationship. IBM tries to reduce the number of suppliers so as to have closer relationships. IBM focuses on a core set of suppliers so as to exercise buyer power and to develop long-term relationships. The segmentation IBM has chosen is based on geography, product characteristics (service, cost) and technology capability. Another differentiating practice IBM uses is the Power Matrix which characterises the buyer/supplier relationship

IBM also obliges its close suppliers to give open-book cost information. This helps IBM determine the margins for each of its suppliers. IBM integrates its processes and IT so as to streamline collaboration. With the open market suppliers, IBM usually requires only IT infrastructure integration to enable electronic procurement.

4.4.5 Communications Equipment

For the Communications Equipment industry, this study focuses on the sourcing of finished goods. Both firms have a centralized procurement organization were all decisions are taken. The only major difference between the two practices the companies have is the number of suppliers each one selects. Cisco has only 4 suppliers with which it

selects to do business whereas Lucent has a wider supplier base. This is mainly attributed to life cycle of the products and how those two firms define the extended enterprise. Cisco selects to co-develop all its products with its suppliers and for this to be successful both companies have to be fully aligned. By this, Cisco hopes to improve co-operation. As far as the power that the suppliers have in this industry, this is relative medium mainly because of the R&D capabilities that those suppliers have. Generally this is the reason, why both firms want to have a collaborative relationship with their suppliers, so as to benefit from their capabilities. Sections 4.4.5.1 (pp84) and 4.4.5.2 (pp 85) describe these practices, whereas Table 8 (pp 68) aggregates these data.

4.4.5.1 Cisco

Cisco runs a rather centralized procurement organization, although it can be characterized as of low flexibility, since every product is handled differently relative to the specific product manager. Cisco has only four procurement partners. As known, Cisco is not involved into production so it sources all manufacturing to these partners. In order to avoid critical conditions in its supply chain, Cisco chooses not to be the largest customer of these companies, usually occupying less than 40% of their capacity (Boasson, 2005). It has some buyer power from its strong R&D division which shares knowledge with the partnering companies.

Cisco's main supplier selection criteria are performance, price and technological capabilities. With the selected suppliers, Cisco develops very close and collaborative relationships so as to increase efficiency and improve product development.

Relative to the IT, Cisco has understood that the bottlenecks in the supply chain come mainly from inefficient communication and towards this improvement is the use of information technology. Furthermore, with the use IT Cisco can better monitor the performance of its suppliers.

4.4.5.2 Lucent

Lucent has a centralized procurement organization that controls all related functions. Lucent has moved forward into a virtual company, namely it doesn't have any production capacity. Similarly to Cisco, Lucent out-sources all production to its partner companies. In this context, Lucent follows a collaborative relationship strategy with its suppliers. This has also been achieved through a decrease in the number of suppliers over the years.

Relative to the IT use, Lucent relies heavily to information sharing. Lucent uses IT to exchange information as well as to publicize RFxs. Efficient communication expedites decision making which is critical to this industry, since the lifecycle of the products is brief.

4.4.6 Consumer Packaged Goods

The Consumer Packaged Goods (CPGs) industry as presented through Gillette and InBev seems to have mixed practices. InBev has a decentralized organizational architecture and so does its subsidiary Diageo. This is mainly attributed to corporate inertia, since it has been there from the merging of different companies that maintained their original practices. However, the small to medium supplier power and the extended life cycle of their inputs seem to support this practice since the companies are very agile

and can move fairly faster and respond to consumer demand variation. On the other hand, Gillette maintained a very centralized procurement organization, mainly because of the strong leadership position. Although the firms are different relative to their architecture, it is suggested a more centralized model relative the strategic decisions and more decentralized regarding the operational decisions so as to be able to consolidate buyer power but also to be flexible in their operational decisions. Both firms seem to have similar segmentation for the suppliers, since they base their decisions on cost, performance and geographical location.

Table 7 (pp 67) and Table 8 (pp 68) present the data for these companies and sections 4.4.6.1 (pp 86) and 4.4.6.2 (pp 87) describe these two practices.

4.4.6.1 Gillette

Gillette has a centralized procurement department which collects data on manufacturing, procurement, cost savings, and sourcing requirements, compares this with the volume and annual production requirements of the products and gives the purchasing orders. Gillette keeps in-house the products that require proprietary technology and outsources the rest. Gillette's practice is to regularly review any cost saving opportunities and cross functionally evaluate them. The procurement organizational structure draws expertise from various corporate knowledge centers, which makes the decision more elaborate and thus not so flexible.

The main criteria Gillette uses for supplier selection are quality and price/cost. Gillete also considers the capacity, technological capabilities, strategic positioning and future potential of its suppliers.

Another practice Gillette uses is that it tries to have full visibility upstream the supply chain so as to reduce uncertainty and to be able to set the profit margins for each chain node. Furthermore, Gillette tries to standardize as much as possible the parts of its products so as to improve the cost structure from this modularization.

Gillette attempts to reduce the number of suppliers so as to improve the relationships and the communication, leverage the buyer power and take advantage from the suppliers' learning, experience and technology curves. Additionally, Gillette now sources its products from the global marketplace. The new low cost country opportunities that have emerged give the chance of significantly reducing the cost. Lastly Gillette relies also on IT to improve communication between stakeholders and expedite ordering.

4.4.6.2 InBev

InBev has a decentralized organizational structure for its procurement department across its diversified business units. Although in the business unit level (for example AmBev) InBev's procurement decisions are well centralized, in the corporate level they lack central guidance. Almost all inputs are commodities and the availability and price are critical to the operations and cost structure of InBev. InBev has a significant buyer power due to the low switching costs from the commoditization of the inputs. However, there is to some extend loyalty to certain suppliers due to legacy and "secret recipes". In order to reduce risk of shortages from fluctuations, InBev has long term relationships with its suppliers.

Inbev sources its products at a regional level and not in a global level primarily due to lack of suppliers that can handle so large quantities. Furthermore, InBev wants to

gain from the reduced transportation costs from using this practice. Relative to some of the inputs, InBev chooses them based on their flavour and other physical characteristics which implies some switching costs and supplier power.

Interestingly, InBev pushes upstream the inventory holding so as to improve its cost structure. However, this implies close relationship with the suppliers and indeed InBev has collaborative relationships with them. The supplier selection is based not only on cost and quality but also on capacity and flexibility to deliver based on fluctuating demand. This is logical considering the seasonality in the demand for beverages.

As a closing remark, InBev also relies heavily on IT to expedite communications and order processing. Due to the large volume of orders and the distance between company and suppliers, IT is very critical to this function.

4.4.7 Pharmaceuticals

4.4.7.1 Novartis

Relative to the pharmaceuticals industry, this study focuses in Novartis and Table 6 (pp 66) presents the relevant data. Additionally, this study considers as inputs the raw material that Novartis procures like simple chemicals, water and the like. Novartis has a decentralized organizational structure. This seems to derive from the low value of the inputs. Each business unit or location is fully responsible for its own procurement although they have access to corporate knowledge bases. Novartis has predominantly based its supplier selection decisions on service levels and quality.

Furthermore, it chooses multisourcing so as not to be depended to few suppliers. This is a result of both the highly regulated business environment and the specific

characteristics of Novartis' products. Any supplier failure will have a twofold impact, on the production itself and on the end users. Furthermore, the regulatory bodies require extremely burdensome bureaucratic processes that a supplier can easily fail to comply. The large number of the suppliers and the commoditization in the products reduces the supplier power (Low supplier power) and gives positional advantage to Novartis by increasing its buyer power.

It goes without saying that in the supplier selection process, the suppliers must meet the necessary regulatory criteria before being considered from Novartis. Furthermore, they must meet the specific production and capacity criteria. Generally, Novartis has individual contracts between suppliers and the local facilities. The relationship that Novartis has can be considered Arms-Length relationship, since the inputs are raw materials that are rather commoditized.

Last but not least, Novartis also has a global procurement group which provides guidance and assistance for the local facilities in that it assists the creation of contracts and the decision support for the sourcing. A last comment about Novartis' procurement practices is that it also uses Information Technology not only for production planning but also for communicating with the supplier base it has.

4.4.8 Retail

Relative to the Retail industry, this study focuses on Wal*Mart and The Metro Group. So as to provide a basis for comparison, the inputs that are considered are finished goods with extended life cycle and more precisely canned foods. Although both companies seem to be operating in industries with the same characteristics, they employ

different organizational models. Wal*Mart has a Hybrid model, where all strategic and tactical decisions as well as some of the operational decisions are taken centrally whereas the bottom operational decisions are taken in a peripheral level so as better capture demand variations. Metro has a more decentralized organizational structure than Wal*Mart and this is logical if we consider both the markets that Metro services as well as the less power that it has. Indeed the superior buyer that Wal*Mart has comes mainly from aggregation of demand and this is mainly an outcome of a centralized organization. However, both firms have to be both adaptive as well as to be able to better monitor their suppliers, thus they have also decentralized groups for that reason.

Sections 4.4.8.1 (pp 90) and 4.4.8.2 (pp 91) describe these practices in more detail whereas the comparison framework is presented in Table 6 (pp 66).

4.4.8.1 Wal*Mart

Wal*Mart is one of the first companies that decided to share information with their suppliers so as to improve its cost structure. The in-house developed system provides supply chain visibility and facilitates communication and collaboration with suppliers. In order to do that effectively Wal*Mart has collaborative relationships with its suppliers. Information sharing is very critical in improving the efficiency and reducing costs. Wal*Mart does that in order to reduce costs and pass that surplus to its customers. The level of collaboration with each supplier is different, depending on the volume and value of products they sell to Wal*Mart. Relative to the supplier selection, Wal*Mart has very clear practices over its suppliers and doesn't charge them fees for carrying their products as most of the mass merchandisers/retailers usually do. The supplier selection criteria Wal*Mart uses is price and performance of the suppliers.

Another practice that Wal*Mart follows is pushing upstream inventory holding. This is done primarily through Vendor Managed Inventory, where the supplier is responsible of replenishing and managing inventory at retailer's premises. Another practice Wal*Mart uses is CMI, or Co-Managed Inventory, a practice that gives Wal*Mart more flexibility to command suppliers' inventory. Additionally Wal*Mart has initiated using RFID so as to increase visibility up to the shelf level and cost savings.

Wal*Mart is unique in its organization structure. It employs a hybrid organization. It has a centralized procurement structure in Bentonville AR, that sets the corporate strategy and satellite decentralized offices around the world to capture opportunities and develop potential suppliers.

4.4.8.2 The Metro Group

Metro has a centralized procurement organization located in its headquarters which is responsible for the purchasing of all the goods. Metro has a network of suppliers in Germany as well as in all other countries it operates. Currently Metro has over 3000 suppliers in Germany and about 1000 in each of the other countries. Supplier selection depends on the product type and the geographic location of the supplier. Thus the supplier's capacity is not usually considered although, product availability is very critical in selecting suppliers.

Relative to Metro's warehousing capabilities outside Europe, it relies solely on the suppliers' warehousing capabilities, which implies that products are delivered either directly to the store or they are cross-docked. For the perishable goods, each business unit is responsible for the strategic and tactical/operational decisions. For non-perishable

goods, Metro usually consolidates orders in regional level so as to improve its buyer power. Metro has a multisourcing practice although it usually has two preferred suppliers that have closer relationships with them.

Metro is attempting to standardize processes to make supplier management uniform across all countries and/or business units. Furthermore, towards this realization, Metro has been using IT so as to expedite communication with its suppliers and within the corporate divisions. Although Metro has collaborative relationship with the preferred suppliers with which it also shares critical information, it has arms-length relationship with the rest and it doesn't share much information. Metro also tries to develop its supplier base, for example it offers training to 14,000 local sheep farmers and 1,000 fishermen so as to train them on animal hygiene and husbandry as well as food processing.

For the private label products, Metro selects the suppliers based on the core competencies, namely technological competencies and availability.

4.5 Common Practices

In the following sections this study will focus on describing some of the best practices that are used from all the companies studied. Although the companies are essentially different, they have been using similar practices so as to capture as much value as possible in their supply chain. Procurement is one of the functions they have been focusing on both value capturing and value creation.

While recognizing the differences that always exist, there are some factors that are oftentimes utilized from the successful companies, among them:

- Managerial Accounting Perspective. It is imperative to not only know cost drivers but also to be able to assign the right cost to the right products. Identifying the causality of costs is the first step in eliminating unnecessary costs.
- Backward Supply chain integration. Although backward integration had been a hype mainly to increase buyer power, the companies can actually reduce the cost by improving the supplier relations. All the companies in this sample are establishing close relationship with their suppliers. The companies integrate strategic suppliers into programs that involve supply rationalization, such as new product development, cost reduction, and logistics operations. Furthermore, and contrary to past beliefs, many of the companies are starting realizing that suppliers have to achieve sufficient profit margins so as to continue offering the same quality. Toyota's practice of alongside development has been copied from many companies.
- Continuous improvement programs. The companies must strive for improvement and reducing unnecessary processes that only add up to the cost.
- Cross-functional teams. Most of the procurement decisions are affecting other functions in the company. In order to optimally address these problems, a team that draws upon corporate wide experience is essential to that point.
- Communications technology. One of the key elements is the speed of decision making and information is an important enabler to that. Although many companies have gone into IT investments, few of them have incorporated communications technology to their supply chain decisions.

- Global Sourcing. Until now companies have relied to local suppliers to procure the inputs. However, all companies have started exploring opportunities in low cost countries and have moved towards global sourcing.
- Relative to the structure of the procurement/sourcing organization, most of the companies have been relying on either centralized or decentralized structures. Centralized structures seem to be preferred not only from companies that provide commodity products or services but from most of the companies. Decentralized structures were used from companies that could afford to be flexible and that have significant buyer power over their suppliers. However, most companies are changing towards more hybrid structures that can capture benefits from both centralized and decentralized organizations. However, this change always depends in the specific characteristics of the product. Many companies have even both structures for different products.
- Top management involvement. Another issue that came up from this research is the top executive involvement in procurement decisions and participation in devising corporate strategy. Most companies have upgraded the roles of the procurement officers and it has been observed top executives' participation in many procurement related projects.

4.5.1 Supplier Relationships

Although until now procurement was mainly a back office function to leverage buyer power and achieve lower prices, the current practice has it being an essential mean to create value in the value chain. Traditionally procurement was price-based,

confrontational, surface-level, short-term, and extremely short-sighted. This has changed in an attempt to introduce new products, improve the existing products and offer higher value to the customers.

The practice in the companies is to have collaborative relationship with the suppliers. It goes without saying that this is not easily maintained with all the suppliers and most of the companies tackle it in different ways. Most of the companies qualify a small number of suppliers (preferred suppliers) with which they have close collaborative relationship that can handle their demand. They also qualify another set of suppliers as potential supply points (back-up plans - contingency suppliers) that will be able to assume demand in case of unfavourable events. These companies are trying to spread knowledge among the preferred suppliers and to integrate their operations as much as possible. As stated before, this practice helps both stakeholders improve their business model and cut on unnecessary processes. Supplier councils and/or meetings are some of the tools used to effectively disseminate intelligence through the company's knowledge base. Furthermore, the buyers also enable their suppliers to obtain data so as increase their visibility and reduce costs. Furthermore, most of the companies, especially those with high infrastructural and manufacturing investment costs, are attempting to acquire visibility and control in Tier 2 or even more upstream so as to improve their resilience and efficiency. The result of that is channelling the purchasing through the preferred suppliers which is the first step in establishing a flexible/hybrid organizational structure.

