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Supply Chain Benchmarking

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Supply Chain Benchmarking

A Major Qualifying Project Report:

submitted to the Faculty

of the

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

by

Allison DiNitto

James Hanlan

Date: March 20, 2008

Approved:

______________________________
Professor Amy Zeng, Major Advisor

This report represents the work of one or more WPI undergraduate students submitted to the faculty as evidence of completion of a degree requirement. WPI routinely publishes these reports on its web site without editorial or peer review.
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Abstract

Global companies are constantly fine-tuning their supply chains and Nypro, Inc. is no exception. The goal of this project was to assist Nypro in their on-going supply chain enhancement endeavors through extensive, survey-based benchmarking studies. The path to this goal was three-fold: to evaluate the company's recent progress in this area, to benchmark Nypro with respect to major companies in the region, and to make recommendations for future supply chain improvements.
Chapter 1: Introduction

Company Background

Nypro Inc. is an expansive company that operates fifty-two separate businesses dealing with varying areas within the plastics industry; from the design and creation of plastic products to the product supply and general assembly of plastic materials and products. The backbone of Nypro is not producing their own product and selling it, rather, the company builds upon the basis of designing and manufacturing plastic products specifically designed for their customers.

It is because of this business model that the company has implemented a customer first mentality throughout the company. While customers are important to any business, this is especially true for Nypro, as they have no real “product” of their own. The fact that Nypro is completely employee-owned reinforces this customer first mentality. Nypro being completely employee-owned means that everyone working there has a very real and personal interest in the success of the company and, by extension, the happiness and satisfaction of the company’s customers. The company’s motto, “We’ll be there for you,” reflects this drive, aided by Nypro’s constant search for new ways to better themselves and the services they provide their customers.

This is where the project group came in. The two of us, Allison DiNitto and James Hanlan, entered the company to perform a study that would result in recommendations relating to aspects of the supply chain management system that Nypro currently has in place.
Problem Statement

The core idea of this study was to analyze the new internal supply chain management strategies of Nypro Inc. in comparison to what they were one year ago and the Supply Chain Management techniques of several major companies that are located in the Northeastern United States. The result of this analysis would be the creation of a final benchmark for the company to utilize in order to improve its overall Supply Chain.

Project Plan

The project team’s strategy for accomplishing this was to conduct a benchmarking study of the supply chain management department at Nypro. This was accomplished via surveys of employees inside Nypro and with people in the supply chain management systems of other major companies in New England. The project team selected this method as the previous project group utilized a similar strategy of surveying employees of Nypro and its major competitors. The results that survey produced caused it to be recommended as a benchmarking method for supply chain management by the engineers in the department. Further, this method is especially effective as the internal survey informs the company regarding how far they have come since the previous study, while the external survey provides ideas as to where to head next.

Goals and Objectives

The study performed at Nypro had six primary objectives. These goals center on both company advancements as well as the group’s personal learning.
1. **Understand the complexity of the chain.**

   In order to make appropriate recommendations for Nypro, the MQP team must understand the company’s structure and the roles of its supply chain. The ability to take an in-depth look at a working supply chain provides the team with evidence of in-class learning.

2. **Gauge internal customer satisfaction.**

   While external customer satisfaction is important to any company, internal customer dissatisfaction can have longer, and far wider in range, ramifications on the company as a whole.

3. **Understand supply chain team and leadership capabilities.**

   Recommendations must be realistic for Nypro. Having a strong understanding of team and leadership capabilities will help guide future improvements.

4. **Develop understanding of under-served functions and offer better service in the future.**

   The areas of Nypro that need the most help make great starting points for change. Premature adjustments have the potential to make a situation worse. Understanding the needs of these functions allows for beneficial changes.

5. **Evaluate internal customer’s perceptions about supply chain management and capabilities.**

   For internal customers to be satisfied with supply chain management, all parties must be kept on the same page. Management needs to be made aware of dissatisfaction in order to reach a resolution.
6. *Analyze Nypro’s supply chain as compared to other companies in the region.*

It is important in business to be knowledgeable in the best practices of other companies. Even if most ideas will not work for your company, even one time or money saver makes the time spent researching worth-while. It is important to recognize that there is no perfect supply chain, and that there is always room for advancements.

**Expected Results**

The project groups’ expected results are three-fold. First, the team expects to provide the supply chain management at Nypro with meaningful feedback regarding how the various departments and facilities within the company view their efforts. Second, the project team expects to provide the supply chain management group with useful strategies that other companies utilize to reduce cost and/or improve their processes. Lastly, the project group fully expects to gain valuable experience within the corporate environment while also improving the fundamental skills gained at WPI in data gathering, modeling and analysis, and process improvement.
Chapter 2: Literature Review

Supply Chain

At this point, the reader may be wondering just exactly what a supply chain is. The dictionary states that a supply chain is “any sequence of processes involved in the production and distribution of a commodity.”¹ If one were to look at the term commodity in its broadest sense, which would include unfinished products and raw materials, then the dictionary definition would be sufficient. However, this textbook definition of a supply chain does not adequately quantify the complexities that are inherent to a supply chain.

The average supply chain will start at the most basic level, at the customer order, and link upwards to other levels of production such as raw materials, component construction, assembly, and storage of varying sizes. A superb supply chain is one in which the companies and corporations involved freely exchange information regarding their production capabilities and any fluctuations within the market. This flow of data makes a supply chain truly effective, as it allows for the full optimization of the supply chain as a whole. With this type of supply chain in place, the overall production and distribution will be greatly improved and better sales and profits for the companies involved is a likely result.

The importance of a company’s supply chain cannot be understated. Today more and more companies are realizing the impact of their supply chain regarding their ability to compete in an ever-increasing global market. The developments within the last century of Just-In-Time

¹ www.dictionary.com
and Lean Management systems have proven to be the stepping-stones for these companies as they refine and renovate their supply chains for the company’s future.

**Benchmarking**

Benchmarking is a process used by organizations to evaluate particular aspects of a method within the organization by comparing their processes to the best practice(s) within their sector. The process of benchmarking allows these companies to improve their processes by adopting aspects of the best practice that can improve areas in which the company is lacking. Benchmarking is frequently run as a continuous process so that organizations may constantly find new methods to improve their existing methods.

Benchmarking is especially useful for any company as it allows the organization to get onto the balcony and observe their processes from an outside viewpoint. This outside viewpoint is necessary as it allows the members of an organization to overcome the idea of “how we have always done it is the best way because it is how we have always done it.” Benchmarking overcomes this mode of thinking by demonstrating the “best” methods and how much more effective they are than the current methods. These demonstrations help to overcome any resistance on the part of organization members who will be utilizing the new processes.

The process of benchmarking can be broken down into six core steps:

1. **Identify the problem areas.**

   This may be accomplished through a number of methods including surveys, focus groups, or informal conversations with customers and employees. Regardless of the method used, the goal is to discover which areas within the organization need improvement when compared to the rest of the organization.
2. *Identify other industries that have similar processes.*

The organization must find industries that have processes similar to those the organization is seeking to improve. Effective benchmarking consists of comparing apples to apples, not apples to grapefruits.

3. *Identify the leading organizations in these industries.*

The idea behind benchmarking is that an organization betters its processes by comparing them to the “best” practices. To do this, the organization must determine which companies are worth being compared alongside.

4. *Survey companies for practices and comparative measures.*

The organization contacts these leading organizations for basic information regarding the processes that they are looking to improve. This contact is usually done through surveys.

5. *Visit the “best” companies to identify leading edge practices.*

Organizations will typically mutually exchange information about the processes in question. The results of this surveying are usually shared by all companies within the benchmarking group.

6. *Initiate the new business practices.*

After the research aspects of benchmarking have concluded, the organizations involved can take the information obtained and see what is implied regarding their own practices. Appropriate plans can then be drafted to implement new processes based off the information obtained from the benchmarking project.
The companies that can benefit the most from benchmarking practices are as flexible as possible. Due to the nature of the business and technological worlds, new practices and technologies are constantly being developed that companies can use to improve their existing processes. The more flexible a company is, the more able the company is to readily adapt to, and adopt, these new processes and retain a competitive advantage.

**Supply Chain Strategies**

**Cross-Docking**

Cross-docking is a method that distributors utilize to minimize inventory storage. This practice involves unloading materials from an incoming form of transport and swiftly loading them onto an ongoing transport. This would normally be done when the materials are being switched to a different form of transport, such as coming into a harbor on a boat and leaving on a train, when materials on the incoming transport are going to be sent to different destinations, or when materials from several points of origin share a destination. When cross-docking is being utilized to its full potential, the results are little to no warehousing, as the materials will not have to be stored.

The defining line between a cross-docking operations center and a warehouse is the time required. If the transferring of materials from one type of transport to another is a process that requires several hours up to a full day, then the station is a cross-docking center. However, if the process will take days or, potentially, weeks then the station is a warehouse. The station is defined as a warehouse due to materials spending more time in on-site storage than they would at an actual cross-docking center.
One of the applications of cross-docking is the hub and spoke arrangement for materials transfer. This arrangement is one in which materials travel down several spokes to a central hub where they are sorted into new containers and packaging to suit their destination. The materials are then sent down a different spoke. The hub in this case is the cross-docking center. The hub and spoke arrangement has certain advantages and drawbacks. Specific advantages are that scheduling is more convenient than other conventional methods, transportation resources are used in a more efficient manner, and connecting new spokes to the central hub is quite simple. The drawbacks to this arrangement stem from the fact that it is very centralized around the hub. If a change is made at the hub, it can ripple across the entire wheel and have unintended effects to other spokes. Furthermore, the hub itself is a bottleneck for the entire arrangement, the “wheel” can only handle up to the capacity of the hub.

**Strategic Partnership**

A strategic partnership is an agreement made between two companies that, while formal, falls short of a corporate affiliate relationship. Strategic partnerships are typically formed when each company possesses one, or several, business assets that would be beneficial to the other(s) but that they do not wish to create themselves. Common strategic partnerships include manufacturers pairing with their suppliers, such as the Ford and Firestone partnership that lasted until the 1960s. In the case of partnerships like this example, the companies form a close relationship in which they may mutually participate in advertising, marketing, and product development. The drawback to these partnerships is that extensive negotiation is frequently required to prevent difficulties arising over intellectual properties, the splitting of profits and expenses generated by the partnership, the duration of the partnership, whether and how the partnership can be terminated and other similar issues relating to the partnership. The benefits of
strategic partnerships however, are widespread and can have beneficial impacts for areas such as shipping, product design, and information technology infrastructure.

