Supply Base Segmentation and Management at a Medical Equipment Manufacturer

by

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Submitted to the Sloan School of Management and the Department of Mechanical Engineering in Partial Fulfillment of the Requirements for the Degrees of

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Abstract

This thesis proposes an approach to supply base management that relies on differentiation between categories of suppliers. The objective of this thesis is to illustrate, through a real company’s example, how profitability analysis can be combined with more typical supply base management approaches to improve a company’s bottom line.

The central innovation in the proposed approach is the use of an indication of suppliers’ impact on company profits to segment the supply base. Previous work on supplier segmentation uses factors such as amount spent at the supplier and the importance of the purchased products to distinguish between suppliers. This thesis builds upon those approaches by adding an analysis of the profit contribution from the supplier and the cost of managing the supplier. Suppliers that cost a lot to manage and contribute little profit require improvement or become targets for supply base reduction. Suppliers that work to reduce the customer’s cost of managing them and contribute positively to the customer’s bottom line deserve reinforcement and stand as examples for the rest of the supply base.

The approach proposed in this thesis provides managers with a tool to evaluate and improve the profitability and performance of their supply base.

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1. Introduction

Suppliers and supply chains matter. As companies outsource more parts of their business to specialist suppliers, those suppliers become essential to the success of the business. Selection and ongoing management of those suppliers are therefore growing in importance. For companies with large supply bases, however, distinguishing between core and less important suppliers is not necessarily straightforward. In the absence of this distinction, companies revert to a “one size fits all” approach to supplier and supply base management that can generate inefficiencies and strain important supplier relationships.

This thesis proposes an approach to supply base management that relies on differentiation between categories of suppliers. The approach is designed to evaluate suppliers according to their impact on the bottom line. The proposed approach augments earlier work on supplier segmentation that tends to focus on measures of strategic alignment between the company and suppliers.

The central innovation in this approach is the use of an indication of suppliers’ impact on company profits to segment the supply base. Previous work on supplier segmentation uses factors such as amount spent at the supplier and the importance of the purchased products to distinguish between suppliers. This thesis builds upon those approaches by adding an analysis of the profit contribution from the supplier and the cost of managing the supplier. Suppliers that cost a lot to manage and contribute little profit require improvement or become targets for supply base reduction. Suppliers that work to reduce the customer’s cost of managing them and
contribute positively to the customer’s bottom line deserve reinforcement and stand as examples for the rest of the supply base.

The objective of this thesis is to illustrate, through a real company’s example\(^1\), how profitability analysis can be combined with more typical supply base management approaches to improve a company’s bottom line. The proposed approach is described in the context of the purchasing department at a major medical equipment manufacturer. The analysis shows the manufacturer spends over €1,000,000 per year to manage the unprofitable suppliers that make up 25% of the supply base. These resources could be reallocated to activities that generate profit, or turned into cost savings to improve the bottom line.

The thesis is organized to highlight the example company’s experience with the proposed approach. The next chapter summarizes a review of current literature on supply chain and supply base management. The third provides background information on the company and industry used to demonstrate the proposed approach, and describes the supply base management problem from the example company’s perspective. The fourth chapter provides more detail on the example company’s internal supply base management procedures, and provides an overview of the approach taken by one of their competitors. The fifth chapter provides a detailed discussion of the analytical approach used to address the example company’s situation. The sixth chapter provides the results of the analysis at the example company. The seventh chapter describes the implications of the analytical results for supply base management at the example company. The eighth chapter describes opportunities for refinement of the analysis and future work. The conclusion discusses how this type of profitability analysis applies more generally for supply base management, particularly at companies with large supply bases.

\(^1\) The company’s name is disguised for confidentiality.
2. Literature Review

The preponderance of the literature relevant to supply base management and segmentation focuses on one of two general areas: supply chain management and purchasing management. Taken together, the literature in these areas provides the basis for much of current practice in supply base management. In addition, the work on management of supply chains for profitability provided the basic concepts that led to the development of the supply base management approach proposed in this thesis.