Last but not least the supplier relationship requires a commitment from both buyer and supplier and doesn't only involve lower prices but also better delivery times, inventory control responsibilities, return policies, and other value-added provisions. This

goes along with the strategic development of the company and includes entire lifecycle planning .

4.5.2 Cost Management and Value Management

Cost management is the predominant trend which currently has moved to value management. Reducing costs is critical for the incumbency and the rationalization of the procurement works certainly towards this. Although many firms are trying to reduce costs which for them are similar to reducing procurement costs, many of the studied companies are trying to increase the value. This is an extension of the cost reduction but also is closely related to the overall corporate strategy. For example, a firm that decides to differentiate its products has to offer a different one, usually of increased quality. This value differential also comes through the effective supply management. Thus the firms studied are paying more attention on the long term revenue streams and on the total cost of the product. Those companies also have full visibility over the costs, the cost drivers and additionally have developed causal relationships between costs and profits.

Relative to measuring cost, most companies use explicit Key Performance Indicators (KPIs). Each of the companies specified a set of KPIs that match their specific business model. However, most of the KPIs fall within the price, service, quality and availability category. In their attempt to move forward and guide their procurement through corporate strategy, the companies are considering long term KPIs instead of traditional short term KPIs.

4.5.3 IT

All of the participating companies have an automated procurement system that facilitates easy ordering and helps the company achieve consolidation of purchases, improvement of processes and the like. Although each of the firms have developed their own systems or have implemented off the shelf solutions, the common characteristics of all of them are the ease of use, multi-supplier pre-qualification, standardization of processes, reduction in maverick buying, on-line ordering, flexible routing and approval and last multiple communication options with suppliers. Lastly, IT also offers better reporting than before since it can more efficiently handle the history of each supplier and retrieve it.

Nevertheless, the level of automation and the extent to which the automated IT systems are used varies among the firms. This is logical mainly due to varying inertia and problematic situations in integrating software. Furthermore, this situation reflects the level of commitment of upper management to IT. All companies in this study are using IT to improve the communications, accommodate the issuance of RFxs, improve visibility over their entire supply chain, monitor suppliers' performance and introduce barriers to entry for potential competitors. In this pursuit they have not relied solely on Electronic Data Interchange (EDI) but they have also move forward into introducing e-marketplaces where the suppliers can pre-qualify and participate in auctions. Internet, although not a panacea, is a tool to increase the number of suppliers without decreasing the visibility and/or performance monitoring. Furthermore, the IT has enabled the companies introduce sophisticated auctioning practices. However, although this was very

common, the companies have started realising that it is not all about cost savings but also value creating and such practices have been reduced.

5 FRAMING PROCUREMENT STRATEGY

5.1 Introduction

In the previous section this research has dealt with identifying the best practices in the 9 studied industries. It also compared the business models relative to the procurement practices those firms use. The key takeaway from the previous sections is that in general there is some uniformity to the practices the companies use. However, there is variation relative to the organizational architecture the firms are choosing to follow. The following section of this study focuses on devising procurement strategy from the architectural perspective and introduces a simple framework that tries to match the internal with the external environment. It also proposes an organizational structure for the function. This is important for the companies since they have to minimize their weaknesses and capture as much value as they can. This is a conceptual framework and only empirical data exists to support it. However this is open for further research and justification.

The steps of this framework are the following. First the company classifies its inputs. This is important so as to understand what the characteristics of the products are and how these characteristics affect the supply chain as well as the procurement decisions (see section 5.2). The next step is to identify the power that its suppliers have relative to its own power. The importance of this step lies in that the part with the stronger power exercises its power to the other party. Section 5.3 refers to this issue. The last step, and the proposition of this research is the identification of the relevant organizational architecture the company should follow depending on the supplier/buyer power and the

importance of the input. Section 5.4 epitomizes this research by proposing different architectures for different cases.

5.2 Identification of the Inputs – The Kraljic Matrix

The first step of this framework is to identify the characteristics of the inputs. The Kraljic Matrix helps understand the inputs since it identifies two dimensions, Value and Criticality. Depending on the relative value they have and the risk in failing to provide the necessary quantity, the inputs are either bottleneck, strategic, non-critical and leverage. Figure 17 presents the Kraljic Matrix.

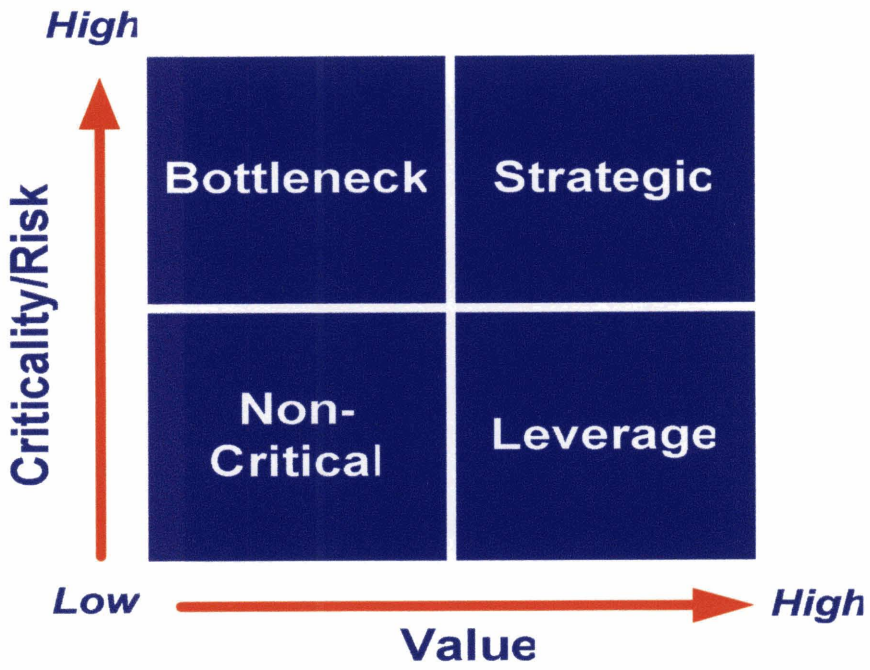

Figure 17 - Kraljic Matrix (Source: Adpated from Kraljic, 1983)

We can easily understand that strategic inputs require more attention from the upper management. For example Toyota's development of the Hybrid engine was a breakthrough in the automobile industry. This product required the close attention of the

upper management and the close collaboration with their suppliers as will be explained later. For the non-critical items, less attention must be devoted since they represent only a small fraction in the value creation process and/or their criticality in the supply chain is very small. Table 9 summarizes the characteristics of those four categories.

Input	Main Tasks	Required Information	Organizatinal Level
Strategic	▪ Accurate demand forecasting. ▪ Detailed market research. ▪ Development of long-term supply relationships / Make-or-buy decisions ▪ Contract staggering. ▪ Risk analysis. ▪ Contingency planning. ▪ Logistics, inventory, and vendor control.	▪ Highly detailed market data ▪ Long-term supply and demand trend information ▪ Good competitive intelligence ▪ Industry cost Curves	Top Level
Leverage	▪ Exploitation of full purchasing power ▪ Vendor selection ▪ Product substitution. ▪ Targeted pricing strategies' negotiations ▪ Contract spot purchasing mix ▪ Order volume optimization	▪ Good market data. ▪ Short- to medium-term demand planning ▪ Accurate vendor data ▪ Price, transport rate forecasts	Medium Level
Bottleneck	▪ Volume insurance ▪ Control of vendors ▪ Security of inventories ▪ Backup plans	▪ Medium-term supply/demand forecasts ▪ Very good market data ▪ Inventory costs ▪ Maintenance plans	Medium/Upper Level Tactical Level
Non-Critical	▪ Product standardization. ▪ Order volume monitoring / optimization ▪ Efficient processing ▪ Inventory optimization	▪ Good market overview ▪ Short-term demand forecast ▪ Economic order quantity inventory levels	Low Level / Operational

Table 9 - Characteristics of Inputs (Source: Adapted from Kraljic, 1983)

This matrix and the item classification enables the company understand the products it sources and thus improves the focus of the analysis product specific.

5.3 The Power Matrix

The next step in devising the procurement strategy is to understand the power differential in the market. This is necessary in order to understand the underlying impetus in the relationship between the supplier and the buyer. Understanding the criticality in the relationship enables the buyers understand whether they have buyer power and how they can exert this power over the suppliers. IBM's Procurement department is renown in using this framework to understand the interrelationships in the industry and be effective in translating this relationship into a contractual agreement.

For this purpose of recognizing the supplier/buyer power differential this study uses the Power Matrix (Cox, 2001 and Cox, 2004) which matches the supplier and the buyer power and classifies the relationship accordingly. Failure in recognizing effectively the relationship type might lead to either adverse selection or moral hazards (Cox, 2004). Adverse selection occurs when the procurement personnel fails to understand their pre-contractual power situation, thus making inappropriate sourcing decisions and selecting the wrong suppliers. Similarly, moral hazard occurs when procurement fails to create effective contractual safeguards pre-contractually and then they become highly dependent on opportunistic suppliers.

Figure 18 presents the Power Matrix. The horizontal axis measures the utility of the supplier's resources. On the other end, the vertical axis measures the utility of the buyer's resources.

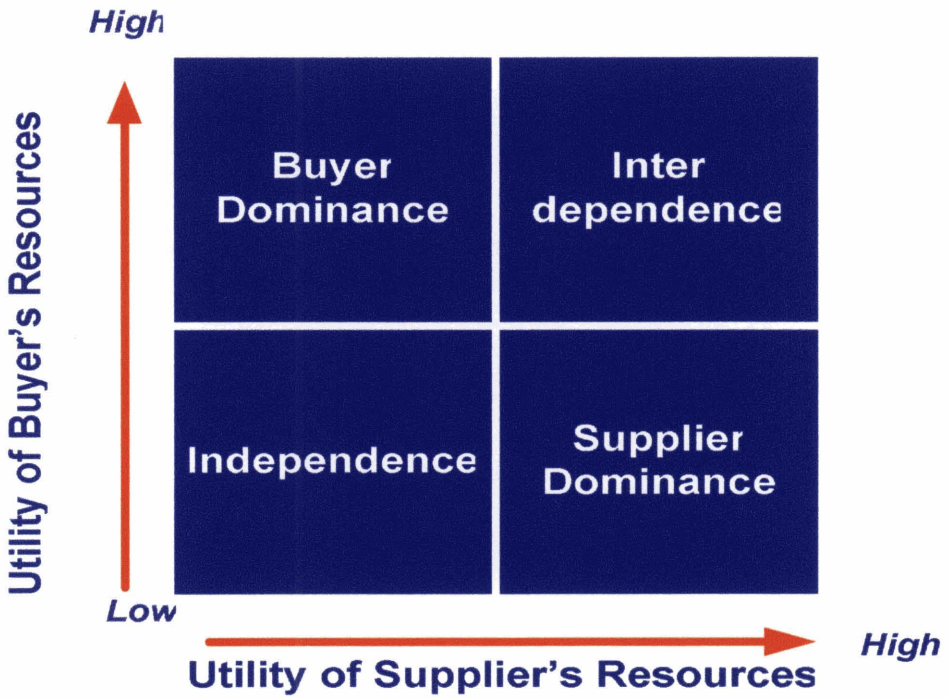

Figure 18 - The Power Matrix (Source: Cox, 2004)

In Figure 18 the buyer dominance quadrant represents the case where the company has more power than the supplier. Again this is relative power not nominal power and this enables the buyer to leverage the supplier's performance on quality and/or cost improvement, and ensure that the supplier receives only normal returns (the case of IBM, Wal*Mart). On the other hand the supplier dominance quadrant occurs when the supplier has all of the levers of power. In this case the supplier is able to marginalize his product and receive above than average returns. Both those cases are problematic, since the minority stakeholders are trying to get out of this situation and none of them really offers the quality/price and/or value that could offer.

In the interdependence quadrant, both the buyer and the supplier possess unique resources that equalize their dominance (Toyota for example relies heavily on the R&D competencies that its suppliers possess). In this circumstance, the supplier/buyer are splitting the returns of their co-developed products. In the independence quadrant, neither the buyer nor the supplier has significant power over the other party. This usually happens to the spot market and generally where the product characteristics are not so important and/or the information is perfect and fully visible.

The elements of qualifying this relationship are the following:

- Switching costs
- Number of buyers
- Number of suppliers
- Proprietary technology (As captured in the Buyer power)
- Barriers to entry (As captured in the Buyer power)
- Distribution channels (As captured in the Buyer power)
- Information sharing – Information Technology.

Table 10 presents some generic attributes for each quadrant and Figure 19 showcases some distinctive examples of the participating companies and their positioning on the Power Matrix.

Attributes of buyer power relative to supplier			
	High	**BUYER DOMINANCE** ▪ Few buyers/many suppliers ▪ Buyer has high % share of total market for supplier ▪ Supplier is highly dependent on buyer for revenue with limited alternatives ▪ Supplier switching costs are high ▪ Buyers switching costs are low ▪ Buyers account is attractive to supplier ▪ Supplier offerings are commoditised and standardised ▪ Buyer search costs are low ▪ Supplier has no information asymmetry advantages over buyer	**INTERDEPENDENCE** ▪ Few buyers/few suppliers ▪ Buyer has relatively high % share of total market for supplier ▪ Supplier is highly dependent on buyer for revenue with few alternatives ▪ Suppliers switching costs are high ▪ Buyer switching costs are high ▪ Buyers account is attractive to supplier ▪ Supplier offerings are not commoditised and customised ▪ Buyer search costs are high ▪ Supplier has significant information asymmetry advantages over buyer
	Low	**INDEPENDENCE** ▪ Many buyers/many suppliers ▪ Buyer has relatively low % share of total market for supplier ▪ Supplier is not dependent on buyer for revenue and has many alternatives ▪ Supplier's switching costs are low ▪ Buyer's switching costs are low ▪ Buyer's account is not particularly attractive to supplier ▪ Supplier offerings are commoditised and standardised ▪ Buyer search costs are relatively low ▪ Supplier has only limited information asymmetry advantage over buyer	**SUPPLIER DOMINANCE** ▪ Many buyers/few suppliers ▪ Buyer has low % share of total market for supplier ▪ Supplier is not at all dependent on the buyer for revenue and has many alternatives ▪ Supplier switching costs are low ▪ Buyer switching costs are high ▪ Buyers account is not attractive to the supplier ▪ Supplier offerings are not commoditised and customised ▪ Buyer search costs are very high ▪ Supplier has high information asymmetry advantages over buyer
		Low	**High**
		Attributes of supplier power relative to supplier	

Table 10 - Generic Attributes of Supplier/Buyer Power (Source: Cox, 2001)