**Reverse Logistics**

Reverse logistics is the process of removing items from their current point in the supply chain and redistributing so as to obtain the maximum value of the item at the end of its’ original useful life. This process is frequently used with relation to returned or damaged goods, as these types of goods can no longer be sold for their original value. The redistribution location for these goods can include warehouses for storage, the original manufacturer of the goods for the purposes of reimbursement, a secondary market such as a wholesaler, or any combination of these options that will result in the acquirement of the maximum value for the goods in question.

A reverse logistics system is considerably different from a normal logistics process. Rather than simply enabling materials to move on to the next spot within the overall process, reverse logistics concentrates on removing products from their current location within the supply chain and redistributing them outside of the supply chain. A reverse logistics system requires convenient effective points to collect and/or remove goods to increase the overall efficiency of the supply chain. Packaging and storage systems are also required for a reverse logistics system to ensure that the goods do not lose any additional value. This system may also require the development of its’ own transport system that will also have to be compatible with the existing supply chain to maintain full efficiency overall.

**Supply Chain Components**

A successful supply chain is one that involves collaboration by all the parties involved. Successful supply chains are those that integrate their activities into key supply chain processes.
In order for these supply chains to be fully optimized, continuous information flows are required to achieve the best product flows within the supply chain. The key supply chain processes are:

1. *Customer relationship management (CRM):*

   Customer relationship refers to the concepts and tools used by companies to manage relationships with their customers. These tools can include the storage and analysis of customer, vendor, and partner information, as well as the internal process information of the company itself. Other tools that are used concerning customer relationship management include such commonplace features as twenty-four hour tech support for the company’s products. These tools allow the companies within the supply chain to maintain a beneficial relationship with their customers and partners as well as build customer loyalty to the company.

2. *Customer service management (CSM):*

   Customer service management is the public face of a company’s customer relationship management efforts. While CRM concentrates on storing and analyzing the data obtained from customers, CSM actually obtains that data. The Customer Service department sends and manages customer feedback surveys, as well as operating the tech support and helpdesk functions that CRM uses to learn about their customers. It falls upon the Customer Service department to give the customers information regarding product availability and upcoming service efforts.

3. *Demand management:*

   Demand management refers to the processes that companies utilize to balance the customer’s demands with the capabilities of the supply chain. If these processes are used properly, they allow a company to meet those customer demands that are reasonable with a
minimal disruption to the supply chain. Demand management processes can include forecasting future customer demands, synchronization of supply with demand, as well as increasing production flexibility while reducing quality variation. Demand management systems also key customer data, gathered through CRM, to provide efficient flows within the supply chain while also coordinating marketing requirements with the company’s production plans.

4. **Order fulfillment**:

   This process involves more than just the filling of orders that the name implies. Order fulfillment involves all activities that allow a company to meet customer requirements and demands while minimizing the costs to both the company and consumer. The main objective of the order fulfillment process is to create a system that flows seamlessly from suppliers to the firm on to the customers.

5. **Manufacturing flow management**:

   For a supply chain to be optimal, the manufacturing processes must flow simply and effectively to ensure that products move through the plants and reach the suppliers in a timely fashion. Manufacturing flow management involves all the activities that are necessary to maintain, and improve, these flows. Various activities that fall within this process include those relating to the scheduling and support of work-in-process storage, transportation, and the handling of components of the company’s products. The overall goal of effective manufacturing flow management is to streamline efficiency within the company’s manufacturing plants while maintaining maximum flexibility.
6. **Supplier relationship management (SRM):**

This process is a mirror of customer relationship management. Supplier relationship management concentrates on building long-term relationships with those suppliers that commit the most long-term value to the company. Specifically, supplier relationship management concentrates on those suppliers that supply key components to the company. An example would be a company that supplies silicon chips to a computer manufacturer. The arrangements made through SRM are frequently win-win as the suppliers are provided with long-term guaranteed business and the manufacturers have a guaranteed flow of needed parts. These agreements typically include some form of fixed price arrangement that both companies have agreed upon and have terms that provide for renegotiation after a certain number of years to accommodate price inflation.

7. **Product development and commercialization:**

This process deals mainly with the development of new products and the successful integration of these products into the existing supply chain. The employees working with this process will have to work extensively with the SRM and CRM teams, as the company will need to know what customer needs will be fulfilled by the new products and whether the company’s current suppliers can handle the additional demand generated. This process also requires extensive networking with the manufacturing flow management team as new production technology may be required to create the planned new product.

8. **Returns management:**

Returns management deals extensively with reverse logistics and cost reduction processes. Returns management is the process through which product returns are either avoided
or managed to minimize the final cost to the company. Methods that can be used to avoid product returns include ensuring a high level of quality before products are shipped. The overall goal of the returns management process is to reduce unwanted returns through preventing any but the highest quality of products being shipped. In doing this properly, a company creates a major competitive advantage through the reduction of returns while increasing customer loyalty due to the high quality of the products.

**Supply Chain Technologies**

There are a variety of technologies available for use by supply chain managers. What follows is an overview of some of these tools. All of these can be used independently of each other. However, to create the most effective supply chain all of the appropriate tools should be utilized.

1. **Radio-Frequency Identification (RFID)**

   RFID tags are automatic identification transponders that store and remotely retrieve data. The information stored on these tags can be read using radio wave readers that can identify the data stored from as much as several meters away and do not require a direct line-of-sight to do so. The applications of RFID tags for inventory management are enormous. RFID tags can be implanted into crates of parts stored within a warehouse. Using RFID in this manner allows a warehouse supervisor to instantly pull up the location of any crate on a portable reader, thus allowing the warehouse inventory to be stored and transported in a far more efficient manner and eliminates the need to search through an entire warehouse to find a specific shipment.

   There are certain drawbacks to RFID technology. For one, RFID is not applicable to every business and industry. For those businesses that utilize low cost inventories, the additional
cost of implementing an RFID system may amount to more than the cost of losing track of some inventory units.

2. **Just In Time (JIT)**

Just in Time is a business strategy centered on improving a business’s return on investment by reducing the in-process inventory as well the costs associated with said inventory. JIT’s core idea is that production should be centered on a pull system as opposed to a push system. In other words, rather than simply producing parts non-stop and shuffling them on to the next station, production actually starts at the end of the production line. The way that JIT works is that there is a certain number of work in progress at each work station, the last station within the production line will start working on their work in progress first, when they have created their first finished product, they send a signal to the previous work station to begin work on their work in progress and so on up the line. In this manner, the amount of work in progress is kept static as only as many pieces as the line can effectively handle are created, thus preventing a bottleneck from forming within the production line.

JIT extends beyond the production line, however, and also has an impact within the warehouse. With an effective JIT system in place, warehouse storage can also be kept at a minimum. The continuous information flow up the line created by JIT allows the warehouse manager to ascertain what the proper safety stock within the warehouse should be. The safety stock could be the amount of stock that is needed for a day’s production, a week’s, or a month’s, whatever management decides is appropriate. When the warehouse starts to ship to the manufacturing plant out of their safety stock, that is the signal for the warehouse manager to place a new order of stock.
The drawback to a JIT system is that it leaves the manufacturer open to severe shocks to their inventory system. Should there be a sudden spike in demand, or a breakdown within the supply chain leading to the warehouse, the manufacturers could find they are unable to produce as they may run out of warehouse stock before a new shipment can arrive. Ways to avoid this inherent problem include running several different methods of demand forecasting. In order to forecast future demand effectively, manufacturers should run both long term and short term forecasting. The long term forecasting should run anywhere from three to five years and will allow manufacturers to forecast any regular seasonal spikes in demand. Short term forecasting should run on a twelve to eighteen month basis and will allow manufacturers to observe if there is any gradual increase in demand that will require them to adjust their safety stock level to compensate. Both of these forecasts should be run on a continuously renewed schedule. That is to say that if the current short term schedule is being run from January 2007 to January 2008, then once the month of March starts, the short term schedule should be adjusted and account for the months of February 2007 to February 2008. This method will have certain costs inherent as the appropriate calculations will have to be accounted on a monthly basis, this will ensure that the company can make the most accurate forecasting possible.

3. **Six Sigma**

Six Sigma is a set of practices designed to systematically eliminate waste within a system while also improving the processes of that system. Six Sigma is a continuous process, rather than a one-time effort, that centers on the steps of DMAIC: **Define, Measure, Analyze, Improve,** and **Control.** First, a company must define improvement goals that will be consistent with the company’s overall strategy while also meeting the customer’s demands. Secondly, the company must measure their current processes to collect the data required for the next step. The company
must then analyze the data gathered and determine the relationships between areas of the processes and any defects found within the products. Next, the company must use scientific experiments to determine how the processes can be improved to eliminate the defects found in the earlier steps. Lastly, once the new processes have been determined, the company must pilot these processes to establish what the new process capability is. Once these new processes are initiated, the company must continue to measure the process and institute any new control methods as they are required.

**Surveying**

Surveying is a process tool that is used throughout the world as a means of gathering factual information pertaining to specific subjects, much like certain elements of the external survey run during this project. Surveys are also used in the same widespread fashion to gather opinions regarding particular subjects, much like certain elements of the internal survey performed during this project. Surveys are typically performed in relation to some other undertaking. These surveys are typically performed either before another project is begun to gauge what should be done, or after the project to gauge the success of the project as it relates to the internal customers.

Surveys are a particularly useful tool for organizations if they are run properly with regards to the surveyors’ ultimate goal. For example, if the goal of a survey is to collect employee’s opinions regarding certain aspects of a company’s functionality, the survey is best left anonymous. The reasoning behind this is manifold; a survey of this nature is best left anonymous as employees are likely to be, at least slightly, suspicious when asked for their opinion regarding an area of the organization. Employees may feel that such a survey is actually
a trap and that putting down their true opinion will land them in hot water down the line. Keeping the survey responses anonymous will allay this fear and encourage employees to respond. This will result in a higher response rate on the survey and will likely result in “truer” collection of responses as employees will not feel a need to “pad” their responses in order to avoid getting into a conflict.

On the other side of the coin, if a survey being run within an organization is collecting data with clearly delineated criterion, such as a survey amongst department managers regarding their departments functionality, the survey should not by any means be anonymous as it would defeat the purpose of the survey. Using the above example, if that survey were to be anonymous, then everyone involved would be frustrated with the outcome. The surveyors would have a fistful of data with no meaningful context to apply it to, while those surveyed would not see anything meaningful come out of filling in the survey for the very same reason.