2.1. Supply Chain Management Literature Review

Porter’s text on competitive advantage emphasizes the market differentiation created by the combined activities of a value system designed to provide products to the end customer.\(^2\) This concept provides the basis for much of modern supply chain management theory. Following Porter’s work, companies engaged in cost-based competition focused on generating competitive advantage by reducing supply chain costs without sacrificing service levels.\(^3\) This approach was demonstrated anatomically and empirically to have a significant impact on overall firm performance.\(^4\) The evidence supporting Porter’s original supply chain management concepts led

to the view that in modern markets it is actually supply chains, not companies, competing with each other.\(^5\)

Recently, the focus of supply chain management is shifting from cost reduction to profit improvement. While cost and profit are clearly linked, firms are beginning to recognize that supply chain management has the potential to increase revenues as well as reduce costs. This may involve differentiating service levels or product characteristics according to the profitability of different customer and product types, or considering the intersection of business strategy and supply chain strategy in market entry and exit decisions.\(^6,7\)

2.2. Purchasing Management Literature Review

As a part of the firm that interfaces with a significant portion of the supply chain, a purchasing organization can have substantial influence over supply chain performance and the firm’s competitive advantage. Much of the current work on the role of purchasing organizations is outlined in Monczka’s text on purchasing and supplier management.\(^8\) Monczka discusses at length the interactions between supply base structure, sourcing strategies, contracting, supplier development, purchasing processes, and the firm’s supply chain.

One of the key facets of this interaction is the importance of supply base segmentation.\(^9\) Supply base segmentation enables differentiated management approaches for different supplier types, and avoids a “one size fits all” approach. This type of differentiated supplier management is

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\(^9\) Ibid.
credited as one of the factors that enabled the success of the Japanese automobile industry. By distinguishing between “partner-suppliers” and other suppliers, Japanese firms were able to pursue time- and effort-intensive practices such as involving key suppliers in product development, without inefficiently spending similar effort with routine suppliers.\textsuperscript{10} 

Supply base segmentation also enables another significant trend in purchasing and supply base management: supply base reduction. Smaller, more concentrated supply bases permit firms to allocate more time and effort to managing relationships with the remaining suppliers as they pursue joint competitive advantage. While a reduced supply base does increase risk by increasing reliance on a smaller number of suppliers, research shows these risks are outweighed by the benefits of the resulting proactive purchasing policies such as development of long-term supplier alliances.\textsuperscript{11} In addition, firms find smaller supply bases enable cost reductions in the form of lower internal administrative costs and lower material prices associated with higher volumes per supplier.\textsuperscript{12}

2.3. Summary

Current literature on supply chain and purchasing management emphasize the importance of supply base segmentation and management in achieving competitive advantage. In addition, the literature suggests developing interest in supply chain management focused on profit improvement.

There is a need to address the connection between these supply chain management approaches. This thesis addresses that need by providing a practical method for combining supply base segmentation with profit-focused supply chain management. The chapters that follow describe the application of a profit-based supply base segmentation analysis in a large manufacturing firm, and discuss the implications of this approach for supply chain management in general.
3. Industry & Company Background

The supply base segmentation and management approach proposed in this thesis is described in the context of a real world example. Specifically, the case of Trzepacz Medical Group\textsuperscript{13} is used to illustrate the value of using profit analysis as a basis for supplier differentiation. This chapter provides background information on the medical equipment industry in general and Trzepacz in particular to facilitate the use of this case study.

3.1. Medical Equipment Industry Background

Trzepacz Medical Group is one of the largest competitors in the market for major medical equipment, alongside other large technology product companies. While there are a number of small niche competitors in specific product areas, these large companies vie for most major customers. These companies produce several competing medical product lines, and pursue sales directly with hospitals and other healthcare providers. It is not uncommon for these companies to bid against each other to equip entire facilities with complete suites of medical equipment and other products, such as basic electronics or appliances.

A company’s ability to provide service for major equipment following the initial sale is an important part of the value proposition for key customers. Customers in this market generally require major medical equipment to be supported for over a decade after initial installation. The competitive environment among these companies drives significant technological innovation in most product lines, and as a result, the customer’s support requirements generally necessitate

\textsuperscript{13} The name of the company is disguised.
product support long after the product has been discontinued by Trzepacz Medical Group and its suppliers. This creates challenges across the supply chain.

A key distinguishing characteristic of this industry is the regulatory environment. All medical equipment producers are regulated and audited by the Food and Drug Administration in the United States and similar agencies around the world. Among other requirements, these regulatory bodies compel producers of medical devices to ensure quality management systems are in place and “current good manufacturing practice” is followed at their own facilities as well as those of suppliers. Formal records of supplier evaluations made periodically over the course of the supplier business relationship must be maintained for the duration of the relationship. Supplier management processes must be documented and followed, and changes to those processes must follow approved transition plans.¹⁴

3.2. Trzepacz Medical Group Background

Trzepacz Medical Group is the medical products division of Trzepacz, an international producer of electronics products. Trzepacz Medical Group was formed over the 3-year period preceding this research project when Trzepacz acquired businesses from a number of other companies to augment their own medical product lines. While Trzepacz Medical Group has a worldwide sales and marketing presence, their primary production and engineering facilities are located across Europe and the United States.