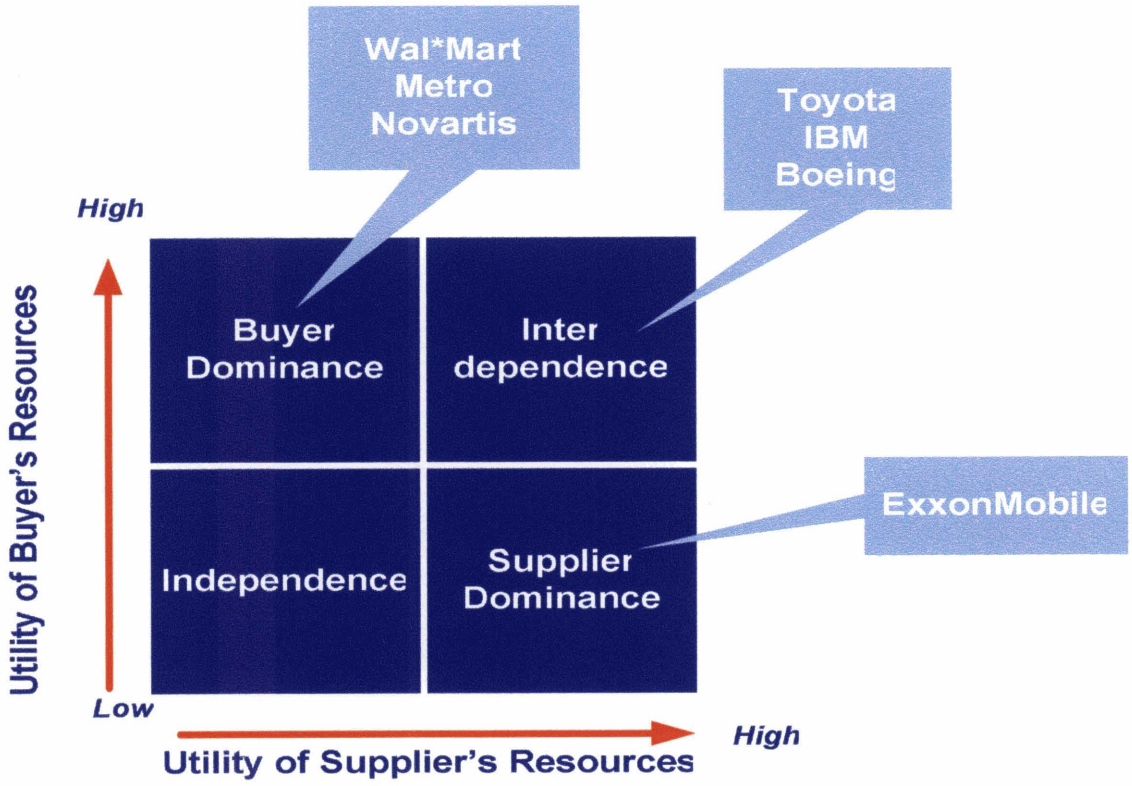

Figure 19 - Sample Positioning on the Power Matrix

The logic behind positioning the companies in these quadrants follows the reasoning of Table 10. For example, ExxonMobile is in a supplier dominance position since the suppliers have exclusive ownership over the product, their number is relative small and they also collude (e.g. OPEC). On the other hand Toyota, IBM and Boeing are in the interdependence quadrant since the suppliers have power due to the technological capabilities but also the buyers are few in their respective industries with positional advantages coming from exclusive ownership of distribution channels. On the buyer

dominance quadrant, Wal*Mart, Metro and Novartis are clearly very representative of the power differential in their industries since they have exclusivity over the distribution channels and the switching costs are relatively small. Although this is a simple analysis of this framework, more thorough analysis goes beyond the scope of this study. Cox, 2001 and Cox, 2004 provide a more thorough investigation of the Power Matrix framework.

5.4 Procurement Organizational Architecture

The last part of this framework is to define the organizational type that fits better for the mix of importance of the input and the supplier/buyer power differential. This is a conceptual framework that is supported by the empirical data as represented in this study. Figure 20 presents this matrix. We use the results of the Power matrix (see 5.3) to assess the supplier/buyer power in the vertical axis. Additionally the results of the Kraljic assessment (see 5.2) provide a basis for identifying the strategic importance of the input.

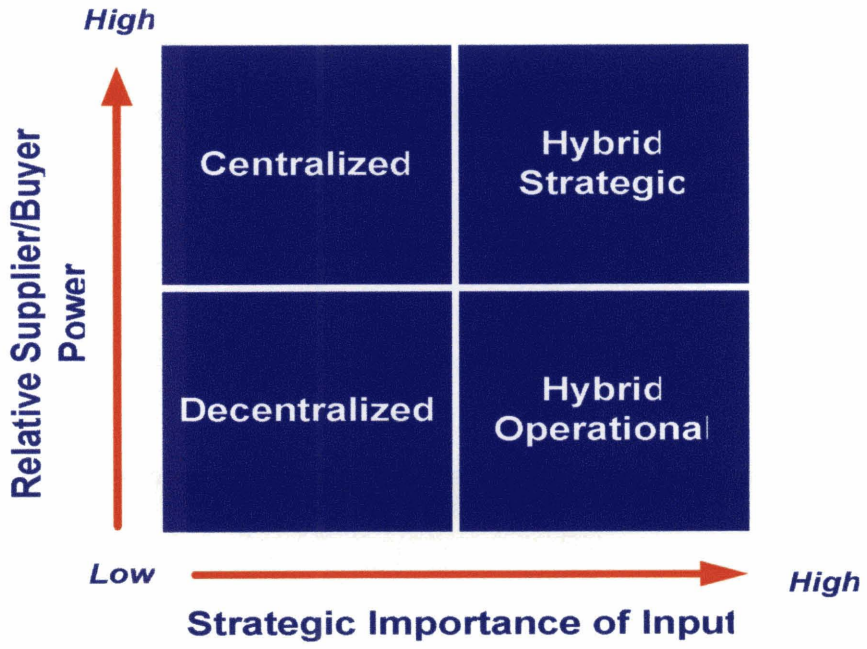

Figure 20 – Matching Organizational Structures with industry elements

5.4.1 Elements of the Procurement Organizational Architecture Matrix

The two axis of the Procurement Organizational Architecture Matrix measure the Supplier/Buyer power differential and the strategic importance respectively. More precisely the vertical axis measures the relative supplier-buyer power. Using the Power Matrix (Section 5.3) we can devise the level of power. One way to measure this appears in Figure 21.

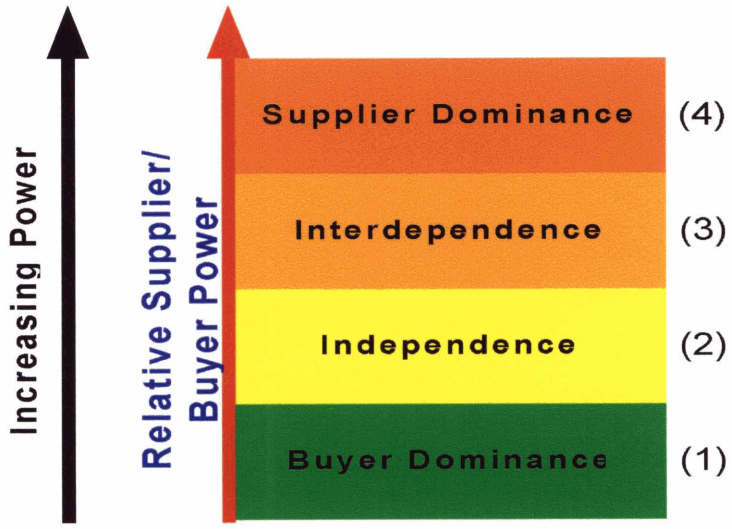

Figure 21 - Assessing Supplier/Buyer Power

This assessment includes all four quadrants of the Power Matrix. In the lower level (1), the buyer dominance implies that there is no supplier power whereas in the top level (4), the supplier dominance indicates the increased power that the supplier has in the industry. The middle levels include the Interdependence (3) and the Independence (2) states. Nevertheless, this assessment includes some arbitrariness. The reason for that is that there is no exact threshold for each level since the boundaries are not so visible and the levels are overlapping. This is mainly attributed to the specific characteristics each

industry and each individual company have and the safest procedure is to do the assignment on a case by case basis. However, this shortcoming doesn't affect the overall framework since the framework intends to capture the strategic elements and the perception of the power differential among the stakeholders.

On the other side, the horizontal axis measures the strategic importance of the inputs. This assessment is mainly extracted from the Kraljic Matrix (Section 5.2). Figure 22 depicts this procedure.

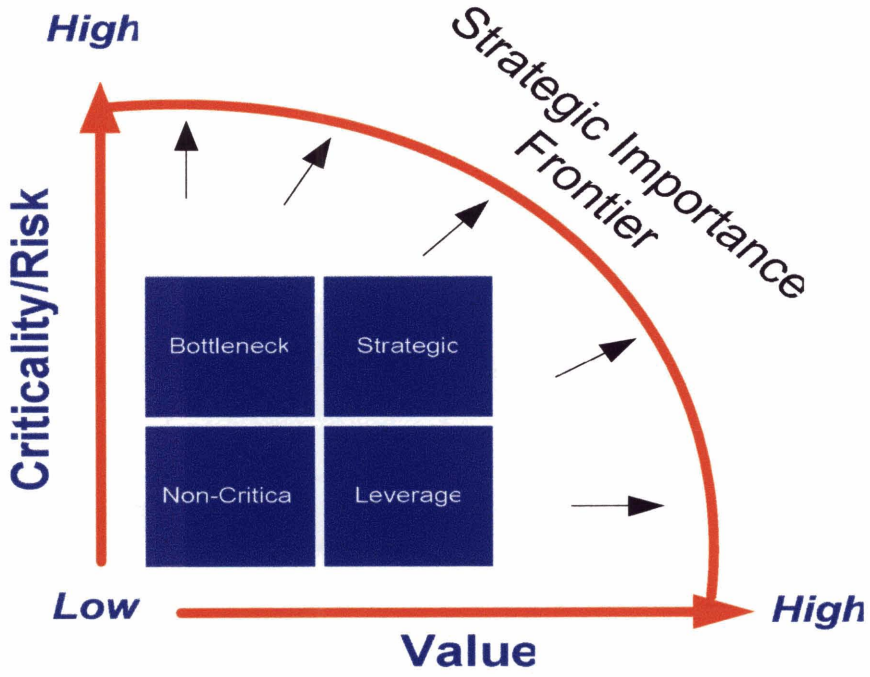

Figure 22 - Assessing the Strategic Importance of Inputs

As we move towards the frontier in the assessment of the products/inputs the strategic importance of the input increases. The strategic importance frontier in Figure 22 represents all those products of high importance for the firms. For example a high value product with low criticality is considered equally important with a low value – high

criticality product, because both of them represent similar risks in the supply chain. Again there is some arbitrariness in this assessment, and the exact qualification is the result of the perception the input has in the supply chain. For example, the systems that Toyota procures for its cars are a strategic input and the high value and high criticality are translated into high strategic importance for the firm. On the other hand, Novartis' commoditized products (for example Sodium) have low value, low criticality and low risk for its supply chain, thus this input has low strategic importance for the firm. Table 9 describes some of the elements that contribute to identifying as strategic or not the input.

Relative to the quadrants of the organizational architecture matrix (Figure 20), there are four options, namely centralized, decentralized, hybrid - strategic and hybrid operational. The left quadrants represent the traditional organizational structures that are used until now by most of the firms. Although, these two quadrants are not considered sub-optimal solutions, the companies are trying to move towards the right side of this matrix so as to better leverage the tradeoffs between the centralized and decentralized systems.

Lastly, this matrix has to be considered as a snapshot of the current situation in an industry. This is a tool to test the logic of the choice of the organizational architecture by assessing the supplier power and the strategic importance of the input. As such, it recommends whether the model the company uses is correct, or it should realign it to more optimal solutions. Additionally, it can also be used as a projection. The company can consider what an optimal combination is for its current organizational choice and attempt to adapt those elements. However, this is an issue of strategic selection and demands many resources for its realization. For example, decreasing the strategic

importance of an input might include modularizing the product/components which is a difficult task. Another example is Wal*Mart's commitment to increase its buyer power which obliges the company to heavily invest so as to accomplish this strategy.

5.4.2 Positioning in the Procurement Organizational Architecture Matrix

This section presents the Positioning in the Procurement Organizational Architecture Matrix. Figure 23 shows some of the companies studied that are positioned on the matrix.

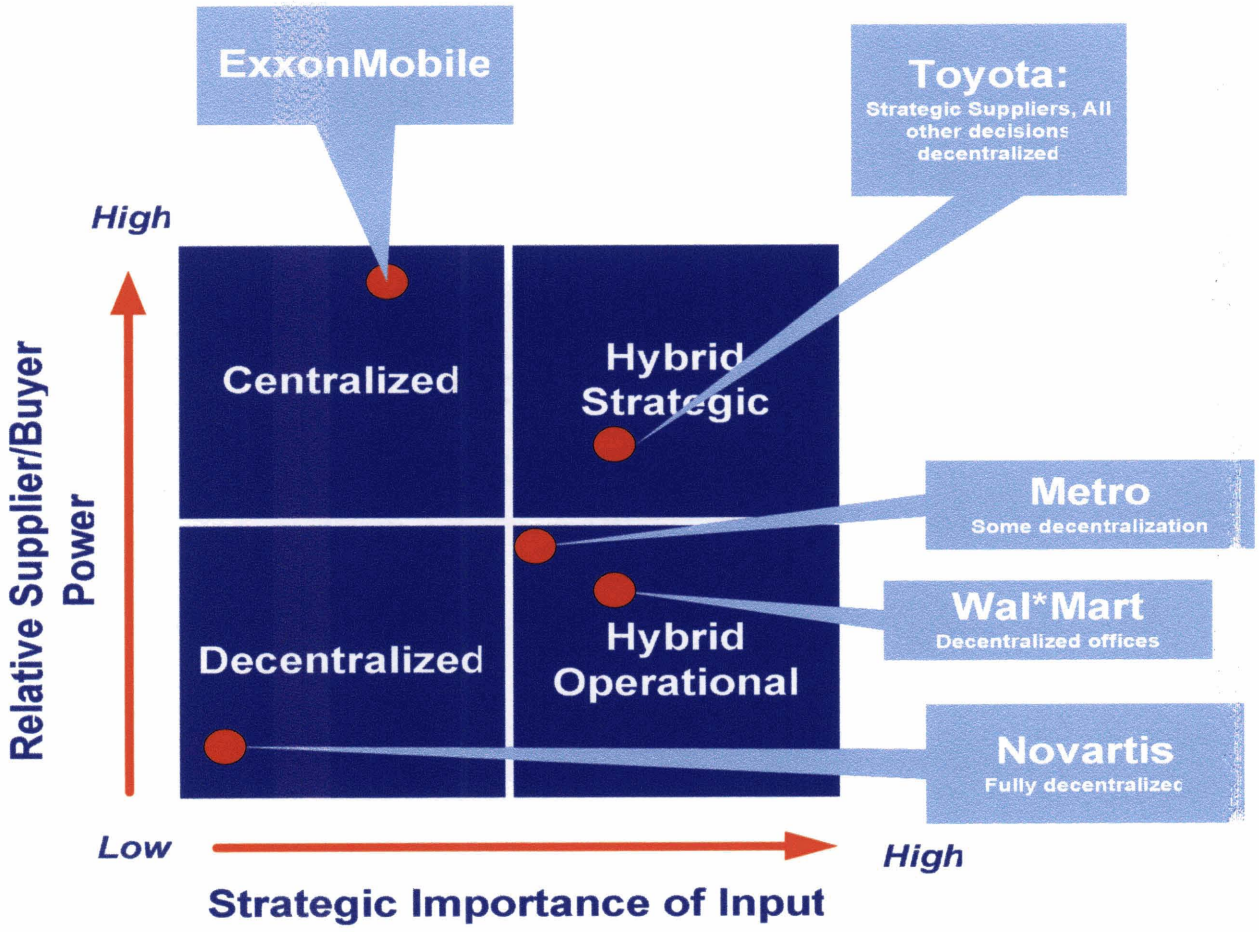

Figure 23 - Sample positioning in the Procurement Architecture Matrix

The necessary data for this assessment appears in Table 11 which summarizes the key findings for the four presented firms.