**Survey Design**

After reading the previous section on how important it is to have a survey that is designed properly, a person may feel some trepidation about actually designing a survey for fear that it would be designed wrong and thus fail miserably. The following section takes a look at the process of designing a survey. While what follows is not the only procedure that can be used in deciding upon a survey’s design, it is the one that the project team recommends. The steps in designing a survey are:

1. *Define the goals of your survey.*

   This first step may seem a little redundant, after all, who decides to run a survey without knowing what they want the survey to be about? What this step really entails is a refinement of
what the survey should be about. For example, suppose a manager wants to know about employee attitudes within his department. That is a very general subject to be surveyed on and the responses will vary. By refining the subject down to employee attitudes on specific areas the proposed survey becomes much more manageable.

2. *Select the target population and sample size.*

   For many surveys that will be run within an organization the target population is obvious. A survey regarding employee attitudes at work dictates that the target population would consist of employees within the organization. That said, as easy as defining a target population can be for corporate surveys it still must be done carefully, if the wrong population is designated as the target population then the survey results will be next to useless. After the target population is decided upon, the sample size must then be decided. The sample size is the amount of the target population that will actually be surveyed. While the preferred choice for accuracy would be to survey everyone possible, this cannot always be the case considering a survey can be limited by the available time, the available budget, or the amount of precision required. In these cases the surveyors must make a decision regarding their sample size while taking into consideration any constraints that they may have to operate under.

3. *Deciding on a survey method.*

   Once the surveyor has decided upon their survey goals, target population, and sample size, the survey method must then be decided upon. There are multiple survey methods, each with their own positive and negative aspects. One method of surveying is a personal interview, in which the surveyor presents the question face-to-face with the person being surveyed. Advantages of this method include the fact that longer interviews are generally better tolerated in person than through other forms of communication. A disadvantage of this method is the
prohibitive cost associated with having the surveyor perform personal interviews with everyone being surveyed a process which, depending on the sample size, could take weeks.

Another method of surveying that is commonly used within organizations is surveying via e-mail. Advantages to this method include speed and low cost. A survey sent out via e-mail reaches its targets almost instantaneously and, since the survey does not have to be printed out, carries a price tag of close to zero. Disadvantages to this type of survey within an organization include a forgetfulness factor. When a survey is sent out via e-mail, someone being surveyed can see it and say to himself “Oh I’ll do that after I finish this,” and then completely forget about the survey. This type of survey frequently requires several reminder e-mails being sent out in order to ensure an adequate response rate.

A final method of surveying prevalent within an organization is internet, or web page, surveys. This method has several advantages, including the sharing speed and low cost of e-mail surveys. Webpage surveys frequently have error checking tools built in so that respondents have to answer the survey in the correct format. Webpage surveys also allow for confidentiality without requiring a middleman to ensure that confidentiality. A disadvantage to this type of survey is, aside from the same forgetfulness factor that e-mail surveys encounter, a need for extreme brevity in the survey format. People filling out a webpage based survey are less likely to fill in long answers and more likely to drop out of the survey part way through if it is too long.

4. Question Design.

There is a simple acronym to remember when designing a survey. KISS – keep it short and simple. If a survey is too long, in the project team’s opinion any survey that takes longer than ten minutes to fill out is too long, there will be a corollary drop in responses. When designing a survey, the questions within should be primarily “need to know” questions, meaning,
the questions should be those to which the answers are essential to the purpose of the survey. If the survey appears too short, “useful to know” questions can be added, but the primary goal of requiring ten minutes or less to fill out should remain paramount. Any survey should also include a cover page or introduction so that the recipients know what the survey is going to be asking, who sent the survey, and why they are receiving it thus hopefully promoting responses. Lastly, any good survey should include a “don’t know” or “not applicable” response to most if not all questions. This prevents recipients from becoming frustrated at having to give an answer they do not feel is representative and then abandoning the survey.

As far as the types of questions included in a survey, there are three general types of questions: multiple choice, rating system, and open ended. Multiple choice questions present the respondent with a variety of answers and ask that they choose the answer that best suits them. Rating system questions frequently present the respondent with a statement and ask them to choose from a scale of anywhere from 1-4 up to 1-10 that best suits their view. Open ended questions are those questions that simply ask a question and have a blank field for the respondent to fill in their own answer to the question. Of these three types, the open ended questions are best left towards the end of the survey. Open ended questions are the most likely to cause people to drop out of a survey, thus they are best left towards the end so that people may be more inclined to just filling them in since they are almost done with the survey. As for rating system and multiple choice questions, these are best placed in a survey when they are scattered so that the type of question alternates every few questions. This helps to prevent respondents from getting “survey fatigue.” “Survey fatigue” is the term the project team came up with to define what happens when a survey respondent becomes bored with repetitive forms of question and starts putting the same answer down for each question without actually reading it. Randomizing
the placement of multiple choice and rating system questions helps prevent this as the respondent will have to pay slightly more attention to the question to know how to answer it.

5. *Piloting the survey.*

Before a survey is released into the field, it should be piloted with a small select group of people. This group can be a selection of the type of people who will eventually be receiving the survey, or a collection of co-workers within the organization, so long as the survey designer is not in the pilot group. The purpose behind the piloting of the survey is to ensure that everything within the survey is understandable and works the way it is designed to. No survey should be sent out without having been piloted first. Without a pilot run a survey designer runs the risk of having certain questions being skipped over because they are too difficult to understand for the target audience.

That may seem like a lot of information for something as basic as a simple survey. While that is correct, there was a lot of information on a simple survey format, the fact is that it is all important information. When a survey is sent out the goal is for a large number of responses to come back so that an adequate amount of data analysis can be performed. As such, any survey sent out should be prepared carefully so as to appear as well thought out as possible and encourage responses.
Chapter 3: Methodology

The first step in fulfilling the project team’s goals for the project, while also meeting the requirements of Nypro, was to create a plan of action that would satisfy both of these goals. Once that general plan was created, the project team had to meet with Nypro and acquire at least an approximate timeline for when the major requirements would need to be completed for the company. As soon as the timeline was acquired, the project team then had to go back and review their plan of action to ensure that the timeline the group had created for themselves meshed with the expectations that Nypro presented in their timeline.

Once the definitive timeline for the run of the project was created, the group had to sit down together and divide the work based on each group member’s particular strengths and interests while also ensuring that each group member would keep the other informed as to what was going on with their work. Once all of the assignments were figured out, the general research portion of the project began. During this phase, the project team gathered all of the necessary information needed to ensure a smooth-running project. This included (but was not limited to) creating a company profile on Nypro, collecting background material on effective supply chain management technologies, techniques, and components, as well as gathering information on benchmarking and surveying techniques.

Internal Survey

The first major stage of the project for the team was to create an internal survey for Nypro that would be sent out to various members of the organization to gauge their satisfaction with the supply chain management group. The first step in this undertaking was to review the
survey conducted by the Boston University project group a year earlier and examine the format that was used for that survey and the questions that came out of their analysis. Upon completing this review, the project team went on to create an initial draft of the survey questions. This draft was then programmed them into the web-based survey software that Nypro used, and that was going to be used for this survey as well. After completion of this initial draft, the survey was given to some supply chain analysts, as well as one employee from IT, to receive a short pre-pilot to identify any problems with the survey’s appearance and functionality. Once the pre-pilot reviews came in, the project team began working on making the recommended changes as well as including some KPI (key performance indicators) charts that were necessary as reference points for certain questions within the survey.

Once these changes were finished, the survey was then piloted amongst several managers and engineers at the Clinton corporate facility. This second pilot was to gauge the survey with regards to content rather than functionality. Once the reviews from the second pilot came in, the project team sat down to make the final changes based on the pilot recommendations. As soon as these final changes were made, the project team submitted the survey to the head of the supply chain department for approval along with an introduction e-mail that would be sent out with the survey link. Once the survey and e-mail were approved, they were sent out posthaste and the project team was free to move on to the next step while waiting for the responses to come in.

**External Survey**

While the internal survey was being circulated amongst the recipients, the project team moved their focus over onto the external survey. The external survey was conducted in a slightly different manner than the internal survey. The Senior Director of the supply chain team at Nypro
presented the project team with a preliminary survey that had the types of questions on it that Nypro wanted asked of those surveyed. The project team then went over the preliminary survey and edited the questions on the survey, as well as the general format of the survey, to make it more streamlined and easier to answer. The survey itself consisted of three parts; each part asked questions in reference to a list of sub elements that are found within Nypro’s supply chain. The recipients were then asked, in the first part, if each element was part of their supply chain. The second part of the survey asked how many resources, people, they had within each element. The third part of the survey asked the recipients if they believed each element belonged as a part of their corporate supply chain.

Once the streamlining of the survey was complete, the new version of the survey was presented to the supply chain team at Nypro for approval. Once this approval was attained, the Nypro supply chain team utilized another of their resources to distribute the survey. The survey was sent to the New England Roundtable of the CSCMP, Council of Supply Chain Management Professionals, which consists of twenty five separate companies all within the New England area. In order to ensure that the recipient companies would respond with meaningful data, the recipients were informed that the project team was running a third party survey and that the results would be shared with all participants. Further, the participating companies were also assured that under no circumstances would their replies be given out with their names attached. The project team was then free to turn to the analysis of the responses that had come in from the internal survey while the external survey was in distribution.
**Analysis**

Data analysis began for a survey as soon as two days after the final submission date for completed surveys, to allow for late submissions. The analysis for the internal survey was compiled with totals for all answers to each question. Once general totals for each question were compiled, the project team then split the answers up and analyzed them under the subcategories of functional, regional, and management level perspectives. The data was broken into these subcategories to give Nypro a more detailed view of satisfaction levels within each of these areas. This analysis allowed Nypro to fully gauge their current internal customer satisfaction overall and as compared to a year ago when the previous study was performed.