Trzepacz Medical Group’s primary product lines include X-ray, MRI, cardiac monitoring, ultrasound, and computed tomography systems, as well as medical information technology

products and nuclear medicine equipment. Trzepacz Medical Group’s primary customers are hospitals and other point-of-care facilities that purchase this type of large medical equipment.

At the start of this research project Trzepacz Medical Group was organized into seven business lines, each of which had profit and loss responsibility for one of the key product lines. The recent formation of Trzepacz Medical Group created an environment of relatively frequent organizational change, however, and by the end of this research project the company had been reorganized into four business units, with a number of the imaging product lines grouped together into a single unit.

3.3. Cardiac Systems Global Purchasing Organization Background

Prior to its acquisition by Trzepacz, the cardiac systems business line was organized around each of its key products at its production facilities in the United States and Europe. The purchasing groups within cardiac systems reflected this organization. In 2003, the cardiac monitoring systems business line reorganized the purchasing groups to form a single Global Purchasing Organization to provide purchasing and supplier management services for the entire cardiac monitoring systems business line, including both production facilities. With the reorganization, this new organization is responsible for management of over 800 suppliers around the world.

The Global Purchasing Organization is also represented on inter-business line purchasing teams tasked with procuring key commodities common to several business lines. The Global Purchasing Organization is a cost center within the business line profit center.

The Cardiac Systems Global Purchasing Organization consists of roughly 100 people organized into six primary groups and a small support staff. The largest group includes supplier managers located at the U.S. and European facilities, with responsibility for overall supply base
management in the business line. There are two groups of buyers, each of which handles individual purchases for one of the production facilities. There are also two groups of material quality engineers to monitor and address supplier quality issues at each production facility. Finally, there is a small process management and improvement group to support process development and purchasing information technology systems for both production facilities.

3.4. Problem Description: The Global Purchasing Organization’s Perspective

Supplier management within the purchasing organizations that became Cardiac Systems Global Purchasing Organization historically focused on generating purchased material cost savings and managing quality in accordance with the regulatory environment. With the formation of the Global Purchasing Organization however, greater emphasis is being placed on overall management of the portions of the supply chain influenced by purchasing. This new emphasis on supply risk management, supplier involvement in the product development process, and long-term supplier relationships necessitates a reallocation of resources within Global Purchasing Organization. Given constant competitive pressure to reduce the cost of purchasing organizations and the need to maintain quality system performance in accordance with regulatory requirements, this reallocation of Global Purchasing Organization resources is only possible with a combination of supply base reduction and supplier management that is differentiated according to the importance of a specific supplier.

The issues facing Global Purchasing Organization in this area are illustrated in Figure 1. Cardiac Systems’ large supply base limits the effort Global Purchasing Organization can expend on any given supplier. This means members of Global Purchasing Organization have limited time to interface with the disconnected information technology tools for supplier management.
This, in turn, leads to supplier data errors and inconsistencies that complicate analysis of the supply base. Difficulty in analyzing the supply base makes it difficult to determine how the supply base should be reduced, which reinforces the problems associated with having a large supply base.

The supply base segmentation and management approach proposed in this thesis was used demonstrate how to break this negative cycle. There are three requirements to address the problem outlined in Figure 1. First, an improved data management process to provide and maintain supplier data was necessary. Second, a method of using the data to differentiate between segments of the supply base was required. Finally, a supply base management process that differentiates between supplier categories and identifies targets for supply base reduction was needed to enable accomplishment of Global Purchasing Organization’s objectives for supply chain management.

3.5. Summary

The supply base management problem presented by the Cardiac Systems Global Purchasing Organization is representative of supply base management challenges in many large firms. A vast, globally distributed supply base is combining with competitive pressures to strain supply base management resources. Managers are conscious of the need to reduce the supply base, but
want to do it in a way that preserves the long-term advantages provided by key suppliers. The following chapters in this thesis describe a proposed approach to the challenges facing Cardiac Systems Global Purchasing Organization with the aim of demonstrating the value of the approach to business in a variety of industries.
4. **Overview of Trzepacz Medical Group Supplier Management Policies**

Trzepacz has developed a number of supplier management policies and procedures. While Trzepacz Medical Group was formed relatively recently, and many purchasing policies are as yet undefined, the company is beginning to apply certain tools developed and employed by Trzepacz. The procedures provide a baseline approach to the challenges facing Cardiac Systems Global Purchasing Organization. The approach described by the Trzepacz procedures is representative of approaches to supply base segmentation taken by many companies. This chapter summarizes those procedures to provide a starting point for the analysis described in Chapter 5.

The two tools relevant to this project are the tool designed to assess the alignment between Trzepacz and suppliers, and the tool developed to evaluate the performance of individual purchasing organizations within Trzepacz.