		Companies			
		Novartis	ExxonMobile	Wal*Mart	Toyota
	Dimensions				
Internal	Inputs	Raw Material	Raw Material	FG (Food)	Components
	Switching Costs	Low	Low	Medium	High
	Life Cycle of Input	Extended	Extended	Brief	Medium
	Life Cycle of Product	Medium	Extended	Brief	Medium
External	Number of Buyers	Small	Medium	Large	Medium
	Bargaining power of suppliers	None	High	Low	Large
	Number of Suppliers in the Market	Large	Medium	Large	Large
Procurement Structure	Number of Suppliers Per Input/Product Line	Multi	Multi	Multi	Multi
	Supplier Relationships	Arms Length	Spot	Collaborative	Collaborative
	Segmentation	Cost	N/A	Geo / Cost	Cost/Cap/Tier
	Buyer Strategy	Focus	Cost	Cost	Cost
	IT	Yes	Yes	Yes	Yes
	Organizational Structure	Decentralized	Centralized	Hybrid (Operational)	Hybrid (Strategic)

Table 11 – Characteristics of Sample Firms on the Cross Industry Comparison Framework

In the upper right quadrant, the company delegates more strategic decisions to its decentralized business units and holds only the core (corporate) strategic decision centralized. This strategy expects to capture as much flexibility as possible and to give to the company the opportunity of moving quickly in industries and markets that are very volatile. Toyota's example best describes this case since its business unit is responsible

for many of the procurement decisions. However, the company retains the overview and the major strategic decisions. Furthermore, the practice is the headquarters to qualify a small number of strategic suppliers with which the company and its sub-units have regular relationships. The business units in turn manage some of the strategic decisions and the tactical and operational decisions. In this case the input is very important for the company and it has to capture as much value as possible. Furthermore, the competencies of its suppliers introduce barriers to entry thus suppliers power. This is the reason, the company needs to centrally monitor the performance and the selection of the suppliers but also to be able to capture the market needs, the customers' shifts and split the risk from operating such supply/value chain.

In the lower right quadrant, the hybrid – operational model represents the case where the company retains many of the strategic decisions and delegates the more operational decisions to the business units. In this case, the most often cited example is Wal*Mart which has a lot of decentralized groups that seek for alternative sourcing options along with other operational processes. All the strategic decisions as well as some of the tactical are kept centrally in the corporate headquarters. Wal*Mart has placed the operational procurement groups near the suppliers and mainly in the low cost countries. The reason for that is to help the suppliers grow effectively and provide Wal*Mart better services/products and additionally because Wal*Mart actively searches for procurement opportunities. Mainly these groups are in the South East Asia where the opportunities for low cost sourcing are greater but also the uncertainty and the inefficient supply are also greater.

ExxonMobile is a good example for the centralized procurement quadrant. For the purposes of this framework the input (oil) can be considered of low strategic importance for the following reasons: the product is standardized, the price is set freely in the exchanges, the company orders in large volumes and has to monitor and optimize the ordering so as to improve efficiency in processing. Additionally, the switching costs for ExxonMobile are small. The reason for that is that ExxonMobile has steady contractual relationship with the oil suppliers and that it is very difficult to approach new suppliers. On the other hand, the suppliers have ultimate power in the market. The high bargaining power of the oil reserve owners and the high volatility of oil prices obliges ExxonMobile to select a very centralized architecture so as to minimize as much as possible the time to take decisions and improve the efficiency of the forecasting. Moreover, with this type of procurement organization ExxonMobile is better able to monitor and assess the decisions of the suppliers and the consolidation in decision making close to the headquarters also improves the reactions in the strategic level – corporate level. Last but not least, the input has also a lot of by-products that are commercialized by different business units and the higher level of decision making in this case improves the corporate welfare.

Lastly, in the decentralized quadrant, the company is able to employ a very flexible structure. Novartis is a very good example for this case. Novartis has a fully decentralized procurement structure, since both the importance of the inputs is low and the supplier power is also very low. Each business unit is free to select the suppliers and is responsible for the strategic, tactical and operational decisions. Having those two characteristics, it has more space to move without being pressed by the suppliers in this process. The suppliers in its supply chain have small power and the inputs (for example

water and commoditized chemicals) have no significant strategic importance for the end product. This is the reason Novartis' procurement model is based on the lower left quadrant.

As it has been said before, the architectural matrix captures the practices in various industries from the best players. However, the companies are moving towards regions in the matrix where they can capture more advantages and in the same time be flexible and adaptable.

5.4.3 Value of the Procurement Organizational Architecture Matrix

The value of this framework is in its attempt to connect the organizational options with the characteristics of the inputs and the supplier power. In this context, the matrix presents the optimal combinations. Most of the companies are trying to move towards more hybrid structures. Nonetheless, there is not evidence to accurately calculate the value that each case creates. This is also an adverse implication of the synergistic value that can not be easily calculated. However, there is generally the consensus that structures in the right quadrants capture more value.

This framework can also be used in order to devise the corporate strategy. The firms can assess either its current situation so as to set up the organizational procurement model or it can use its model and attempt to modify the industry characteristics. However, it has to be mentioned that the former approach is more difficult and requires internal and strategic discipline as well as resources.

Conclusively, this framework is an advisory tool. It can help the company set up a procurement organization based on the characteristics of the industry it operates in that

will maximize the benefits based on the practices of the studied companies. Additionally it can help the company understand which elements of the industry it can adjust so as to optimize its procurement. For example if the firm has a hybrid decentralized model and wishes to move to a decentralized model, then it will have to decrease the strategic importance of the inputs. This means that it will have to devote resources in that, e.g. modularizing the input or streamlining the ordering process.

6 MACRO- ECONOMIC TRENDS

The next chapter is focused on the macro economic trends that not only have affected the Procurement and Sourcing practices until now but also shape the future practices. It is a commonplace to suggest that the firms are searching for the lowest cost possible (or the best value) but this has been the main driver in corporate strategy and definitely has an effect in the Procurement Strategy of the organizations. However, there are more factors affecting this. Although the aim of this part is not to identify each factor, some common issues will be presented. Lastly, each of these trends also presents a challenge for each firm to overcome in a pursuit to sustainable competitive advantage.

6.1 Strategic Sourcing – The Extended Enterprise

One of the major shifts in the procurement practices observed in the sample companies is the understanding of the strategic importance of procurement and the rationalization of the function. Most of the companies have moved forward in Strategic Sourcing, i.e. not only cutting costs but also impacting the corporate financials in the long term. Strategic Procurement is nothing more than alignment of the functional objectives with the suppliers and the corporate vision.

Figure 24 presents a simplified approach of the level of decision making in a procurement context. The sequence from a procurement focus to strategic procurement focus is not an easy nor explicit process. Duffie and Koster (2005) define cycles of thought leadership and technology advancements typically that lead to three distinct waves in progression:

- Leverage wave where the organization uses information, knowledge, volume/spend, and relationships to optimize price,
- Total Cost Management wave where the organization uses technology and capability of the suppliers that can push costs out of the supply chain, and
- Extended Enterprise wave where the company attempts to fully integrate its supply chain through collaborative technology and innovation both in its suppliers and its partners so as to ultimately build and/or entrench core capabilities.

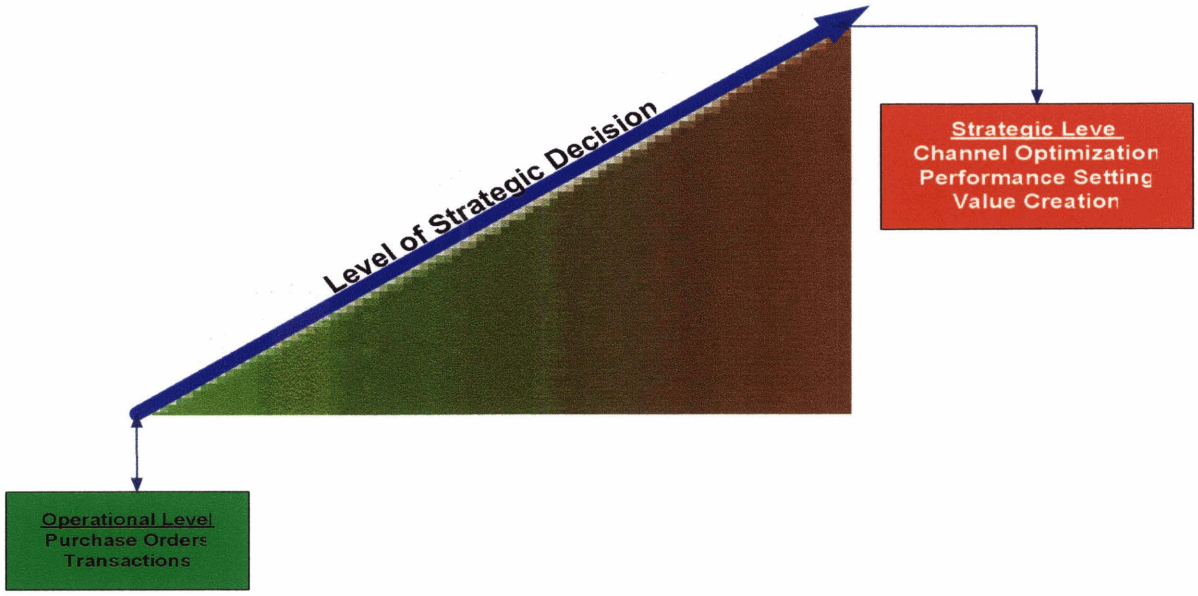

Figure 24 - Level of Decision in Procurement Strategy (Adapted from Duffie, Koster, 2005)

The core in this procedure is to examine the logic of the strategy. For example, is it valuable to select a supplier based on superior manufacturing capabilities but of local presence if the company is envisioning global expansion and business growth? A clearly defined procurement strategy will improve the quality of the results and the organization's objectives. Additionally many firms have been introducing cross-

functional, cross-enterprise groups to participate in this function so as to globally optimize the problem (instead of myopic traditional approaches).

Relative to the theory of the Extended Enterprise, this is nothing more than being able to monitor and if possible control the activities upstream. Depending on the criticality of the product, the relationship of the partners and the power that each stakeholder has, it is to the benefit of the company to know the bottlenecks and the strengths/weaknesses of each partner. Sheffi (2005) focuses on how resilient is an enterprise and the Phillips fire case explains how Nokia was able to overcome the disruption by being the extended enterprise and having better visibility upstream than its competitor, Ericsson.

The performance of an organization goes well beyond its core processes, extending to the performance of its business partners. For the end customer, it is important that the product as a holistic approach is what he expected. Failure in a supplier's component is translated into failure of the company's product in the consumer's eyes. For example, problems in the components that GM sourced from its suppliers have been demonized for lowering customer perception. Another example is British Airways which collaborates closely with the seat suppliers. They are Tier 2 suppliers, giving products to Airbus, but BA's quality perception is heavily dependent on the seats. This is the reason BA chooses the extended enterprise model.

The extended enterprise is all about close and/or collaborative relationships with suppliers and integration of processes. With this tactic, the firms can also take advantage of suppliers' competencies, since they oftentimes have better insights and expertise in areas that the companies may not have. Suppliers also contribute in other ways like

marketing concepts, technology pursuits, or creative financing. Moreover, the Extended Enterprise to be beneficial must first tighten the process integration through collaborative technology and innovation in relationships, and second establish and build (core) capabilities.

6.2 Low Cost Sourcing

Low cost sourcing has been the focal attention of many firms and definitely of the studied companies. The current economic context makes it imperative to reduce costs and the technological advances can now allow sourcing globally in low cost countries. The question is not whether to source in a low cost country, but what to source, where to source it from and in what quantity/quality.

Figure 25 presents an important trend; more than 80% of the respondents answered that they have been sourcing in a low cost country for at least a year. Almost 40% have been using this practice for more than five years. The low cost sourcing practice has affected the procurement of the organizations and it will continue affecting it in the near future.

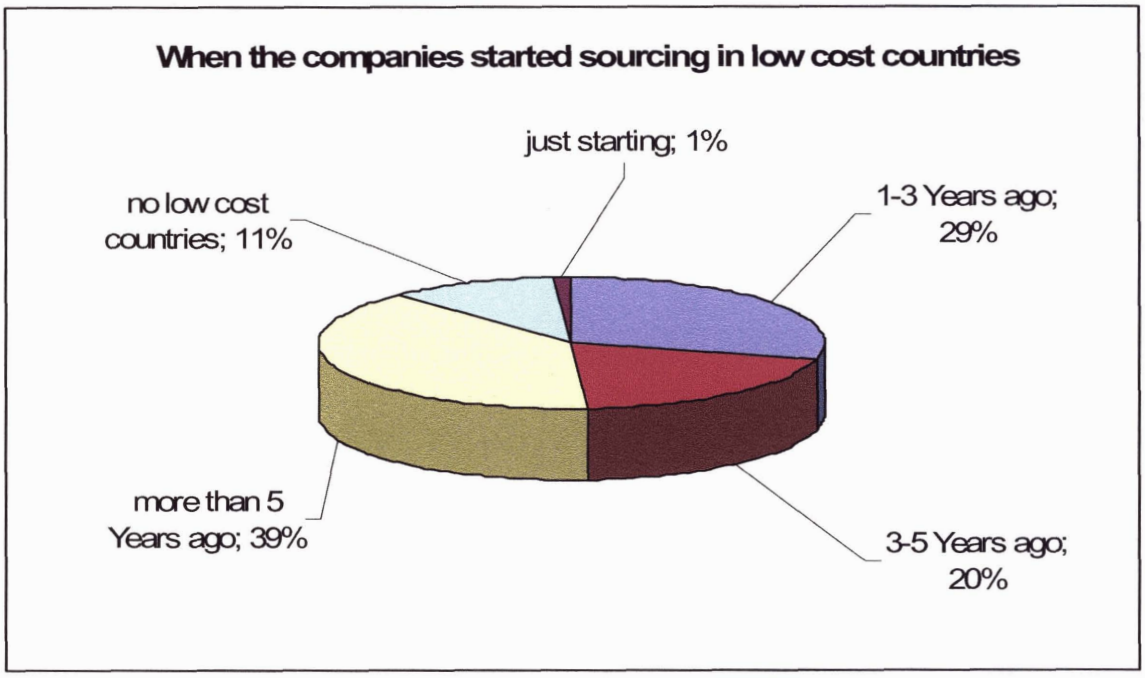

Figure 25 - When the companies started sourcing in low cost countries (Source: Eye for Transport, 2006)

The reasons for sourcing from low cost countries appear in Figure 26. It is apparent that the predominant reason is the cost of the materials-labor/inputs. Most of the companies as discussed earlier need to reduce their cost structure and the low cost countries offer this opportunity. Furthermore, this is an outcome of the pressure from their customers to reduce the prices and generally improve the overall cost structure. It is understood that the cost has been a major driver in the sourcing practices the companies use.