The data from the external survey was also compiled, however, the analysis comparing Nypro to the responding companies had to be performed under different circumstances. Once the data was compiled, the participating companies were examined regarding their overall size related to Nypro. The resultant findings were that the three responding companies; Boston Scientific, CVS, and Yankee Candle are all companies of varying size with regards to both financial resources and the size of their respective supply chains. Due to these differences, the analysis was actually broken into two different forms. One analysis simply showed the four companies’ data side by side, with names removed, so that Nypro could then see how they compared to each company. The second analysis consisted of an averaging of the responses that informed the team as to how many resources each company had working within each part of their section. This was beneficial to Nypro as it gave them a slightly clearer view as to how their resourcing strategy stacked up against the “regional average.” Once the analysis was complete, the project team was free to move on to their conclusions and recommendations.
Flow Chart

Start

Acquire Timeline

Create Plan of Action

Background Research

Internal Survey

Initial Drafts of Survey

Pre-Pilot

Perform Necessary Changes

Pilot Survey

Final Draft

Release Survey into Field

Collect and Compile Data

Analyze Data

Nypro Recommendations

Final Reports for Nypro and WPI

Send Equivalent External Results to Each Contributing Company

Finish

External Survey

Review First Draft of Survey

Perform Necessary Changes

Get Final Approval of Survey

Send Survey to Consortium of Companies
Chapter 4: Internal Survey

Design

The first key part of the project for the project team was the designing of the internal survey for Nypro. Before anything else could be done, the project team had to meet with their sponsors at Nypro to discern the actual goals for the survey. In this case, the project team found that the goal for the survey was to benchmark Nypro’s supply chain management group against their own expectations and the recommendations resultant from the BU survey. After reviewing the BU survey and brainstorming on how to use the survey to meet the supply chain management groups’ goals, the project team drafted an outline of the questions for the internal survey. After meeting with their WPI project advisor, the project team had to update their outline with the advisor’s recommendations and then present the new outline to the SC management group for review.

While the SC management group reviewed the updated survey outline, the project team was busy learning how to use Microsoft Office Share Point Portal Server 2003. Share Point is the web based survey software that Nypro uses for their internal surveys. Once the SC management group had finished reviewing the updated survey outline, the project team sat down to solidify the basic format for each question while also taking into account the feedback coming in from both the WPI project advisor and the SC management group at Nypro. This process actually took several weeks as there were constantly new ideas coming in regarding either the format or content of the survey.
Once the final revisions to the outlined survey were in, the project team could begin creating the survey within Share Point. The final format for the survey was comprised mostly of rating system questions, with a few yes or no questions, and a few fill-in-the-blank questions as well. Once the final format of the survey was approved, the project team still had plenty of work to do relating to the survey. First, the project team had to meet with an employee within the IT department. The project team had to set up the links to the survey web site as well as insert an introduction and thank you into the web site while also inserting pop-up graphs for the previous year’s KPIs (key performance indicators) that were to be used in relation to the first two questions.

Once these steps were complete, the project team was almost finished with the design phase of the internal survey. The project group still had to draft up an e-mail that would be sent to the survey recipients explaining the nature of the project while also requesting their time in filling out the survey. The project team then pre-piloted the survey with the afore-mentioned IT department employee and an employee within the supply chain group to check the survey for functionality and ease of use. Once the pre-pilot was finished, the project team was free to pilot the survey to ten other Nypro employees to gauge the survey’s content. Once the feedback from the pilot group came in and was acted upon, the project team proceeded to send the survey out to its 184 intended recipients.

**Data Collection**

The attempted data collection for the internal survey was very frustrating for the project team. The results came in very slowly over the course of almost two months. During this time, numerous reminder e-mails were sent out both by the project team and the head of Nypro’s SC
management group. After nearly two months, the project team decided to call the survey closed with only 41 responses out of a possible 184.

**Analysis**

Thanks to the wide variety of Nypro employees who actually responded to the survey, the project team was able to go in-depth more than the number of responses would seem to indicate. The data analysis for the internal survey began with a conversion of the rating system answers into a binary system in which a person’s answer was represented by a 1 underneath the particular value for that question. Unfortunately, partway through this process, the project team learned that Excel 2003 did not have enough columns for what the team wanted to do with the data. At this point, the project team had to upgrade their software to Office 2007 and learn how to use the new software. Once the team had accomplished this task, they were able to run the analysis they desired on the data collected.

After all of the data was converted into the new binary system and compiled, the team then made an Excel graph for each question. Upon seeing the graphs created by the team, the on-site sponsor at Nypro asked the project team to make sub category graphs for each question that broke the analysis down further into the functional, regional, and management level perspectives. Once the subcategory analysis was complete, a few interesting findings came to light. One of these was that within the Functional Perspective, only four respondents were from segment, an area that had particularly negative opinions throughout the survey. Upon further research, it was found that three out of those four segment respondents were from the Consumer Electronics/Nokia segment, an area that has been having particular issues that resulted in the segment portion of the survey to be not entirely representative. Another observation of note is
that overall the respondents were most satisfied with Resin/Pigments which is the most established commodity management area within Nypro, while the areas that the respondents were least satisfied with are those that currently have no dedicated resources. This was of particular interest to the project team because it highlights to the supply chain management group what areas really need their help at the moment. Lastly, an observation of note related to the survey had to do with the question SC workshops. The Nypro employees who had attended SC workshops were, overall, more satisfied with the SC group’s efforts than those who had not been to a workshop. This highlights the benefits of running, and attending, SC workshops.

Once all of the graphs were complete, the project team had to brainstorm to come up with an effective way to organize and display all of the data gathered within the graphs created for Nypro. Ultimately, after a meeting with the SC management group, the project team decided on a Word document that utilizes hyperlinks. In this manner, anyone using an electronic copy of this document can skip about through the document to whatever area they have a particular need for. The final hyperlinked document consists of the basic analysis presented first, followed by the overview graphs for each question paired with their respective hyperlinks, while the detailed information makes up the last two-thirds of the report.
Chapter 5: External Survey

Design

In terms of actual design work performed by the project team on this survey, there was not a large amount. In the case of the external survey, the survey was given to the project team who were then asked to edit and reformat the provided survey. The original design for the external survey was actually based on the survey run by the BU project group the year before. After the editing and reformatting was complete, the survey then left the hands of the project team and was handed over to the supply chain management group at Nypro for a final review before being sent out into the field.

The survey itself was comprised of eight major categories, each with anywhere from four to seven sub-elements. Each of these categorical sub-elements represented an element that is currently a part of Nypro’s supply chain. The survey itself actually asked only three questions, but these questions pertained to each of the categories and sub-elements listed within the survey. The first question asked of the survey recipients was whether or not the given sub-element was currently a part of the company’s supply chain. The recipients were then asked how many resources (people) they had working in the given element. Lastly, the survey recipients were asked to indicate if the felt that the given element should be part of their global supply chain. The survey was designed in this manner to ensure that it would be easy to fill out and thus would take at most ten minutes to complete.

When the survey was ready to be released into the field, the guidelines for the project team, as presented to the team by Nypro, underwent several changes. The original plan for the
external survey was that it was to be sent out to companies that the project team had chosen within the plastics industry. The project team felt that this would be an effective manner of combining benchmarking with the survey, so that the end result would be an analysis of Nypro compared against their competitors within the industry. While this was the original plan, the project teams’ sponsors at Nypro decided that a comparison, on the organizational level, against major companies within their geographical region would be more beneficial to their supply chain enhancement endeavors. At this point the project team was informed that they would be conducting the survey via telephone to ensure a quick surveying process as there was a long wait time for responses attached to the internal survey. This new plan ended up changing, on the advice of the potential recipients, the day that the survey was to be released. It was determined that a phone call process might actually result in a longer survey time due to missed calls and calling at unfortunate times. Thus, the decision was reached to send the survey out to its intended recipients via e-mail and that the project team would work with what they received once the submission deadline was reached.

It was shortly before this point that the intended recipients for the survey were determined. As it turned out, one of the colleagues of the project team’s sponsor at Nypro was a member of the CSCMP, or Council of Supply Chain Management Professionals, and it was decided that the project team would be well served by utilizing this resource in connection with the external survey. Thus, once the final revisions were complete and the survey was ready to be released, the project team sent the survey to the sponsor’s colleague who then forwarded the survey on to the New England Roundtable of the CSCMP.

The project team also had some additional constraints to work under regarding the external survey. For one, the survey could not be very in depth in nature, due to the large
number of elements required by Nypro, as well as the stated preference by Nypro that the survey take no more than ten minutes to complete. Secondly, there was little room for customization within the survey. If there was a particular question or element that did not fit within the supply chain of a company being surveyed the question had to be skipped, as there were few ways for a participating company to change the nature of the question. Lastly, the external survey had to be conducted under severe time limitations. The survey recipients were given only a week in which to collect the necessary information and fill out the survey, while the recipients for the internal survey had almost two full months. This short survey time left little room for stragglers to submit their data and may have discouraged some recipients from responding.

**Data Collection**

The external survey had a response rate of roughly sixteen percent or, 4 out of 25 companies responded to the survey. Out of these respondents, one was from a consulting firm and the purpose of their response was to inform the project team that, as a consulting firm, their company had no supply chain to speak of and as such would contribute no meaningful data.

The following are short profiles of the three companies apart from Nypro who submitted their data to the survey.

**Boston Scientific Corporation**

Boston Scientific Corporation, BSC, is a developer, manufacturer and marketer of medical devices used in a range of medical specialties. BSC specifically focuses on the advancement of “less-invasive” medical technologies that serve as alternatives to surgeries and other procedures that may be traumatic to the patient’s body. BSC’s approach to their industry is analogous to supply chain optimization in that their goal is, through their devices, to reduce cost,
risk, procedure time and the need for patient aftercare, much as the goals of supply chain optimization are to reduce cost, risk, production time and increase quality control. One of BSC's better known products is the Taxus Stent, which is a form of drug-eluting stent. A stent is an expandable framework that is placed within an artery to expand it and prevent a blockage from occurring; a drug-eluting stent is the same type of device, but is also coated with a drug that prevents blockages from occurring thus increasing the overall effectiveness of the device. Prior to these products, the typical treatment for blocked arteries was a form of open-heart surgery that carried with it a high amount of risk. The advent of drug-eluting stents created a safer and cheaper alternative to open-heart surgery and accurately represents the overall goals of BSC.

The Taxus Stent is mentioned in such detail above as it directly relates to the efforts that BSC undertook in 2005 that netted it an award for Logistics Management. Upon its release, the Taxus Stent obtained an almost seventy percent share of the drug-eluting stent market and BSC needed to find a way to improve their logistics structure to keep up with the incoming demand and retain that market share. BSC’s goal was to knock the transit time between the production center in Ireland and the distribution center in the US down to 2.7 days from 3.7 days. In order to accomplish this goal, BSC had to redesign both their own supply chains and their relationship with their production teams, freight handlers, and contractors. The end result of BSCs effort was a full day reduction in transit time as well as a reduction in freight costs and an increase in the actual number of shipped cartons of product.