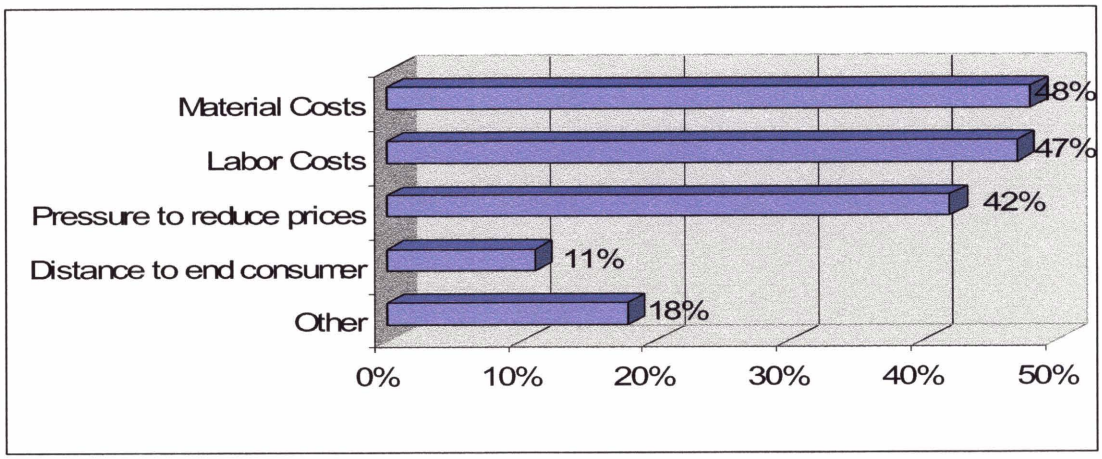

Figure 26 - Reasons for sourcing in low cost countries (source: Eye for transport, 2006)

As illustrated in Figure 27 the companies prefer not to outsource more than 25% of their inputs. This correlates with the perception of the core competencies of the company and additionally is a level as to the Virtual Enterprise business model that some of the companies are following, for example Cisco and IBM in this research's sample. However, the level to which the virtual company catches up has to be studied in more detail.

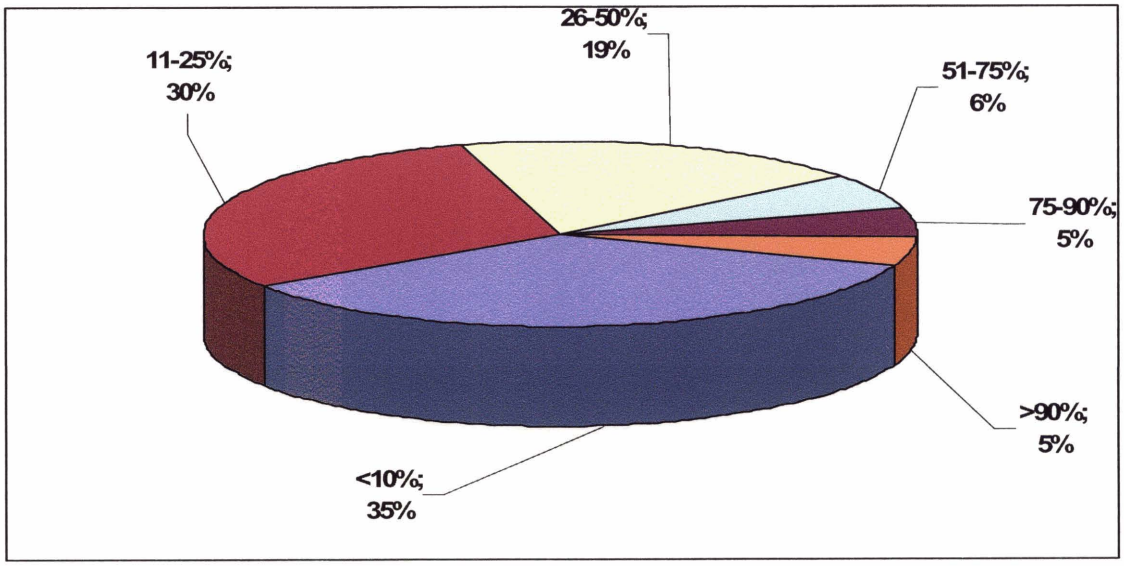

Figure 27 - Percent of Inputs Outsourced (Source: Eye for Transport, 2006)

The last thing that the companies will have to focus their efforts is the unreliability of the quality and delivery that the suppliers in low cost countries are promising. This is quite problematic, since as mentioned earlier, efficiency is closely correlated with steady flow of material and any shortages or quality deficiencies can result in manufacturing downtime and increase in the production cost. Figure 28 presents the major risks that are identified in sourcing in low cost countries.

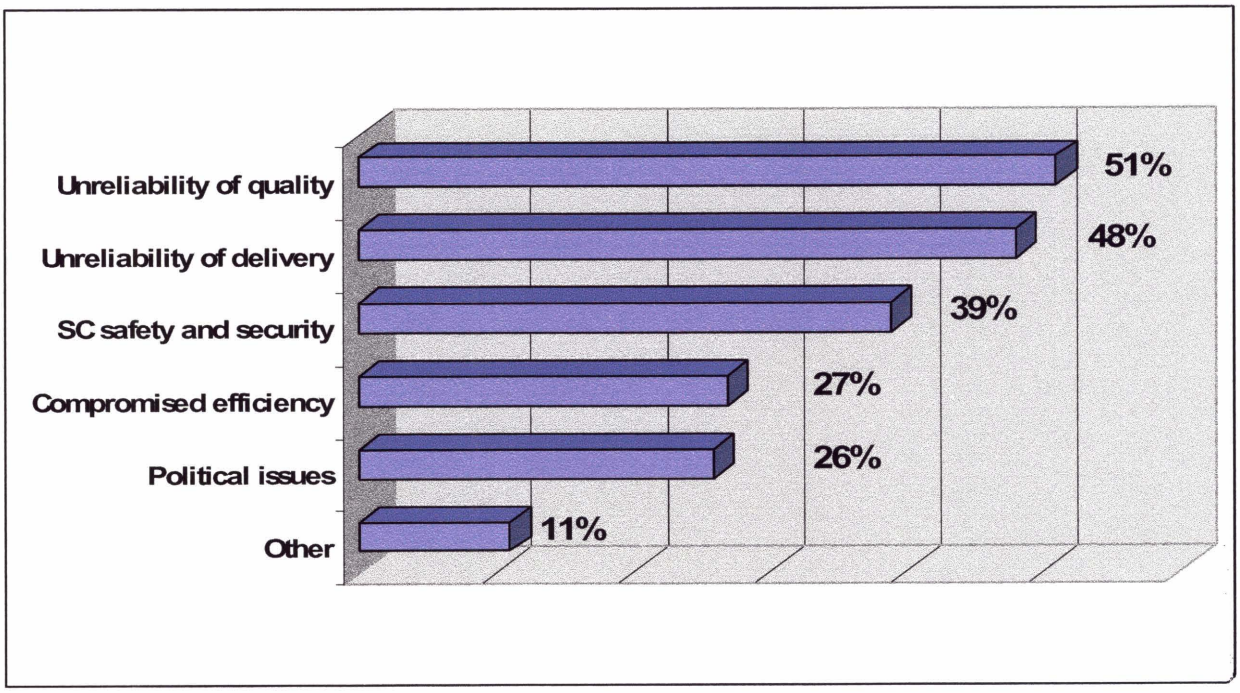

Figure 28 - Major risks in sourcing in low cost countries (Source: Eye for Transport, 2006)

Lastly, another trend that is going to become more visible in the next years is the outsourcing (partial or full outsourcing of capabilities) of product development. This is a trend coming from the industries with high R&D investments. The companies in their pursuit to split risk, but also in an attempt to include in their business models only core competencies, try to source a higher amount of service outside the firm and more specifically the firms' research function.

6.3 Labor

Another challenge for the future procurement practitioners will be the labor sourcing. Although this is not within the immediate scope of this research, it is important though to point out that labor is also a focus for global sourcing. A lot of attention is paid in global workforce mobility, namely when the workforce is moved from a place to another. More precisely, the firms are trying to find the best workforce available and the global sourcing practices have also an immediate effect on that. This is closely related to the sourcing practices that the firms select (centralized vs decentralized models, see section 5.4 pp 107) and the trend to combine low cost product sourcing and low cost service sourcing. This goes along the attempt to rationalize not only the tangible inputs (materials) but also the intangible (services, labor and the like) and obliges quick decisions and flexible procurement models.

Among the areas that draw attention, Asia has been exemplar in becoming one of the world's most successful global sourcing hubs. However, each region has different strengths and focuses in different industries. Countries like India, the Philippines, China, and South Asia are hotspots for labor sourcing. India is mainly known for its IT skills but it has also developed abilities for the Automanufacturing and Engineering industry as well as for Travel and Hospitality, retail and banking. Additionally, the Philippines, have call centers capabilities in addition to software and animation. The biggest labor market in the area in terms of absolute numbers is China which attracts companies with high-volume, transaction-based business processes. Manufacturing is one of the core labor related competencies with high-tech heating up. Malaysia's IT infrastructure makes it unique for IT related investments since it has skilled force. Additionally, back office

operations are also supported by the present labor force. Last but not least is Thailand which has good software development capabilities as well as supporting high-tech infrastructure.

6.4 Energy

Another critical factor that will affect the future procurement practices is the price of the energy. With oil process soaring in the 70-80$ threshold (Figure 29) the companies experience harsh pressure in their cost structures. The cost of energy is both a direct cost for the companies, since it is used in the manufacturing, delivery processes and the like, as well as indirect cost because it affects inflation which in turn increases the prices of commodities. Although the focus of this research is not to study the inflationary increasing returns of the oil prices, this simple approach demonstrates that the rising prices will affect the sourcing practices of the companies, namely the geographic focus, the performance measurements/drivers that the companies will select and the value creation/capturing opportunities.

Additionally, the increase of energy consumption from the new low cost countries that have been emerged in the global economic context, will inevitably change the global map relative to the raw material consumption and the logistics/transportation routes.

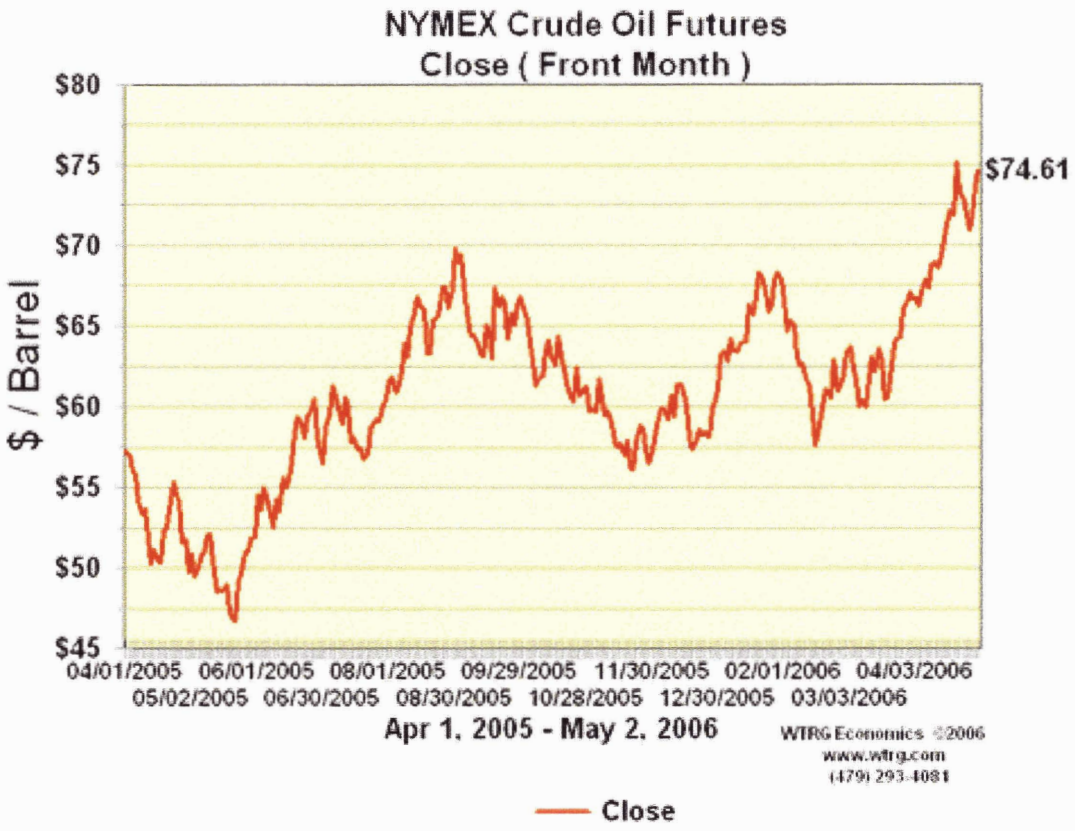

Figure 29 - Crude Oil Prices (Source: http://www.wtrg.com/daily/crudeoilprice.html)

6.5 Agility

Agile sourcing is the ability to be adaptable and flexible, in order to quickly respond to new or changing requirements. This is primarily achieved by utilizing traditional and non-traditional contracting tools when procuring goods and services.

The companies have to be able to adapt in an environment of constant and unpredictable change. Low volume, high quality, make or engineered to order, short life-cycles and short development and production lead times are characteristics of the products customers want. This concept forces companies to change their business models so as to accommodate these customer needs. Simple put, it is inefficient to keep the same

product for too long, since the competition will move into this market segment to capture it and reduce the profit margins.

Agile business models are very difficult to be deployed. The reason is that they include many stakeholders which makes decision making quite difficult. Agility is a concept that requires alignment of all the departments with (oftentimes) conflicting targets. For example, agility discourages increased throughput since this might create unnecessary inventory which is very difficult to get rid of. However, increased production is directly related with smaller average costs. These two different cases indicate the contrast in mass production and agile operations.

Additionally, agility is closely related with information sharing. In order to be flexible and adaptable, the company has to promptly recognize all the opportunities and the changes in the customer decisions. This is where information sharing fits. For example the Point of Sale information in the Zara case enables this company to operate with a 4 week production lead time as opposed to the industry average of 6 months, giving great competitive advantage and reducing costs. Nonetheless, in order to perform to that context the companies have to be able to change. This is where the logic of the strategy is tested and verified against the context.

Last but not least, agility is closely related to trained workforce. The reason is that since the decision making is mostly decentralized, the decision makers have to have knowledge and authority to take such decisions. Thus agile companies invest heavily in training and try to increase the educational level of their workforce.