The first step in BSCs process was to meet with their freight forwarder to determine how to increase the size of shipments. Thanks to this meeting BSC realized that they could ship significantly more product in each flight between Ireland and the US, as they were not utilizing the available space in the aircrafts and, as such, had more smaller shipments than was needed and
were actually losing money on these flights as they were paying to ship empty space. In order to get more product on the planes, BSC had to redesign their packaging design. Before the redesign, the planes could only hold eighteen cartons on a pallet and the cartons themselves were oddly shaped and did not fully utilize the space. After the packaging redesign, BSC was able to fit 167 percent more product in each plane.

BSC’s next step was to work with their production teams to speed up production times so that the Stents could be ready for sterilization on the same day that they were produced. This improvement in production required another multi-discipline collaboration, but was ultimately successful and resulted in a further half day reduction in wait time before a shipment. BSC next had to negotiate with the company performing the sterilization of the Stents to arrange both a speeding up of the process and an earlier start time to ensure the Stents could be ready for a same day delivery time table. As Saron Hines, the strategic sourcing manager for Boston Scientific at the time put it, “this was all accomplished by picking up a phone or sitting around a table with our partners—good old-fashioned communication.” (Levans, 2005) This example shows that sometimes companies do not need to invent new processes or methods to improve the supply chains, rather they should concentrate on making sure that the basic concepts of good business are being followed and see how far that will get them before committing to an expensive new system that may, ultimately, not have been needed.

**CVS/Caremark**

CVS Caremark Corporation is a combination of the US’s largest pharmacy chain with a leading pharmaceutical services company. While headquartered in Rhode Island, the company has over six thousand stores scattered across the United States. CVS/pharmacy is the nation’s largest retail pharmacy chain, generating over 68% of its revenue from the pharmacy business.
The company is committed to meeting its goal of being the fastest and easiest pharmacy retailer for customers to use. Currently, CVS fills one out of every seven retail prescriptions in the country. In addition, CVS can boast of having the largest retail loyalty program in America with over fifty million cardholders enrolled in their ExtraCare program.

Caremark Pharmacy Services is one of the nation’s leading pharmacy benefit management companies. They provide prescription benefit management services to over two thousand health plans. Caremark’s customers are mainly the sponsors of health benefit plans, i.e. employers, unions, government employee groups, and others. Caremark provides pharmaceuticals to eligible participants in the benefit plans owned by their customers and are also a national provider under the government’s Medicare Part D program. Caremark operates a retail pharmacy network that has over sixty thousand pharmacies participating. In addition, Caremark also operates eleven mail service pharmacies and over seventy specialty pharmacies.

With regards to their supply chain, CVS has some very impressive initiatives underway. CVS is currently performing collaborative planning with their suppliers on just under half of their total store volume. The suppliers have total visibility regarding inventory and movement from purchase order to shipments to the store. CVS also has a complex and comprehensive distribution network comprised of thirteen distribution centers. These centers have almost every type of automation that could increase their productivity. As a result, their store deliveries are over ninety-eight percent on time within 15 minutes.

This amazing delivery time is due partly to CVS distribution system DeXma, short for Deus ex machina, or God in the machine. DeXma is a four hundred thousand square feet distribution center in Ennis Texas. What is remarkable about this center is that, aside from some key strategic points, the materials handling is done entirely by automation. The benefit from this
process is that everything that is shipped to CVS stores is packed in shelf sequence, meaning that when a shipment arrives, the stockers do not have to organize the shipment at all, but simply place the orders on the shelves. Prior to DeXma unloading shipments at stores would take about two hours; however, utilizing DeXma, the process takes only twenty minutes.

In addition to these savings, DeXma also allows for the potential of CVS to require thirty percent less employees at any new distribution center. DeXma centers are much smaller than conventional distribution centers; CVS’ goal is to have no distribution center larger than five hundred thousand square feet as for every hundred thousand square feet after that productivity drops by at least ten percent. As many of CVS distribution centers are at least five hundred thousand square feet, the future change over to all DeXma centers will be quite a boost to the CVS bottom-line. However, not all of CVS upgrades to their supply chain are so futuristic. One very simple, yet highly effective, technique was to redesign the totes, dollies, and carts that are used to fill the shipping trucks. These containers were designed specifically to fill the trucks from all sides to minimize the wasted space; resulting in an increase of trailer utilization by a factor of ten percent. These approaches to supply chain improvement represent a completely integrated view of supply chain management and are a combination of bringing in new techniques, while also finding methods to improve current methods that do not necessarily require replacement.

**Yankee Candle**

Yankee Candle does not have an exactly auspicious beginning. Yankee Candle was started by Mike Kittredge when he melted down some crayons to make a candle for his mother for Christmas. One of his neighbors saw the candle and offered to buy it from Mike, and thus was the company founded. Mr. Kittredge continued to expand his business and after only a few
years had to relocate from his parents’ basement to an abandoned paper mill. The company began to grow in leaps with the creation of two devices specifically tailored to the candle making business. One of these was a “heated room” which enabled liquid wax deliveries to arrive at the first factory site and led to significant cost savings for the company. The second device was a turntable taper wheel that allowed the company to double their production while also reducing their required labor hours. Today Yankee Candle is the most recognized name associated with candles and the best selling candle brand in the country.

Yankee Candle is slightly different from the rest of the class when it comes to their supply chain. Yankee Candle rejects the common practices of Six Sigma and kaizen; rather they take a “back to basics” approach to their supply chain. What this approach signifies is that Yankee Candle is constantly searching for improvements and changes that can be made to their supply chain, but also put effort into ensuring that the basics of the supply chain are functioning. “We want to make sure that when we do it, it will consistently work.” One of the improvements that Yankee Candle has initiated is a new form of packing material. Rather than using standard Styrofoam to pack their products, Yankee Candle has switched to using paper pulp made out of simple newspaper and water. In addition to providing better protection for their products, the switch in materials has led to some significant cost savings as the materials for the packing materials are very cheap and easy to obtain. Also, as paper pulp is one hundred percent recyclable, and Styrofoam is not, the switch allows for a better image for Yankee Candle with regards to being a “green business.”

Another approach to supply chain improvement that Yankee Candle is taking is the creation of “employee involvement teams,” or EITs. These EITs are made up of employees from all aspects of the company including machine operators, candle makers, purchasing, etc. These
teams are informed of what the biggest challenges that the company is facing and are then asked to come up with potential solutions. These EITs unify areas of the company that had previously worked completely independent of each other, such as the production groups and packaging groups. The results of these EITs include a partial shift to a pull system in which candles are packaged when ordered by a customer, and replacement candles then produced to replace the candles that were packaged. The result was a smoother production and packaging process that had fewer bottlenecks than the older system.

Similar to these EITs, Yankee Candle also utilizes a cross-functional group that meets daily to discuss day-to-day and week-to-week production. One result from this group was the creation of an e-mail group to track materials. This group allows problems such as material defects to be resolved within a day as everyone who would need to know about the issue finds out immediately and no one area of the company is left out of the loop. While none of these techniques are practically earth-shattering in their innovation, what is remarkable is the practicality behind them. Yankee Candle is using the essential concepts of communication and process improvement to their full potential and the resulting improvements to the company from these efforts speak for themselves.

**Analysis**

Due to the nature of the external survey, and the multiple formats of questions within the survey, the analysis of the data collected from the survey had to be performed in multiple formats as well. For the majority of questions posed in the survey, a simple combination of tallying the responses with basic bar charts was used. For these responses, which were primarily the answers to the first and third questions regarding an element’s place within the company’s
supply chain, a binary system was created in which a 1 represented a “yes” answer and a 0 represented a “no” or blank answer. The ones were then tallied for each element and were then graphed within bar charts that contained the final tallies for each category.

While this method of analysis accounts for the majority of the data collected from the external survey, not all of the data collected could be analyzed and represented in such a fashion. Some of the data responses actually required more research before analysis could be performed. One category of responses that fit under this umbrella is the Supply Chain Systems category. The questions within this category related specifically to what Enterprise Resource Planning, or ERP, system the company currently used as well as what Supply Chain Management package they used. The data collected from these fill-in-the-blank questions required a certain knowledge-base before any analysis could be done. Thus the project team spent time going over each of the ERP and SCM systems mentioned within the survey to gather data regarding each system’s capabilities and potential upgrades.

Another question from the survey that could not be analyzed via a simple tally was the question regarding each company’s total resources within a section. For this question, the categories themselves had to be combined with each other to meet the format of Nypro’s organizational profiles, so that apples could be compared to apples. In this vein, Sourcing and Commodity Management were combined, and Forecasting and Planning and Purchasing were combined. Once the format for the responses had been changed, the comparison amongst companies could commence. For this question, the responses were compared against two aspects of Nypro. First, the numbers of resources for the companies other than Nypro were all averaged together. Once this was done, two sets of comparisons were performed. The first set compared Nypro as a whole to the average for the participating companies. The second set
performed a similar comparison except this time the average was compared to Nypro’s corporate level only. The result of this analysis was that while in some areas, overall, Nypro is ahead of the “big” business, when the observer compares the figures against Nypro’s corporate area they see that Nypro is greatly lacking in terms of employed resources.
Chapter 6: Conclusions and Recommendations

In working on this project, the project group found that the knowledge that had previously seemed to be just conceptual was actually practical in the extreme. The group feels that this project was an excellent method of benchmarking not only the target company, but their own knowledge of the material that they are expected to know upon graduation. The project group is exceptionally satisfied with the end results for this project and is thrilled to have had the chance to work on it.

Internal Survey

1. Better interaction and communication with segment and corporate team members.

   The internal analysis showed that the current problem spots for the SC group are the segment and corporate areas. Increased communication with these areas may make the employees within these areas more aware, and thus more appreciative, of the supply chain groups’ efforts.

2. Increase attention and attendance of supply chain workshops.

   As was shown from the internal analysis, those employees who attend an SC workshop have a better overall view of the SC department and their efforts. An increase in attendance at these workshops, both overall and from a wider range of departments, may help reduce the difficulties encountered by the supply chain group.
3. **Refine supply chain tracking tools.**

   In order for the supply chain group to know where they need to put in more effort, the group needs to be able to track their current progress in a more effective manner than is currently used.

**External Survey**

1. **Crisp KPI and measurements.**

   Nypro needs to keep their KPIs as crisp and clearly measurable as possible. Maintaining high visibility regarding how progress is measured will encourage the correct steps to be taken to actually make progress.

2. **ERP system is far too limited.**

   Nypro’s current ERP system is very outdated. BPCS was considered new software in the 1980’s and, at the time of their research, the project team was unable to find any technical information regarding BPCS other than personal pages. This is an indication that the manufacturer itself has abandoned this software.

3. **Lean corporate resources.**

   The current corporate resources assigned to supply chain management are exceptionally lean and need significant improvement if the supply chain group is to continue making improvements within the company.
4. Add resources to MRO, Decoration, Logistics, and front (customer) end of the supply chain.

As exhibited by the surveys, the areas listed above are particularly weak due to a lack of resources. In order to increase internal customer satisfaction, the amount of resources assigned to these areas needs to increase.

5. Matrix organization, resources very decentralized (enhance communication).

One of the key problems with a matrix organization is that the channels for communication become exceptionally tangled. In order for the supply chain group to have a meaningful effect, communication throughout the organization needs to improve so that everyone can be on the same page.
Chapter 7: Industrial Engineering Design Capstone

Introduction

Worcester Polytechnic Institute prides itself on its real-world project based curriculum. One of such ventures required to earn a degree from WPI is the Major Qualifying Project. The goal behind this assignment is to solidify the classroom tools and communication needed to confidently solve problems in the major field of study. This experience is essential in preparing the student to enter the field or a master’s program upon graduation.

Each academic major has its own unique requirements for the MQP. For Industrial Engineering students, a design capstone is necessary as part of this project. This important portion of the project allows the student to apply engineering design concepts, such as process analysis and improvement, human factors, and quality control, to resolve a problem and reach a goal. The student must be able to design a system, component, or process to meet the needs of a client to be successful in the future.

For a senior Industrial Engineering major, the opportunity to work with Nypro’s supply chain was a dream-come-true. The project stemmed from previous work done by a team of Boston University graduate students. This original project provided Nypro with a benchmark of their own supply chain elements with respect to other businesses in the field by conducting both an internal and external survey. The follow-up project was also centered on conducting two surveys, an internal and an external, but took the analysis one step further by benchmarking Nypro’s supply chain against both its own company’s expectations and the practices of other local businesses.
Constraints

The team had a handful of constraints to work with on the project. The first and most obvious was that the benchmark was to be conducted on research and surveys alone, and was implemented by the sponsors. Nypro was interested in a follow-up study using the same methods as the original benchmark performed by Boston University graduate students. There are a number of benefits to these techniques including the vast amounts of available data, personal opinions, and multiple means of analysis. Certain challenges, including gauging the validity of information, avoiding data anomalies, and relying on timely results, are also apparent. Circumventing these difficulties, while collecting meaningful data, is essential in order to provide Nypro with a helpful summary and recommendation for the future.

The second constraint was that the internal survey was to be distributed directly on the Nypro website. At first glance, this seems great. All employees would have access, none could take the survey multiple times, and record would be made of all results with their respective producer and time/date stamp. With more in-depth scrutiny, one then realizes that it is impossible to ensure anonymity, potentially damaging the validity and volume of responses. This constraint would prove to be an important factor in the data analysis portion of the internal benchmark.

The next constraint involves the external survey. Companies were given a very limited amount of time to complete and return the survey. Because of this, Nypro expressed a preference that the questionnaire take no longer than ten minutes, there was no room for recipients to add additional information that may fit within their own organization, and there was very little time for respondents to gather the necessary information to meet the deadline. This
constraint potentially affected both the volume and quality of responses received for the external survey.

**Design**

Out of the two surveys, only the internal one had significant design input from the team. The questions presented in this survey centered on Nypro’s fiscal year 2007 key performance indicators, fiscal year 2008 initiatives, internal customer service, tactical and strategic support, team and leadership effectiveness, and overall satisfaction. Questions were written collaboratively through many meetings between the MQP team, advisor, and sponsors and were designed to take the user under ten minutes to answer. By keeping the questionnaire short, it would appeal to more internal customers and impose less on their busy schedules. The survey went through many revisions for both format and content before all parties were satisfied.

In-between revisions, the MQP group worked to get the internal drafts working online using Nypro’s Microsoft Share Point Portal Server 2003. Adequately learning how to use this software was very important for providing the sponsoring company with the quality and style survey they were looking for. Several pilot groups tested the survey for ease and clarity before the final version was released. Both the questions and formatting were selected to make the most helpful analysis available to Nypro with which to base recommendations on.

Once results were gathered, a Microsoft Excel file was created to house the data for sorting and analysis. Responses were graphed for each question, as well as categorized for further investigation. Once the data was studied for each survey question, it was then grouped three additional ways to provide a functional, regional, and management level perspective on the
results. By designing the breakdown in this way, it became more clear which areas of the company are most in need of supply chain resources and service.

**Implementation**

Both surveys were executed over e-mail. The internal survey was web-based, accessed by a hyperlink, and required the user to log-in to the Nypro Supply Chain website. The link was both sent out in an e-mail and publically released to all employees with access to the website. Respondents were given a handful of reminders and approximately two months to submit their work.

The external survey existed within a Microsoft Excel worksheet and was attached to the notification e-mail. The MQP team set this up as a third-party survey, by offering confidentiality and an equivalent share of the results to encourage responses. The spreadsheet was sent to twenty-five companies in the north-east region of the country through the Council of Supply Chain Management Professionals. Respondents were only given one week to e-mail results to the team.
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Greetings,

You are receiving this e-mail as part of an effort by a group of WPI students to assist Nypro in the enhancement of its Supply Chain Management. Below this message is a link that will bring you to a benchmarking survey regarding recent efforts to improve Nypro's SC Management. Please take the time to fill out this short survey.

Your response is needed before noon on Tuesday, December 4th.

Completing the survey should take under ten minutes, and you will not only be assisting us, but Nypro as well. If you have any questions, feel free to contact us as benchmarking@wpi.edu.

For the survey:

Thank you,
The WPI project team

KPI Charts

The following text and charts appear when the e-mail link is utilized to access the survey.

This data is referred to in the first two assessment questions. The actual survey was set to open in a separate window so the taker could view both questions and data side-by-side while answering.

Please review the following charts displaying Nypro's FY07 data and FY08 objectives.

Then, please open the survey by clicking on the link at the bottom of the page.
### FY07 Supply Chain KPI Results

<table>
<thead>
<tr>
<th>Initiatives</th>
<th>FY 07 Goal</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>America’s</td>
</tr>
<tr>
<td>Cost Reduction / Bottom Line Improvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory Days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Flow (A/P) Days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Molding Machine Database</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Web Based Supplier Pages</td>
<td></td>
<td></td>
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<tr>
<td>Supplier Scorecard</td>
<td></td>
<td></td>
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<tr>
<td>Commodity Codes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blanket PO/Consignment</td>
<td></td>
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</tr>
</tbody>
</table>

All results within this chart were removed as they are proprietary data.

### FY08 Supply Chain KPI Objectives

<table>
<thead>
<tr>
<th>KPI</th>
<th>FY08 Goal (Global)</th>
<th>Americas Goal</th>
<th>China Goal</th>
<th>Europe Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Reduction (M Annual)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Avoidance</td>
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<td></td>
</tr>
<tr>
<td>Inventory Days (Total)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Flow/A/P Days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consignment/Blanket PO’s</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>SC Workshops</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SC Certification Program</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>e-Ordering (EDI)/ e-Auctions</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Other System Tools</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>MRO Business Support</td>
<td></td>
<td></td>
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<tr>
<td>MAT Sourcing</td>
<td></td>
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</tr>
<tr>
<td>CER Support</td>
<td></td>
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<tr>
<td>Plant SC Org Development</td>
<td></td>
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</tr>
<tr>
<td>– Review Plant Org Structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Re-align SC Resources</td>
<td></td>
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</tr>
<tr>
<td>Supplier Scorecard</td>
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<tr>
<td>- Refine Process/Format</td>
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<tr>
<td>- Pilot Automated Version</td>
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</tbody>
</table>

All goals within this chart were removed as they are proprietary data.

[Click Here to Open Survey]
Questions

The following image was taken directly from the survey on Nypro’s Website.

Global Supply Chain Management

Supply Chain Gap Analysis- Part II: New Item

SUPPLY CHAIN GAP ANALYSIS SURVEY- PART II

***Please answer questions 1 and 2 using the attached FY07 and FY08 KPI charts.***

1) Have you seen the positive effects of these KPIs in FY07 at your facility, region, or segment? *
   - [ ] Yes
   - [ ] No
   - [ ] Unsure

2) Do you feel that SC Management has enough resources to support the FY08 initiatives for your facility/region/segment? *
   - [ ] Yes
   - [ ] No
   - [ ] Unsure

3) With the given resources, how are we assisting your facility/region in the following areas? *

<table>
<thead>
<tr>
<th>Poorly</th>
<th>OK</th>
<th>Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cash Flow / Inventory Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consignment</td>
</tr>
<tr>
<td>Cost reduction</td>
</tr>
<tr>
<td>Material Specifications</td>
</tr>
<tr>
<td>SC Organization Development</td>
</tr>
<tr>
<td>Sourcing</td>
</tr>
<tr>
<td>System Tools</td>
</tr>
</tbody>
</table>
4) Please rate your satisfaction with the following areas of SC Management. *

<table>
<thead>
<tr>
<th></th>
<th>Not 1</th>
<th>Somewhat 2</th>
<th>Very 3</th>
<th>4</th>
<th>5</th>
<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>Leadership</td>
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<td>Organizational Development</td>
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<tr>
<td>Performance</td>
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<tr>
<td>Priorities</td>
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<tr>
<td>Vision</td>
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</tbody>
</table>

***In questions 5-8, please rate your satisfaction with the following areas of SC Support.***

5) Adequately setting up contracts and guidelines for consignments and cost reductions? *

<table>
<thead>
<tr>
<th></th>
<th>Poor 1</th>
<th>OK 2</th>
<th>Great 3</th>
<th>4</th>
<th>5</th>
<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>Machining / Automation / Tooling</td>
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<td>Decoration / IML / IMD / Stamping / Labeling</td>
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<tr>
<td>Electro-Mechanical Components</td>
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<tr>
<td>Resin / Pigments</td>
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<td>Logistics</td>
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<tr>
<td>MRO / Indirect Materials</td>
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</tbody>
</table>