6.6 E-Procurement

Another trend that will affect the procurement models is E-procurement. The term E-Procurement includes all those business practices that use internet or similar technologies as a means of communication. For example, online auctions is one of those practices. E-auctions have the advantage that can facilitate large number of remote bidders simultaneously and for very low cost. The bidders place their proposals electronically and the system determines the best option. This is important, especially in commoditized markets where the variations in the specifications are not that large and the bidders compete mainly for the price. Other practices include eSourcing (for contractual processes, like tendering, RFxs), e-marketplaces, e-Catalogues and e-Payment. The benefits of e-Procurement include efficiency improvements, reduced lead times, reduced fulfillment time, improved commercial relationships with suppliers, reduced operational/transactional costs, open marketplaces and full visibility over the supply chain.

However, there are risks inherent in this practice. The main dangers that the buyer faces are the confidentiality of the inputs, the integrity of the suppliers, the availability of the fulfillment and generally how binding the result is. In order to overcome these risks the companies have started developing a pool of suppliers who are eligible to participate in these bidding processes. For example Cisco and Lucent have already started awarding web-certificates to the willing suppliers who have to pass an introductory screening and pre-qualify for that process.

Challenging is also the different technological protocols that are used from the various incumbents. At this point only some e-marketplaces can be considered to be cross

functional by all incumbents. Most systems are inhouse developed or custom made which makes the usage from outside non qualified users prohibitive. Additionally, most of them are intended as barriers to entry for competitors, since each seller/supplier has to commit many resources to developing them and usually most of the suppliers go only with one or at most a couple of systems. Internet based systems are somehow more global, but they also require considerable investment.

Again the issue here is company inertia and resistance to change. E-Procurement is fundamental bottom up change throughout the firm. It is observed that a lot of stakeholders are reluctant to change for various reasons. Although this goes outside the scope of this research, it has to be mentioned that E-Procurement implementation is very risky and has to be closely monitored so as to bring success.

6.7 Measuring the Procurement Performance

Measuring the performance of the procurement department is a very difficult task and a challenge that will also affect the future practices. Simply put, the goals are different depending in the organizational level, the business unit and the vision of each stakeholder/unit.

One of the important criticalities of monitoring performance is the lag between action and result. Although the bottom line of procurement is immediately apparent to the financial statements of the present year, the long term effects of not reaching customer satisfaction and/or quality are not. That is also the danger, of getting into the vicious cycle of measuring only the immediate effects and ignoring the long term effects. For example, Cisco is heavily involved in supplier development. Although this is an

immediate cost for Cisco, its long term benefits (for example being able to develop new products) far outweigh this disadvantage.

Another critical issue is the comparison basis. There is a relevance issue here. There are many comparison bases, for example relative to last year's spending, or relative to the competitors' spending. The measurements chosen need identify these problems. Again the practices used have to be aligned with the entire corporate strategy so as to devise accurate metrics.

Traditionally, firms have been engaged in measuring simple metrics like cost savings, numbers of suppliers or cost of procurement as a percentage of company turnover which are inadequate. The reason is that these metrics fail to capture the quality and generally all the intangible factors. This is also the reason why procurement has a strategic element; it helps the long term viability.

Relative to the comparison, performance measures should include internal and external comparisons. Internally procurement has to be measured in relation to other corporate functions as well as with previous years' spending levels. The difficult comparison is the external since the data are proprietary, thus difficult to be gathered. Additionally, it is difficult since companies rarely have the same structure. However this goes beyond the scope of this study.

6.8 Other Challenges

Other challenges that will affect the procurement practices include:

- Growth through reaching new markets, since the growth has to be aligned with the procurement strategy, so as to be better met.

- Improving customer service which is generally related with the procurement practices to select suppliers and inputs,
- Differentiating from competitors,
- Improving cash position and/or reducing costs, which is the bottom line of competitiveness,
- Improving productivity and throughput so as to reduce average costs,
- Collaborating closely with suppliers, which doesn't necessarily mean giving up or splitting profits but being able to more closely monitor the performance and the growth, co-develop new products and the like,
- Reducing the number of suppliers, whether they are close/immediate suppliers or a broader pool of qualified suppliers,
- Integrate the operations with the suppliers so as to increase visibility in the supply chain and better monitor the performance

7 SUMMARY

7.1 General Conclusion

The key takeaway from this study is that the decision making of Sourcing and Procurement has moved from the operational level to the strategic level. Strategic sourcing is nothing more than creating and capturing as much value as possible out of this. This process entails discipline and is cross functional. Strategic Sourcing is not a new concept but it has realized a growing importance. Procurement decisions are more complex than they used to be since they have to be aligned with the corporate strategy and the long term vision of the company.

Organizations focus on both quantitative and qualitative aspects of products and/or service since now strategic sourcing can also facilitate better internal or external customer service which is equivalent in increased revenue/profits. Additionally, the increased competition inevitably leads to differentiator strategies so as to avoid commoditization of the products. New product development is considered to be closely tied with supplier collaboration and spreads risks throughout the supply chain.

However, close supplier collaboration can not exist with many suppliers. This is also the reason why the companies select to have very close relations with a small number of suppliers in addition to maintaining a larger pool of either potential or simpler products suppliers. Towards this trend, e-Procurement practices and generally electronic communications practices have enabled the increase in the number of suppliers without diminishing the performance monitoring.

7.2 Best practices

Best practices in purchasing vary across industry relative to the specific tools that each company uses, but all of them use similar underlying principles. Companies are pushing the purchasing of non-strategic items to lower organizational echelons and put more effort to rationalize spending on critical items. More precisely, the firms studied in this research put more effort in the following:

- Align procurement with the corporate strategy, so as to maximize the gains. All of the firms have a separate position for procurement in the strategic level. Additionally, those firms have streamlined their communications so as to decrease the lead times and raise any miscommunication within the departments and between buyers/suppliers.

- Segment the suppliers. All the companies select their suppliers using different metrics. Some of them are cost related whereas others include geographic location, performance, fulfillment measurements and the like. Some companies have gone deeper into selecting their suppliers and focus more on the capabilities the suppliers have. Nevertheless, the predominant trend is to select a few suppliers with which they have closer relationship and pre-qualify a larger pool of supplier which have a twofold role, acting as a backup plan and reducing the supplier power of the closer suppliers.

- Choose a centralized/decentralized/hybrid purchasing structure based on overall company strategy. As analyzed in section 5.2 (pp 100), 5.3 (pp 102) and 5.4 (pp. 107), the firms have to identify the characteristics of the inputs they procure, identify the power of the suppliers and then choose the right organizational model for sourcing and procuring. Based on the framework produced, the firms will be better off if they use a mix of

centralization/decentralization models, because they will be able to utilize the advantages of both systems. The optimum balance between centralization and decentralization is dynamic, requiring continuous review and adjustment.

- Streamline communications. Routine paperwork adds no or little value and distracts the purchasing staff from more important, long-term duties, e.g. finding new sources of materials and negotiating contracts. This is where automation should play an important role to reduce transaction costs. Additionally, use E-procurement to automate processing of transactions between buyer and seller and to share information within and outside the company.

7.3 The Procurement Organizational Architecture Framework

The main part of this research has been first to understand what the alternatives are relative to the procurement organizations and second to find the optimal structures for different combinations of industry characteristics. For this purpose it is proposed a framework that consists of three parts.

The first part of this framework enables the understanding of the product characteristics. By using the Kraljic matrix, we classify the products based on their value and criticality to bottleneck products, strategic products, non-critical products and leverage products. This step captures the importance the product has in the supply chain of the company and how this importance can affect the efficiency and generally the profitability of the supply chain.

The second step of this framework looks on the power differential between suppliers and buyers. Using the Power Matrix, we classify the different alternatives as

buyer dominance, supplier dominance, independence and interdependence. The importance of this step is in that it captures how each party exerts its power which affects the decision making of the other party.

The last step of this framework is the Procurement Organizational Architecture Matrix. This step aims at proposing the organization that best fits the current situation in the industry. Each option depends on the strategic importance of the inputs and the supplier/buyer power differential. At this point four different options are proposed. These are centralized, decentralized organizations, hybrid organizations with more strategic decisions delegated and hybrid with more operational decisions delegated.

The value of this framework is in that it gives the opportunity to the firms to capture more benefits of each structure depending on the characteristics of not only the industry they are in but also of the products that they are selling. This strategic manoeuvring can give the company a distinctive competitive advantage in that it reduces the lead time of the decision making. Additionally the level of decision making is primarily done close to the need which also improves the result.

7.4 Extending the research

The purpose of this research has been to identify the practices that some of the best companies in their industries use. In this context, this study is qualitative and attempts to capture the practices of a small sample of companies. In order to extend the results of this study, it is proposed to test the logic in a more global basis. In other words, to increase the sample of the companies to include a broader variation of the practices as well as the architectural options that the companies are using.

As stated before, the sample of this research is very small. We observed little variation in the centralized/decentralized/hybrid models the firms are using as well as in the introduction of IT and more generally in the investments the companies are making in the procurement area. Additionally, the focus has been in large firms that are able to commit greater resources. To this extent, this study was mainly devoted into corporate strategy with many business units and/or large procurement spending. Thus it is proposed that a future study will include Small and Medium Sized Enterprises.

Another issue that this research brings forward is the measurement of the dimensions. At this point the identification of the characteristics of the products has been mainly qualitative. This introduces some arbitrariness which could be waived. Thus, another extension of this research is the quantification of the exact levels of each value.

Last but not least, another proposal is the study of the performance measurement systems and/or metrics that the companies are using. These systems capture the efficiency of each strategy and show the future direction of the firm. Thus it is necessary to understand what performance metrics the companies have and how these performance metrics are related to the corporate/business strategy of those firms.

APPENDIX

A.1 Return on Assets

Another example that shows the effect procurement has in the Return on Assets of a company. (The assumptions are a simplification of real life examples)

	Element	Base	Improvement
1.	Sales	1,000,000	1,000,000
2.	Inventory[12]	150,000	135,000
3.	Total Assets[13]	500,000	485,000
4.	Total Cost[14]	950,000	900,000
5.	Profit[15]	50,000	100,000
6.	Investment Turnover[16]	2,00	2,06
7.	Profit Margin[17]	5%	10%
8.	**ROA[18]**	**10%**	**20,6%**

Table 12 - Procurement effects on ROA (Source: Leenders et.al. 2006)

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[12] Assuming 10% Decrease

[13] Total Assets include Inventory

[14] Total Cost includes purchases which account for 50% of Sales. In improvement we assumed a 10% reduction in procurement costs.

[15] Profit = 1 – 4

[16] Investment Turnover = 1 / 3

[17] Profit Margin = 5 / 1

[18] ROA = 6 * 7

A.2 Profiles of the 9 Industries

i. Aerospace Industry Profile

The main geographic segments of the aerospace industry are the US and the European with the US being the leader in revenues and employee number (Tiwari, 2005). In 2002, total consolidated revenues were US$153Billion and 714,000 employees were employed. The European aerospace industry had total consolidated revenues of €74.6 B and 408,000 employees.

More specifically, the passenger transport sector comprised the 52.2% of the US and 46% of the European market (Tiwari, 2005). Although many countries produce aircrafts and/or missiles, only EU and US are the ones that provide large passenger aircrafts. For the EU, this comprised the 55% of the revenues, whereas for the US this only represented only the 34%.

During 80s the military segment was nearly double the commercial segment in revenues. However by 1992 both had the same revenues. The commercial aerospace had a steady growth since the 90s whereas the military has had a more modest growth. Both segments reduced the employee number during this period in an attempt to cut down costs. The post 9/11 effects have also caused turbulences in the industry.

Significant part in this industry has the U.S. space segment, both military and non-military, with sales of US$20.6 B in 2003 (Tiwari, 2005). On the other side the satellite segment had revenues of US$14.9 B and the rocket segment had US$5.7B

One of the most significant characteristics of this industry is the Barriers-To-Entry. The incumbents have created deep expertise through investments in Research and Development (R&D) and have moved up their experience curves.

The following figure shows the operating profit margins for the aerospace industry. As we can see the profits are low with a slight decreasing trend, making this industry unattractive.

	2000	2001	2002	2003	4 year Average
Large Commercial Aircraft	7.9	7.8	8.5	5.9	7.5
Business & Regional Aircraft	14.8	7.9	13.3	12.0	12.0
Maintenance, Repair & Overhaul	14.6	12.8	5.4	5.9	9.7
Jet Engines	14.8	14.2	12.8	11.8	13.4
Military Weapons	8.1	8.4	8.6	7.4	8.1
Rocket launch & satellite making	0.5	0.3	2.2	(5.9)	0.7

Table 13 - Aerospace & Defense Industry Segments Operating Profit Margins (Tiwari, 2005)

ii. Apparel Industry Profile

The apparel industry has transformed to a global industry with incumbents facing competition from low cost countries, thus profits have been volatile. Another reason for that is also the lifecycle of the fashion products. U.S. and Europe are the largest markets for apparel products. In 2003, U.S. consumption of apparel and footwear was more than US$311 B (Kumar, 2005). In 2003 the U.S. apparel industry grew by 1.5% to US$ 212.5 B whereas the retail market compounded annual growth rate between 1999 and 2003 was

0.8%. On the other side, EU[19] was a €200 B industry in 2002 employing 2.1 Million persons (Chu, 2005).

The apparel industry is a slow growth and over capacitated one. The consumers are cost conscious, thus many companies are resolving to differentiating their products. Low cost sourcing mainly from Asian countries also poses threat to the incumbents. Being labor intensive, the apparel industry requires small investments in technology; however this is changing with new players devoting resources in high tech facilities and increasing the innovation.

A trend in the US apparel is the doubling of imports between 1974 and 1985 and the trade deficit was 12% (Kumar, 2005). This has been due to the low cost sourcing efforts from the companies. To this extend, a lot of apparel firms promoted private labeling so as to achieve lower costs by bypassing the expensive designer costs. This has also been part of the commoditization that has been taking place in this industry.

Important role in this industry play the sales channels, the means of reaching the customer. The alternative channels are wholesale, retail, catalog, and Internet. The wholesale channel includes selling to various types of retailers like department, specialty and discount stores as well as to national chains. 2002 -2003 has been tough for the industry (Kumar 2005) but the incumbents continued domestic and international expansion, which could also be attributed to attempts to diversify risk, leverage competitive advantages.

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[19] By European Union, it is meant the EU 15 member states.

iii. Automotive Industry Profile

The US Automotive industry is a US $542B (2003 figures, Braese, 2005) and employs 1.9 million persons. It is comprised from passenger cars, light, medium, and heavy trucks. The following table indicates the distribution in sales of vehicles by type. The predominant category in absolute number is passenger cars with a total of about 45%.

Type	Units	% of Total
Passenger Cars	7,610,468	44.9%
Light Trucks, total	9,028,572	53.2%
Medium-Duty Trucks, total	186,425	1.1%
Heavy-Duty Trucks, total	141,964	0.8%
Total US Sales	16,967,429	100.0%

Table 14 - 2003 U.S. Sales by Vehicle Type (Braese, 2005)

On the other side, the automotive retail was a US$ 699.2 B industry. The National Automobile Dealers Association with over 19,500 dealers is a major factor in the market. The dealer usually receives the vehicles by truck (specialized vehicle carriers) from either the plant or from a local distribution center. In automotive retail the dealers receive the vehicles by truck either directly from the manufacturing plant, or from a vehicle distribution center. Another observation is that the aftermarket uses different channels to provide service parts.

The segmentation of consumers is based on price, vehicle type and demographics. The marketing departments of the auto manufacturers then decide on the specific vehicle offering based on this segmentation. The decision offering process depends on

identifying the match between customer segments and vehicles, in which process there might be many combinations.

The automotive industry is dependent on the dealerships to sell the cars, although a direct channel exists too. The OEMs often incetivize the dealers to hold locally inventory of cars through favorable finance terms. This stems from the operations of the OEMs and their attempt to have as stable production patterns as possible.

The five major automotive manufacturers in terms of revenue include General Motors, DaimlerChrysler, Ford, Toyota, and Volkswagen. General Motors leads this group, but the Asian counterparts increase their share.

The main drivers (Braese, 2005) in this industry are economies of scale, globalization, competition, changing consumer demands, regulatory requirements and technology innovations. The benefits of the economies of scale are very significant to the industry so incumbents keep a stable plant utilization of about 80-90% of total capacity. Furthermore, the globalization favors international sourcing of raw material as well as selling internationally. Special reference has to be given to asian economies which have both low cost material and increasing demand for vehicles.

Relative to the third driver, competition is intense among the incumbents and in many occasions they have got into price wars. In the late 1950's the Big 3 (GM, Ford Chrysler) changed their operations so as to retain market share. In this context, all incumbents are trying to improve their operations, minimize the cost and increase the efficiency of their supply chain. Important aspect is also the changing consumer demands, especially in the U.S. where demand is scattered in many different options. The regulatory requirements, especially the environmental ones, are also constraining the

design of new vehicles and increase the cost as well as limiting the lifecycle and the geographic market. Last but not least, the technology is a lever in various stages of the product development as well as in the supply chain in general. This driver includes not only the information technologies, i.e. the computerization of producing vehicles and/or the introduction of computers in the car itself, but also the improved materials that are used in manufacturing.

Among the challenges in the automotive industry is the rationalization if the production and more precisely achieving a steady production flow subject to achieving high forecasting accuracy and flexibility. One of the systems employed for this case is the Build-to-Order, where the auto manufacturers start building a vehicle after the initiation if the order from the customer. Another concept is the modularization of the components, i.e. the sharing of the same sub-components from different end products.

iv. Computer Industry Profile

The personal computer (PC) segment is the largest and includes desktops, notebooks and other peripherals. The server segment includes mainframes and supercomputers targeted to more professional customers, whereas the workstation segment is the high-end computers that are used for engineering purposes. The size of the computer hardware industry was US $228 B in 2003 (Roy, 2005). PCs were 78% of the total sales, servers were 20% and workstations represented 2% of total sales (Roy, 2005).

The PC segment has become more price sensitive, thus it is very competitive. After the dot-com bust the growth has primarily been driven from consumer demand. The US is by far the largest market for PCs, representing almost 40% of global sales by

revenue (Roy, 2005). Relative to the consolidation that has been observed, the five major companies in the industry own the 44% of the revenues (Roy, 2005).

The servers segment lost revenues after the dot com crash in 2001 but has recovered after 2003 growing at a modest rate of 3.2% (Roy, 2005). The server market can be subdivided into three categories based on usability and performance of servers, e.g. entry-level server, the midrange servers and the high-end servers (Roy, 2005). The increase in computational power of PCs has also increased price competition in the entry level server market. However, the sales of these entry-level servers are high due to the SMEs' spending and increased awareness. On the other hand, the market for high-end servers is declining due to decrease in IT spending and R&D expenditure.

Regarding the incumbents in the market, IBM is the largest player in the server and represents 32% of the US$ 45 B market in 2003 (Roy, 2005). HP is the second largest player with 27% of the total server revenue. We can easily see that the server market is heavily concentrated to two companies. Other Computer Manufactures include Sun (12%), Dell (9%) and Fijutsu (6%).

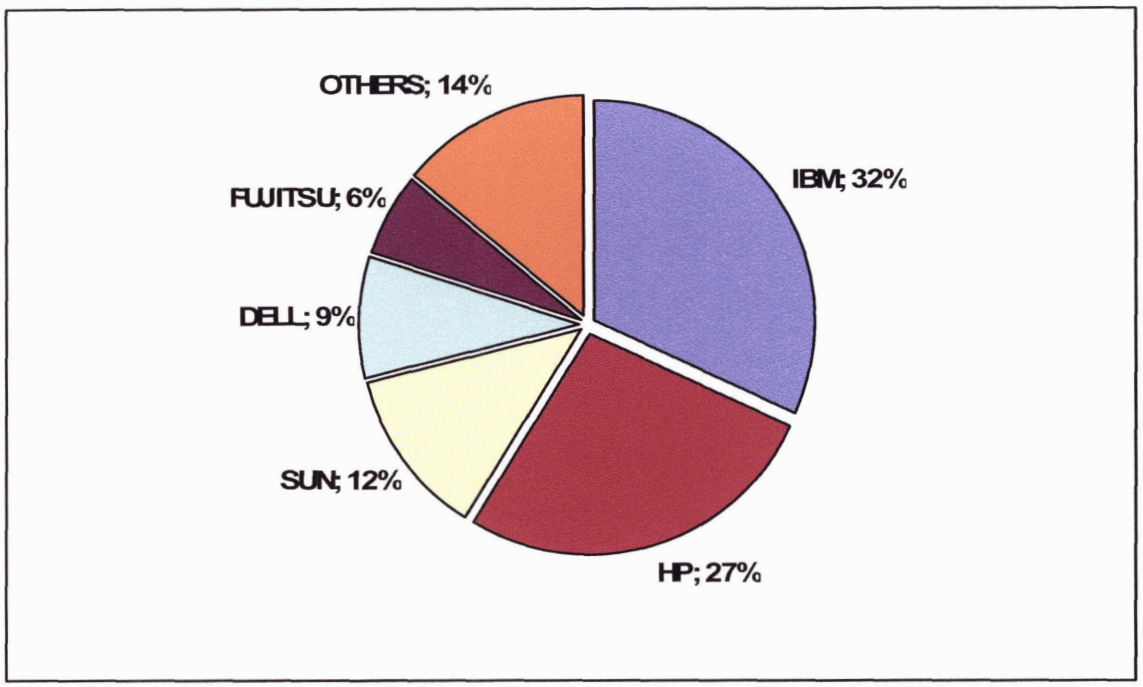

Figure 30 - 2003 Revenue Distribution by company (Roy, 2005)

However, HP and IBM have different strategies and go after different market segments; IBM is focused on the high-end server segment whereas HP on the entry-level server segment.

The last segment of this industry, the workstations, has been decreasing since 2000. This is justified by both the increasing computational power of PCs as well as from the high price of these products. As a result of this trend workstations represent 2% of total revenue.

Focusing on some characteristics of this industry, the price of the computers (especially for the PCs) has been steadily decreasing over the past years, making them affordable to a wider customer base. This has contributed to the strengthening of the sector and the firms now target (Roy, 2005) the low income segment of the market; foreseeing large growth potential especially in the developing world. Furthermore, the

industry seems to be consolidating so as to achieve economies of scale and scope. For example HP and Compaq merged in 2001 whereas Gateway merged with eMachines in 2004. Another trend in the market is the attempt from the incumbents (mainly from IBM) to redefine it. IBM has divested some of its business to diversify and strategically move to providing integrated IT services to its customers. Each of the industry incumbents is trying to go after market niches (either geographic focus or customer segmentation) so as to increase its profits by leveraging its competitive advantages. Following this trend, all incumbents have built their supply chains around their business models. However, this has not excluded some of the vendors from (attempting) penetration in other industry segments already served.

v. Telecommunications Industry Profile

During the 1970s and 1980s the telecommunications industry grew up considerably being somewhat favored by the rising personal computing. Furthermore Internet has favored the growth during the eighties along with the emergence of cellular telephony, fiber optics and wireless technology during the nineties. The industry is still evolving and trying to adapt to new challenges, one of them being the voice over internet protocol (VoIP) technologies or digital communication, which enables telecommunication of better quality and cost.

The next table shows the telecommunications industry revenue for 2004. CAGS is projected to be 6.1% for the years 2003 – 2008 and reach US$1.7 Trillion (Boasson, 2005)

	2002	2003	2004	2005	2006	2007	2008	CAGR 2003-2008
Asia/Pacific	303,471	341,913	382,258	409,51	439,602	456,891	467,058	6.4
Growth (%)	6.7	12.7	11.8	7.1	7.3	3.9	2.2	-
Central and Eastern Europe	62,616	65,527	73,738	79,387	84,218	88,208	92,558	7.2
Growth (%)	25.6	4.6	12.5	7.7	6.1	4.7	4.9	-
Latin America	78,009	81,937	95,082	104,633	112,554	120,851	130,675	9.8
Growth (%)	-17.8	5.0	16.0	10.0	7.6	7.4	8.1	-
Middle East and Africa	53,124	63,673	74,655	85,617	96,735	109,754	122,124	13.9
Growth (%)	4.9	19.9	17.2	14.7	13.0	13.5	11.3	-
North America	388,994	401,818	424,788	449,702	480,036	508,539	530,669	5.7
Growth (%)	0.0	3.3	5.7	5.9	6.7	5.9	4.4	-
Western Europe	309,429	337,846	355,734	368,409	378,765	385,578	395,103	3.2
Growth (%)	2.8	9.2	5.3	3.6	2.8	1.8	2.5	-
Total Telecom Equipment	252,956	249,975	275,959	288,79	307,474	317,546	325,76	5.4
Growth (%)	-14.4	-1,2	10.4	4.6	6.5	3.3	2.6	-
Total Telecom Services	942,686	1,042,739	1,130,295	1,208,468	1,284,437	1,352,276	1,412,427	6.3
Growth (%)	7.8	10.6	8.4	6.9	6.3	5.3	4.4	-
Total Telecom Market	1,195,642	1,292,714	1,406,255	1,497,258	1,591,911	1,669,822	1,738,187	6.1
Growth (%)	2 2	8.1	8.8	6.5	6,3	4.9	4.1	

Table 15 - Worldwide Telecommunications Market Revenue by Region, 2002-2008 (Boasson, 2005)

The services sector is larger than the equipment in size by more than 3-to-1 (Boasson, 2005) with Revenues of US$1.04 T in 2003, compared with $250 billion for equipment. It is projected (Boasson, 2005) that this ratio will be steady by 2008. The largest market is the North – Atlantic followed by the Asia/Pacific and the Western Europe. However, Middle East and Africa are also growing up.

The US Telecommunications industry had been heavily regulated and was only recently deregulated. After a long anti-trust lawsuit, deregulation began in 1982, breaking up AT&T in 1984 and opening up the long distance service market for competition. The

1996 Telecommunications Act enables competition between local telephone companies, long distance carriers and cable TV operators by reducing legal barriers to entry.

The telecommunications equipment industry has followed the general trend of boom and bust with a peak at 2000 with capital expenditure reaching almost US$ 120 B (Boasson, 2005). The aggressive spending by new entrants and competitive responses from incumbents to upgrade, improve and expand resulted to overcapacity. The excess inventory produced had to be pushed into the markets, which caused eventually the drop in the prices and the bust of the companies. This growth (generally all the high tech industries) can be attributed to the Internet bubble, since those products can also be considered complimentary.

vi. CPG Industry Profile

The CPG industry – Personal Care and Cleaning Products is a US$156 B industry, with 50% of its sales coming from the United States (Rah, 2005). The next table presents the sales in 2004 of the largest incumbents in the market.

Company	Global Sales (in $M)	Net Income	%
Unilever	54,035	3,478	28.37%
Procter & Gamble	43,373	5,724	22.77%
L'Oreal	17,669	2,082	9.28%
Kimberly-Clark	14,348	1,705	7.53%
Colgate-Palmolive	9,905	1,423	5.20%
Gillette	9,252	1,378	4.86%

Table 16 – Sales and Net Income of Market Leaders in Household Nondurables (Rah, 2005)

Unilever is the global leader in the market (even if we consider the consolidated figures of Procter & Gamble and Gillette) with US$54 B in revenue and US$4.6 B in operating income. 56% was generated in the foods category and 43% in home and

personal care. P&G follows with US$43 B along with L'Oreal, Kimberly-Clark and Colgate – Palmolive.

The beverage industry is also a part of the CPG industry. It is highly fragmented with the top five companies holding a combined 12.4% of total beverage sales. This comes after a lengthy period of rapid consolidation. Beverages have a low value-to-weight ratio so they have to be shipped directly to the customer from the production facilities. Thus firms often license out the production of their beverages to firms.

As with other industries, consolidation is a primary trend in CPGs. After the merging of Procter & Gamble with Gillette in 2005, the industry has been even more concentrated. The companies are trying to achieve higher economies of scale and advantage from synergies in their supply chains and in their marketing capabilities.

Another trend is the geographic expansion of the incumbents. North America and Western Europe are saturated mature market with no growth capabilities. Thus, expansion to new markets is inevitable to achieve growth. Among the new markets are Central and Eastern Europe, China, India and Russia. Furthermore CPG companies are trying to capture customer segments with higher disposable income in order to gain from the higher margin items.

However, in order to reduce costs, companies have devoted resources in better forecasting. Hence, companies are trying to better understand and utilize demand information and point of sale (POS) data. Part of this strategy is filling all the market niches and offering a wide product line that fulfils all customer needs.

Low cost sourcing strategies are posing a threat to the traditional business models. This trend will shift production where the production costs are lower in order to achieve higher margins. This is important in lieu of large retailers and distributors who are growing large and have start leveraging this power to achieve lower prices. Another threat retailers pose is the development of private label products which are substitute to the traditional CPGs.

The CPG Industry demand drivers include advertising and marketing, Price and Household Income and Product Innovation and Brand Extension. The demand for consumer packaged goods is heavily driven by advertising and marketing. Procter and Gamble and Unilever alone spent more than $3 billion in marketing in the United States (Rah 2005). The companies are trying to increase awareness so as to achieve customer loyalty. Another driver is the disposable income. Increase in disposable income increases the quantity the consumers buy and gives the opportunity to CPG companies to charge more. As far as the product innovation is concerned, CPG companies are following a strategy where they are trying to capture as many market segments as possible in order to achieve growth and stay competitive. This also comes from the opportunity to charge premiums for their products.

On the other hand, transportation cost, information technology, utilization, economies of scale and scope drive production. The companies in their attempt to reduce cost have followed a heavy expansion strategy, in order to take advantage of the production economies as well as synergies in the whole supply chain. Most CPGs have low cost to weight ratio which has adverse implications to the transportation costs. Thus the incumbents are trying to improve supply chain efficiency and lean production.

vii. Pharmaceuticals Industry Profile

The pharmaceutical industry heavily invests in research and development and the future of the companies depends on the introduction of new drugs to the market. Since it is very difficult to quantify the benefits on the product line basis from the R&D process, the incumbents are trying to increase conversion of the R&D productivity into a sustainable and long term revenue stream.

Drug development is a very risky business. Out of 10,000,000 attempts only one drug finally finds its way to the market (Singh, 2005). Nevertheless, the returns are very high; the pharmaceutics industry has had an annual global growth of 9 to 11% in recent years (Singh, 2005). The industry seems to reaching a saturation point. S&P (2005) projected a 7% to 8% growth rate for 2005 to US $600 B. In 2006, however, a drop to 6% to 7% growth is projected with sales reaching US$640 – 650 B.