6) Adequately assisting materials teams with delivery and/or credit crises? *

<table>
<thead>
<tr>
<th></th>
<th>Poor 1</th>
<th>OK 2</th>
<th>Great 3</th>
<th>4</th>
<th>5</th>
<th>N/A</th>
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<td>Logistics</td>
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<tr>
<td>MRO / Indirect Materials</td>
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</tbody>
</table>
7) Providing timely RFQ support? *

<table>
<thead>
<tr>
<th>Poor</th>
<th>OK</th>
<th>Great</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<th>Machining / Automation / Tooling</th>
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<td>Decoration / IML / IMD / Stamping / Labeling</td>
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<td>Electro-Mechanical Components</td>
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<tr>
<td>Resin / Pigments</td>
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<tr>
<td>Logistics</td>
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<td></td>
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<tr>
<td>MRO / Indirect Materials</td>
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</tbody>
</table>

8) Meeting your expectations? *

<table>
<thead>
<tr>
<th>Poor</th>
<th>OK</th>
<th>Great</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
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</table>

<table>
<thead>
<tr>
<th>Machining / Automation / Tooling</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Decoration / IML / IMD / Stamping / Labeling</td>
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<td>Electro-Mechanical Components</td>
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<tr>
<td>Resin / Pigments</td>
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<tr>
<td>Logistics</td>
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<tr>
<td>MRO / Indirect Materials</td>
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</tbody>
</table>

9) How effective have you found the following system tools? *

<table>
<thead>
<tr>
<th>Not Effective</th>
<th>Very Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contracts / Agreements</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>Cost Savings Reports</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Molding Machine Database</td>
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<tr>
<td>Spend Reports</td>
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<tr>
<td>Supplier Directory</td>
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</tr>
<tr>
<td>Supply Chain Website</td>
<td></td>
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</tr>
</tbody>
</table>
10) If you attended a SC Workshop, please rate the following areas.

<table>
<thead>
<tr>
<th>Area</th>
<th>Poor</th>
<th>OK</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agenda</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Best Business Practices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Content</td>
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<td></td>
<td></td>
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<tr>
<td>Delivery</td>
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<tr>
<td>Duration</td>
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<td></td>
</tr>
<tr>
<td>Networking Opportunities</td>
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<td></td>
</tr>
<tr>
<td>Supplier Meetings</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worthiness Of Recommendation To Others</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11) What gaps do you see in SC resources, initiatives, and offerings?

12) Would you recommend us to a friend/business partner? *

  - Yes
  - No

If Not, Why?

* indicates a required field
Post-Submission Text

Once the “Save and Close” link is selected, the survey taker is redirected to another webpage stating the following.

**Thank you for taking the time to fill out this Supply Chain survey!!!**

Your feedback is instrumental towards our efforts to improve global supply chain management and Nypro as a whole.
Graphical Analysis

Summary Data

Question 1

Have you seen the positive effects of these KPIs in FY07 at your facility, region, or segment?

- Yes: 68%
- No: 10%
- Unsure: 22%
Question 2

Do you feel that SC Management has enough resources to support the FY08 initiatives?

- Yes: 41%
- No: 44%
- Unsure: 15%
With the given resources, how are we assisting your facility/region in the following areas?

<table>
<thead>
<tr>
<th>Area</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Flow / Inventory Improvements</td>
<td>2</td>
<td>10</td>
<td>12</td>
<td>7</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Consignment</td>
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<td>12</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Cost Reduction</td>
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Question 4

Please rate your satisfaction with the following areas of SC Management.

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Question 5

How satisfied are you with SC Management's ability to adequately set up contracts and guidelines for consignments and cost reductions?

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How satisfied are you with SC Management's ability to adequately assist materials teams with delivery and/or credit crisis?

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How satisfied are you with SC Management's ability to provide timely RFQ support?

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How satisfied are you with SC Management's ability to meet your expectations?

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Question 9

How effective have you found the following system tools?

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If you attended a SC Workshop, please rate the following areas.

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Question 11

What gaps do you see in SC resources, initiatives, and offerings?

- Satisfied or Blank Response
- Constructive Criticism

56% Satisfied or Blank Response
44% Constructive Criticism
Question 12

Would you recommend us to a friend/business partner?

- Yes: 80%
- No: 20%
Question 12 (Continued)

If Not, Why?

- Communication Errors / Poor Feedback: 25%
- Ineffectively Organized: 38%
- Too Early in the Process / Unsure: 37%
Additional Data

Question 1

Have you seen the positive effects of these KPIs in FY07 at your facility, region, or segment?

- Yes: 68%
- No: 10%
- Unsure: 22%
Functional Perspective

1) Corporate Services

- Yes: 71%
- No: 29%
- Unsure: 0%

1) Facility

- Yes: 78%
- No: 0%
- Unsure: 22%
1) Asia Pacific

- Yes: 100%
- No: 0%
- Unsure: 0%

1) Corporate

- Yes: 45%
- No: 22%
- Unsure: 33%
1) Europe

- Yes: 50%
- No: 25%
- Unsure: 25%
Management Level Perspective

1) Controller

- Yes: 72%
- No: 14%
- Unsure: 14%

1) Engineer

- Yes: 50%
- No: 50%
- Unsure: 0%
1) General Manager

- Yes: 50%
- No: 50%
- Unsure: 0%

1) Material Manager

- Yes: 87%
- No: 0%
- Unsure: 13%
1) Program Sourcing & SC

- Yes: 67%
- No: 16%
- Unsure: 17%

1) Vice President

- Yes: 25%
- No: 50%
- Unsure: 25%
Question 2

Do you feel that SC Management has enough resources to support the FY08 initiatives?

- Yes: 41%
- No: 44%
- Unsure: 15%
Functional Perspective

2) Corporate Services

- Yes: 14%
- No: 72%
- Unsure: 14%

2) Facility

- Yes: 52%
- No: 35%
- Unsure: 13%
Regional Perspective

2) America - North

- Yes: 50%
- No: 33%
- Unsure: 17%

2) America - South

- Yes: 20%
- No: 80%
- Unsure: 0%
2) Europe

- Yes: 0%
- No: 75%
- Unsure: 25%
Management Level Perspective

2) Controller

- Yes: 29%
- No: 57%
- Unsure: 14%

2) Engineer

- Yes: 100%

Legend:
- Yes
- No
- Unsure
2) General Manager

- Yes: 50%
- No: 17%
- Unsure: 33%

2) Material Manager

- Yes: 56%
- No: 44%
- Unsure: 0%
2) Program Sourcing & SC

- Yes: 17%
- No: 50%
- Unsure: 33%

2) Vice President

- Yes: 50%
- No: 25%
- Unsure: 25%
Question 3

With the given resources, how are we assisting your facility/region in the following areas?

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Functional Perspective

### 3) Corporate Services

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- Cash Flow / Inventory Improvements
- Consignment
- Cost Reduction
- Material Specifications
- SC Organization Development
- Sourcing

### 3) Facility

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- Cash Flow / Inventory Improvements
- Consignment
- Cost Reduction
- Material Specifications
- SC Organization Development
- Sourcing
3) Asia Pacific

3) Corporate
3) Europe

- Cash Flow / Inventory Improvements
- Consignment
- Cost Reduction
- Material Specifications
- SC Organization Development
- Sourcing
Management Level Perspective

3) Controller

![Chart for Controller]

3) Engineer

![Chart for Engineer]
Question 4

Please rate your satisfaction with the following areas of SC Management.

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<th>Area</th>
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4) Corporate Services

4) Facility
4) Finance

4) Segment
Regional Perspective

4) America - North

4) America - South
4) Asia Pacific

Frequency vs. Rating

Leadership
Organizational Development
Performance
Priorities
Vision

4) Corporate

Frequency vs. Rating

Leadership
Organizational Development
Performance
Priorities
Vision
Management Level Perspective

### 4) Controller

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### 4) Engineer

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4) General Manager

4) Material Manager
4) Program Sourcing & SC

4) Vice President

Leadership
Organizational Development
Performance
Priorities
Vision

Rating
Frequency
1 2 3 4 5 N/A

0 1 2 3 4

Leadership
Organizational Development
Performance
Priorities
Vision

Rating
Frequency
1 2 3 4 5 N/A

0 1 2 3 4
Question 5

How satisfied are you with SC Management’s ability to adequately set up contracts and guidelines for consignments and cost reductions?

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5) Corporate Services

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

5) Facility

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
5) Finance

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

5) Segment

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
Regional Perspective

5) America - North

5) America - South
5) Asia Pacific

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5) Europe

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

Rating

Frequency
Management Level Perspective

**5) Controller**

![Controller Frequency Chart]

**5) Engineer**

![Engineer Frequency Chart]
5) General Manager

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- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

5) Material Manager

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- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
5) Program Sourcing & SC

Frequency of ratings for various categories:
- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

5) Vice President

Frequency of ratings for various categories:
- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
How satisfied are you with SC Management's ability to adequately assist materials teams with delivery and/or credit crisis?
Functional Perspective

6) Corporate Services

6) Facility

Page 125 of 188
Regional Perspective

6) America - North

6) America - South
6) Europe

- **Machining / Automation / Tooling**
- **Decoration / IML / IMD / Stamping / Labeling**
- **Electro-Mechanical Components**
- **Resin / Pigments**
- **Logistics**
- **MRO / Indirect Materials**
Management Level Perspective

6) Controller

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

6) Engineer

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
6) Program Sourcing & SC

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

6) Vice President

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
**Question 7**

How satisfied are you with SC Management's ability to provide timely RFQ support?

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Functional Perspective

7) Facility

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7) Corporate Services

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7) Finance

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

7) Segment

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
Regional Perspective

### 7) America - North

![Bar Chart](image1.png)

- **Machining / Automation / Tooling**
- **Decoration / IML / IMD / Stamping / Labeling**
- **Electro-Mechanical Components**
- **Resin / Pigments**
- **Logistics**
- **MRO / Indirect Materials**

### 7) America - South

![Bar Chart](image2.png)

- **Machining / Automation / Tooling**
- **Decoration / IML / IMD / Stamping / Labeling**
- **Electro-Mechanical Components**
- **Resin / Pigments**
- **Logistics**
- **MRO / Indirect Materials**
7) Asia Pacific

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

7) Corporate

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
7) Europe

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
7) Controller

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Legend:
- Blue: Machining / Automation / Tooling
- Red: Decoration / IML / IMD / Stamping / Labeling
- Green: Electro-Mechanical Components
- Purple: Resin / Pigments
- Teal: Logistics
- Orange: MRO / Indirect Materials

7) Engineer

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Legend:
- Blue: Machining / Automation / Tooling
- Red: Decoration / IML / IMD / Stamping / Labeling
- Green: Electro-Mechanical Components
- Purple: Resin / Pigments
- Teal: Logistics
- Orange: MRO / Indirect Materials
7) General Manager

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

7) Material Manager

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
7) Program Sourcing & SC

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

7) Vice President

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
How satisfied are you with SC Management's ability to meet your expectations?

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Functional Perspective

8) Corporate Services

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

8) Facility

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
Regional Perspective

### 8) America - North

- **Machining / Automation / Tooling**
- **Decoration / IML / IMD / Stamping / Labeling**
- **Electro-Mechanical Components**
- **Resin / Pigments**
- **Logistics**
- **MRO / Indirect Materials**

### 8) America - South

- **Machining / Automation / Tooling**
- **Decoration / IML / IMD / Stamping / Labeling**
- **Electro-Mechanical Components**
- **Resin / Pigments**
- **Logistics**
- **MRO / Indirect Materials**
8) Asia Pacific

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

8) Corporate

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials
8) Europe

- Machining / Automation / Tooling
- Decoration / IML / IMD / Stamping / Labeling
- Electro-Mechanical Components
- Resin / Pigments
- Logistics
- MRO / Indirect Materials

Rating

Frequency

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Management Level Perspective

8) Controller

8) Engineer
8) General Manager

8) Material Manager
8) Program Sourcing & SC

8) Vice President
Question 9

How effective have you found the following system tools?

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9) Corporate Services

9) Facility
9) Finance

- Contracts / Agreements
- Cost Savings Reports
- Molding Machine Database
- Spend Reports
- Spend Reports
- Supplier Directory
- Supply Chain Website

9) Segment

- Contracts / Agreements
- Cost Savings Reports
- Molding Machine Database
- Spend Reports
- Spend Reports
- Supplier Directory
- Supply Chain Website
Regional Perspective

9) America - South

![Bar chart showing frequency of different categories for 9) America - South](chart1)

9) America - North

![Bar chart showing frequency of different categories for 9) America - North](chart2)
9) Asia Pacific

Rating

Frequency

Contracts / Agreements
Cost Savings Reports
Molding Machine Database
Spend Reports
Supplier Directory
Supply Chain Website

9) Corporate

Rating

Frequency

Contracts / Agreements
Cost Savings Reports
Molding Machine Database
Spend Reports
Supplier Directory
Supply Chain Website
9) Europe

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- Contracts / Agreements
- Cost Savings Reports
- Molding Machine Database
- Spend Reports
- Supplier Directory
- Supply Chain Website
Management Level Perspective

9) Controller

9) Engineer

Frequency

Rating

Frequency

Rating

Contracts / Agreements
Cost Savings Reports
Molding Machine Database
Spend Reports
Supplier Directory
Supply Chain Website
9) General Manager

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- Contracts / Agreements
- Cost Savings Reports
- Molding Machine Database
- Spend Reports
- Supplier Directory
- Supply Chain Website

9) Material Manager

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- Contracts / Agreements
- Cost Savings Reports
- Molding Machine Database
- Spend Reports
- Supplier Directory
- Supply Chain Website
9) Program Sourcing & SC

- Contracts / Agreements
- Cost Savings Reports
- Molding Machine Database
- Spend Reports
- Supplier Directory
- Supply Chain Website

9) Vice President

- Contracts / Agreements
- Cost Savings Reports
- Molding Machine Database
- Spend Reports
- Supplier Directory
- Supply Chain Website
If you attended a SC Workshop, please rate the following areas.

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- Agenda
- Best Business Practices
- Communication
- Content
- Delivery
- Duration
- Networking Opportunities
- Supplier Meetings
- Training

10) Facility

- Agenda
- Best Business Practices
- Communication
- Content
- Delivery
- Duration
- Networking Opportunities
- Supplier Meetings
- Training
10) Finance

- Agenda
- Best Business Practices
- Communication
- Content
- Delivery
- Duration
- Networking Opportunities
- Supplier Meetings

10) Segment

- Agenda
- Best Business Practices
- Communication
- Content
- Delivery
- Duration
- Networking Opportunities
- Supplier Meetings
Regional Perspective

10) America - North

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10) Asia Pacific

10) Corporate
10) Europe

- Agenda
- Best Business Practices
- Communication
- Content
- Delivery
- Duration
- Networking Opportunities
- Supplier Meetings
Management Level Perspective

**10) Controller**

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**10) Engineer**

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</table>
10) General Manager

- Agenda
- Best Business Practices
- Communication
- Content
- Delivery
- Duration
- Networking Opportunities
- Supplier Meetings

10) Material Manager

- Agenda
- Best Business Practices
- Communication
- Content
- Delivery
- Duration
- Networking Opportunities
- Supplier Meetings
10) Program Sourcing & SC

10) Vice President
What gaps do you see in SC resources, initiatives, and offerings?

- Satisfied or Blank Response: 56%
- Constructive Criticism: 44%
11) What gaps do you see in SC resources, initiatives, and offerings?

- Satisfied or Blank Response: 44%
- Inadequate Resources or Support: 29%
- Lack of Customizability for Plant or Supplier: 15%
- Training / Filling Positions: 12%
Question 12

Would you recommend us to a friend/business partner?

- Yes: 80%
- No: 20%
12) Corporate Services

Yes: 0%
No: 100%

12) Facility

Yes: 87%
No: 13%
Regional Perspective

12) America - North

- Yes: 72%
- No: 28%

12) America - South

- Yes: 100%
- No: 0%
12) Asia Pacific

0%

100%

12) Corporate

22%

78%
12) Europe

- Yes: 75%
- No: 25%
Management Level Perspective

12) Controller

- Yes: 71%
- No: 29%

12) Engineer

- Yes: 100%
- No: 0%
If Not, Why?

- Communication Errors / Poor Feedback: 37%
- Ineffectively Organized: 25%
- Too Early in the Process / Unsure: 38%
External Survey

Responder Request

Dear New England Roundtable Executive Forum Participants:

A group of supply chain students at WPI is working with Rashid Shaikh and Diane LaRoche at Nypro to conduct a supply chain survey. They ask for your help in completing the attached questionnaire by **Monday, January 28**. I apologize for the short notice. Details below:

There are two burning questions challenging most supply chain executives today; first the very definition of Supply Chain (corporate capabilities that should be part of their next generation supply chain) and secondly the challenge to measure progress of supply chain initiatives or the return on the supply chain investment. This brief survey is designed to help understand current supply chain capabilities or future trends of participant companies, their performance tracking tools, and ROI methods and measurements.

The survey results will be shared with all who participate. To ensure sanctity and accuracy of the data, the survey is being conducted by a group of Worcester Polytechnic students under the guidance of the Nypro Inc Supply Chain team. In consideration of everyone's time, this one page survey is designed to take less than 10 minutes and can be filled out by multiple people in your organization.

Please complete the attached Excel document and email it to the Benchmarking Team at WPI at **benchmarking@wpi.edu**. **Questionnaires are due by Jan. 28th** in order to compile the results and have them available to share during the next scheduled CSCMP New England Roundtable Executive Breakfast. Your quick response is greatly appreciated. If you have questions, please contact Diane LaRoche, Global Supply Chain Systems and Analysis at Nypro at **XXXXX@Nypro.com**, or call her at 978-368-XXXX (office) or 978-328-XXXX (mobile).

Thanks very much for helping these students with their project.

Regards,

Jeff

Jeff Wickham

**Supply Chain Executive Forum Coordinator**

**CSCMP New England Roundtable**
**Survey**

Supply Chain Survey - WPI Benchmarking Project - January 2008

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Worksheet - External Survey Participants

**Capabilities or key SC elements of your integrated supply chain**

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<th>Capabilities/ Elements that are currently part of your Corp Supply Chain</th>
<th>Total resources that are fully employed in this function</th>
<th>In your opinion, Should this element be a part of your Global Supply Chain</th>
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<td>Early supplier involvement (development)</td>
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<td>New Technology (Product) Development</td>
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<td><strong>Commodity Management</strong></td>
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<tr>
<td>Strategic Supplier Management</td>
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<td>Contract Negotiations</td>
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<td>Commodity Technical expertise</td>
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<td>What ERP system do you have</td>
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<td>What SCM Package do you have</td>
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<td>Do you measure your ROI?</td>
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Graphical Analysis

Supply Chain Systems

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Current Elements

Sourcing

- Supplier Qualification
- Supplier Quality Engineering
- AVL Management
- Early supplier involvement (development)
- New technology (Product) Development

Commodity Management

- Strategic Supplier Management
- Contract Negotiations
- Commodity Technical expertise
- Commodity Commercial expertise
Forecasting and Planning

- Demand Forecasting
- Customer order management
- Capacity Planning
- Material Planning
- S & OP Process

Purchasing

- Material Planning
- Material Replenishment
- PO/Invoice Management
- Cash/Credit management

Logistics and Inventory Management

- Network Optimization
- Inventory Management
- VMI Management
- Freight Rate Benchmarking
Business Solutions and Indirect Material/Services Mgmt

- Commodityization
- Contracts
- Purchase cards/Rebate System
- Spend Control
- Best Business Practice Development

KPIs and Web Tools

- Cost Reductions/Savings
- Cost Flow Tracking (ex. AP Days, AR Days)
- Inventory Tracking
- Fill Rate
- Dashboard Software packages (internal/supplier)
- Do you measure your ROI?

Other Elements

- Customer Service
Global Elements

Sourcing

- Supplier Qualification
- Supplier Quality Engineering
- AVL Management
- Early supplier involvement (development)
- New technology (Product) Development

Commodity Management

- Strategic Supplier Management
- Contract Negotiations
- Commodity Technical expertise
- Commodity Commercial expertise

Forecasting and Planning

- Demand Forecasting
- Customer order management
- Capacity Planning
- Material Planning
- S & OP Process
KPIs and Web Tools

- Cost Reductions/Savings
- Cost Flow Tracking (ex. AP Days, AR Days)
- Inventory Tracking
- Fill Rate
- Dashboard Software packages (internal/supplier)
- Do you measure your ROI?
- What other KPI's do you measure

Other Elements

- Customer Service