The United States and Western Europe had a drop in the growth rates by 4% and 2.8%, respectively (S&P 2005). On the other hand, Latin America and Asia had double digit growth. China has the largest growth; in 2005 it is projected to grow by 28% reaching US $11 B.

Relative to the largest companies, the following table presents the global and US sales of the top 10 companies.

COMPANY	GLOBAL SALES (BIL.US$)	COMPANY	US SALES (BIL. US$)
Pfizer	50.90	Pfizer	30.70
GlaxoSmithKline	32.70	GlaxoSmithKline	18.80
Sanofi-Aventis	27.10	Johnson & Johnson	16.20
Johnson & Johnson	24.60	Merck	15.00
Merck	23.90	AstraZeneca	11.30
Novartis	22.70	Novartis	10.20
AstraZeneca	21.60	Sanofi-Aventis	10.00
Roche	17.70	Amgen	9.50
Bristol-Myers Squibb	15.50	Bristol-Myers Squibb	9.20
Wyeth	14.20	Wyeth	8.20

Table 17 - Leading Pharmaceutical Companies— 2004 (Source: Standard& Poors Industry Survey: Healthcare, Pharmaceuticals, 2005)

However, there are increasing concerns about the continuation of the financial success of the pharmaceuticals. The rise in the cost of R&D, the pricing pressure from health care organizations and governmental bodies, the increasing presence of generic drugs and the expiration of patent protection on key products are starting to have an impact on industry's financial performance.

The challenge is to improve R&D productivity and/or improve operational efficiency. Both of them are not trivial, since R&D production is not assured and operational efficiency implies a push model in the supply chain, which again in turn is impractical. Under this reality the pharmaceuticals have temporarily also relied on more traditional approaches, namely increase product awareness and customer loyalty, initiate concentration in the industry so as to achieve economies of scale and scope.

viii. Petroleum Industry Profile

The heavy use of the petroleum industry's products raise the importance it has to the global economy. According to the World Trade Organization (Santos, 2005), the total value of the trade of oil crude and products in 2002 was US$615B, representing 9.8% of the total global merchandise trade and 44.9% of the world exports of primary goods. The majority of the crude oil comes from the Middle East, whereas there are other oil producing countries like Nigeria, Brazil.

This industry is considered strategic because of the extensive use of oil in the modern manufacturing, in transportation and other activities.

The industry consists of upstream and downstream activities. In the first part belong the exploration, production and transportation of crude oil and gas to the point of transformation into final products (refineries). The downstream activities deal with the processing of crude oil in refineries, the distribution and the marketing activities of all the oil derived products (Santos, 2005).

Oil consumption is seasonal; during the summer months the "driving season" effect increases consumption and during winter the cold weather is related with increased consumption. The end consumers of oil and its products include retail (retail customers, household) as well as manufacturing establishments and transportation equipment owners.

The petroleum industry is a growing industry mainly through the industrialization of low cost countries like China and India. The next table presents the top 20 Oil companies' reserves and output.

COMPANY	COUNTRY	STATE OWNERSHIP (%)	RESERVES		OUTPUT		REFINERY CAPACITY(THOUS. B/D)	PRODUCT SALES (THOUS. B/D)
			LIQUIDS (MIL. BBL)	GAS(Bcf)	LIQUIDS(THOUS. B/D)	GAS(M Mcf/D)		
1. Saudi Aramco	Saudi Arabia	100	259,400	230,600	9,045	6,900	2,246	2,569
2. ExxonMobil	US	(public)	12,856	54,769	2,516	10,119	6,326	7,957
3. NIOC	Iran	100	125,800	940,900	3,852	7,640	1,524	1,618
4. PDV	Venezuela	100	77,800	148,000	2,500	4,000	3,085	2,500
5. BP	UK	(public)	10,081	48,024	2,121	8,613	3,408	6,724
6. Royal Dutch/Shell	UK & Netherlands	(public)	7,257	44,920	2,334	8,849	4,314	7,445
7. ChevronTexaco	US	(public)	8,599	20,191	1,808	4,292	2,164	3,738
8. Total SA	France	(public)	7,323	22,267	1,661	4,786	2,696	2,982
9. Pemex	Mexico	100	16,041	14,850	3,723	3,244	1,692	1,536
10. PetroChina	China	90	10,997	41,147	2,120	2,407	1,990	1,548
11. ConocoPhillips	US	(public)	5,171	16,060	1,241	3,522	2,840	3,046
12. KPC	Kuwait	100	99,000	55,500	2,170	1,054	1,085	1,054
13. Sonatrach	Algeria	100	10,533	148,960	1,729	7,807	450	747
14. Adnoc	UAE	100	55,210	133,348	1,200	4,242	912	371
15. Petrobras	Brazil	32	9,772	11,202	1,701	2,010	2,103	2,400
16. Pertamina	Indonesia	100	4,722	90,262	1,139	2,562	1,057	1,156
17. Eni	Italy	30	4,138	18,008	981	3,486	681	1,005
18. Repsol	YPF Spain	(public)	1,882	19,942	594	3,021	1,234	1,252
19. Lukoil	Russia	8	15,977	24,473	1,622	364	1,151	1,094
20. NNPC	Nigeria	100	21,153	105,836	2,166	677	445	306

Table 18 - World's top 20 oil companies — 2004 (Source: S&P Oil and Gas Industry Analysis, 2005)

The following table presents the revenues and income for the biggest US petroleum companies as well as the 2003 – 2004 growth.

Company	Million US$ Revenues	% 04-03	Million US$ Net Income	% 04-03
EXXON MOBIL	291,252	27%	25,330	18%
CHEVRONTEXACO	147,967	29%	13,328	84%
CONOCOPHILLIPS	121,663	22%	8,129	72%
VALERO ENERGY	53,919	45%	1,804	190%
MARATHON OIL	45,444	22%	1,261	-5%
SUNOCO	23,226	46%	605	94%
AMERADA HESS	17,126	18%	977	52%
PREMCOR	15,335	74%	478	310%
TESORO PETROLEUM	12,139	39%	328	331%
MURPHY OIL	8,634	62%	701	138%
FRONTIER OIL	2,862	32%	70	2059%
GIANT INDUSTRIES	2,513	37%	16	45%
HOLLY	2,246	60%	84	82%

Table 19 - US Petroleum Indusrty Financials (Santos, 2005)

There has been some consolidation in the last ten years in the industry which led to the "Sisters". Again this is a natural outcome from the attempt to achieve growth, market penetration and economies of scale. The downstream industry is usually characterized as a mature, rather competitive, and complex industry (Santos, 2005). Petroleum refining presents the biggest challenges in the downstream supply chain. The prices of the raw materials and the final products are highly volatile and considering the capital intensity of each establishment this makes it an unbalanced investment.

Among the issues that the petroleum industry faces is the environmental regulations and compliance rules which are increasing in severity. Furthermore, geopolitical factors conserve high volatility of petroleum prices in the international markets. For those reasons the industry attempts to reduce cost and increase efficiency in order to improve profitability.

ix. Retail Industry Profile

The retail industry markets very diverse products. One classification of the product distinguishes them to durable and non-durable goods. Durable goods are products that are not consumed or disposed of relatively quickly and include automotives, furniture and the like. Non-durable goods on the other hand are general mass merchandise, apparel and grocery items.

Retail sales in 2003 were US$3.40 Trillion resulting from a 5.4% growth from 2002 (Chiles & Dau, 2005). The importance of the retail industry in the US economy (Chiles & Dau, 2005) stems from both the turnover (approximately 31% of the US Gross

Domestic Product) and from the number of employees (more than 23 million in 2004 or approximately 20% of the total US workforce).

Figure 31 represents the growth of the retail industry as well as the trend. The growth from 2002 to 2004 can be attributed to two distinct product categories (Chiles & Dau, 2005), luxury goods and general merchandising or discounted stores' goods. There seems to be some correlation of the growth in sales for luxury goods to the increase in the consumer disposable income. This is also endorsed from the downturn which was experienced in 2001, after the Internet and Stock Bubble and the 9/11 attacks. This weak economy also resulted in the rise of discount super-stores like Wal-Mart, Target and the like.

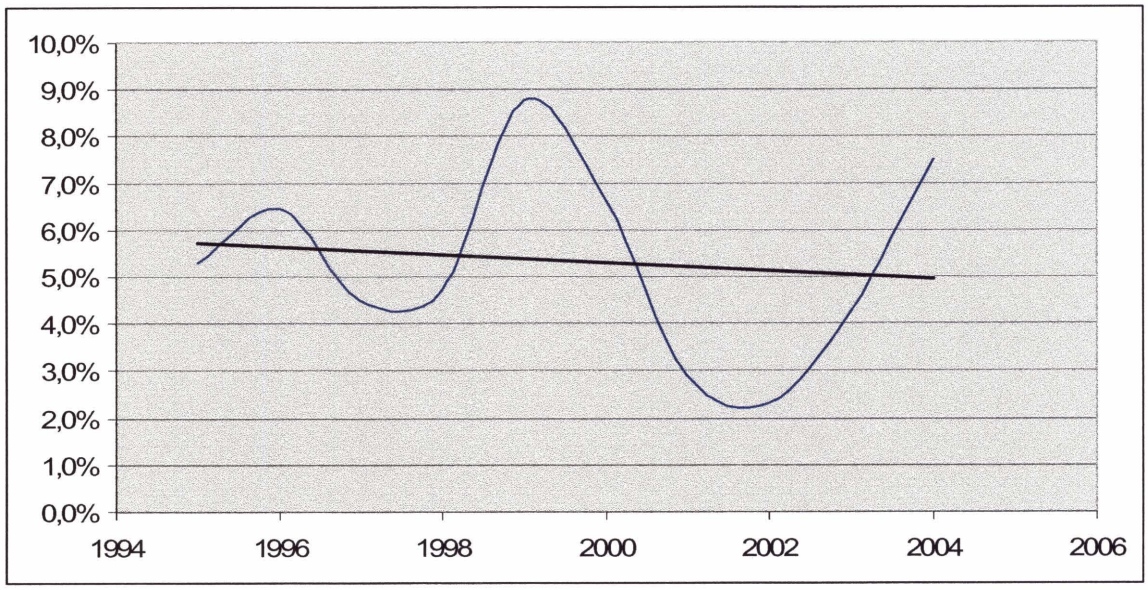

Figure 31 - Retail Trade Growth (Source: S&P General Retail Industry Research, 2005)

One important strategy is to fulfill customer needs, which entails understanding them and increasing product availability. The major issue here is using effectively the consumer demographics in order to improve the customer segmentation.

Regarding the retail channels, the industry is Multi-channeled (Chiles & Dau, 2005). Figure 32 presents the channel breakdown of the retail industry. It can easily be discerned that multi-channel practice is dominant in the market.

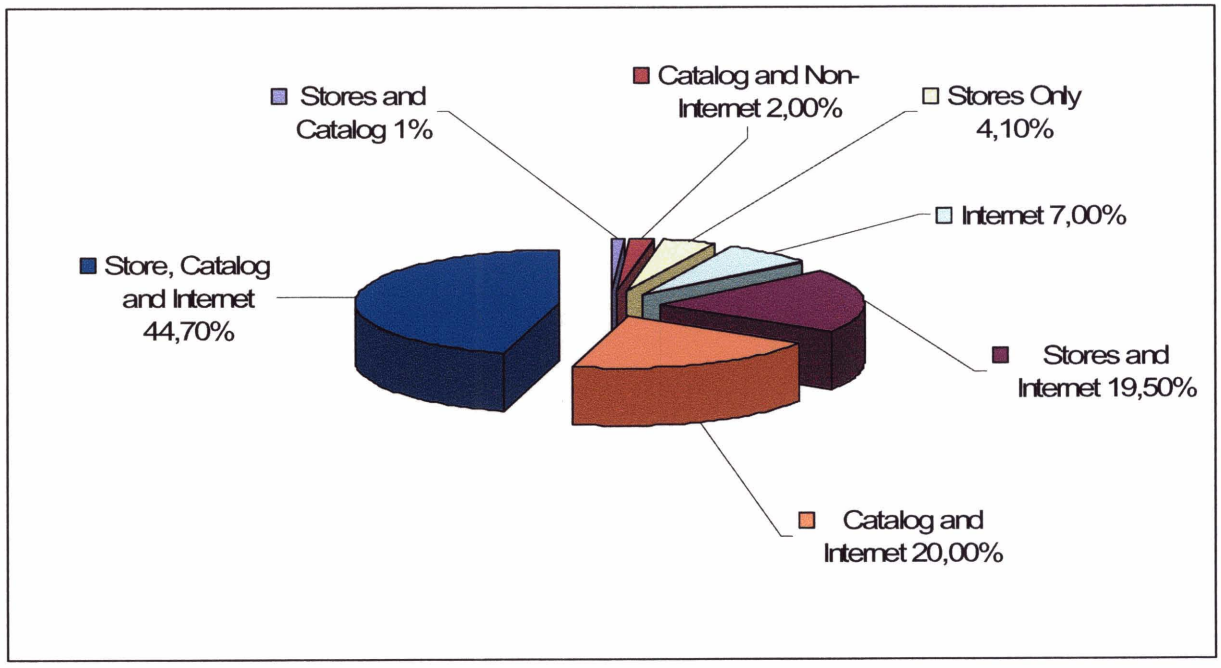

Figure 32 - Single and Multi-Channel Retailers by % (Source: Chiles & Rau, 2005)

As for the company breakdown, the following table presents the top 20 global retailers by revenue in 2004. Wal-mart is by far the largest retailer, which enables him to exert his buying power to suppliers (as will be explained later).

Company	Sales (US$ Mil)	Country
Wal-Mart Stores Inc.	256,329	US
Carrefour SA	79,653	France
The Home Depot Inc.	64,816	US
Royal Ahold N.V.	63,360	Netherlands
Metro AG	60,565	Germany
Kroger Co.	53,791	US
Tesco PLC	50,342	UK
Target Corp.	48,163	US
Rewe Group	44,275	Germany
ITM Enterprises	43,394	France
Costco Wholesale Corp.	42,546	US
Sears, Roebuck and Co.	41,124	US
Aldi Group	36,000	Germany
Safeway	35,552	US
Alberston's Inc.	35,436	US
Ito-Yokaido Co, Ltd.	33,854	Japan
Walgreen Co	32,505	US
Auchan	32,439	France
Lowe's Cos.	30,838	US
E.Leclerc	30,737	France

Table 20 - Top 20 Retailers Worldwide by Revenue in 2004 (US$ M) (Source: Chiles & Dau, 2005)

Retail industry supply chain trends are based on inventory management efficiency and supplier and retailer relationships. Low profit margins are also affecting the business model of the retailers which are trying to improve efficiency and decrease costs. Retailers are focusing their efforts in deepening the collaboration upstream the value chain, mainly by information sharing so as to minimize overall costs. Lastly, another trend that is dominant in the industry is the transformation of the traditional retailer to a virtual company. This benefits the internal cost structure, since those companies have reduced inventory costs. However, the challenge is to better utilize the customer patterns and come up to better customer segmentation.

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