4.1. **Trzepacz Supply Market Management**

Trzepacz developed a supply market evaluation tool based on the work by Monczka. The evaluation process recommends evaluating the business relationship between Trzepacz and a supplier from Trzepacz’s perspective and the supplier’s perspective, then mapping the two views against each other to determine the degree of alignment between the supplier and Trzepacz.
The buyer’s view is summarized by the matrix shown in Figure 2. The business relationship is assessed based on the amount spent with a given supplier relative to the total amount spent by the purchasing organization and the risk associated with the purchased product. These assessments combine to sort the business relationship into one of four categories.

A similar process is employed to assess the business relationship from the supplier’s perspective, as summarized in Figure 3. The relationship is evaluated based on the amount spent with the supplier relative to the supplier’s total revenue and the overall attractiveness of the buyer’s company. Again, these assessments combine to sort the relationship into one of four categories.

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15 In this analysis, “supply risk” is used to indicate the impact of quality problems for a given purchased product. Critical parts are considered “high” risk, while ancillary parts are considered “low” risk.
The buyer’s view and supplier’s view are then mapped together, as shown in Figure 4. This combination of perspectives illustrates the degree of alignment between the supplier and the buyer.

Generally, business relationships that fall into the upper right quadrant are well aligned and are considered important by both the supplier and the buyer. Those in the lower left quadrant are characterized by mutual indifference; unimportant products are purchased from suppliers that do not consider the buyer to be an important customer. The upper left quadrant is a mismatch that favors the supplier, with important products being purchased from a supplier that does not consider the buyer to be important. The lower right quadrant is a mismatch that favors the buyer, with relatively unimportant products being purchased from a supplier that considers the buyer to be an important customer.

This tool is intended to be part of a supply base segmentation and management process for purchasing organizations within Trzepacz.

4.2. Trzepacz Purchasing Process Survey Tool

As part of an internal corporate evaluation process, Trzepacz developed a set of Process Survey Tools for various functional areas, including purchasing. Internal auditors use these tools to
periodically assess the purchasing organizations within each business line. A purchasing organization’s overall score is determined by their performance in fourteen interrelated areas:

- Insourcing and Outsourcing Processes
- Commodity Strategy Development
- Supply Base Optimization and Management
- Supplier Partnerships
- Supplier Integration in the Product Creation Process
- Supplier Integration in the Order Realization Process
- Supplier Development and Quality Management
- Strategic Cost Management
- Strategies and Plans
- Organization and Teaming Strategies
- Globalization
- Measurements
- Information Technology Systems
- Human Resource Management

The organization’s scores in several areas rely upon the organization’s performance in the Supply Base Optimization and Management area, since identification of suppliers for partnerships, development efforts, and other initiatives rely upon accurate characterization of the supply base.

This evaluation system inevitably becomes an important part of the incentive structure for purchasing organizations within Trzepacz. Purchasing organizations are driven to show improvement from year to year, even within Trzepacz Medical Group where the organizations were only recently formed. This incentive structure, combined with the importance of supply base management within the Process Survey Tool, emphasizes the importance of accurate
analysis and management of the supply base within Trzepacz Medical Group in general, and Cardiac Systems Global Purchasing Organization in particular.

4.3. Summary

The supply base segmentation approach developed by Trzepacz provides a useful baseline analysis of the supply base, provided appropriate data is available. In the next chapter, the steps necessary to implement this approach are described. This segmentation procedure is then augmented with the proposed process for analyzing a supplier’s contribution to profit to provide additional insight into the supply base and enable differentiated management.
5. Analytical Approach

The primary objective of this thesis, mentioned earlier, is to demonstrate, by way of a case study with Cardiac Systems Global Purchasing Organization, a proposed process for supply base management based on analysis of suppliers’ contribution to profit.

This chapter describes the analytical approach taken to accomplish this objective. In particular, it outlines the process necessary to reverse the negative cycle illustrated in Figure 1. The key steps in this process are:

- Evaluate the current Cardiac Systems Global Purchasing Organization supplier data management approach.
- Develop an improved supplier data management approach, and use it to process Cardiac Systems supplier data.
- Use the refined data to analyze the Cardiac Systems supply base, using the Trzepacz approach described in Chapter 4 and the proposed profit analysis technique.
- Sort suppliers in the Cardiac Systems supply base into appropriate categories.
- Recommend management approaches for each key category of supplier.

The above steps are expanded and described in detail in this chapter.

5.1. Interviews and Review of Process Documentation

The first step to address the challenges facing Cardiac Systems Global Purchasing Organization was to gather basic information regarding current policies and practices inside the organization, and compare them to practices in other business lines within Trzepacz Medical Group and at key competitors. This involved conducting a series of informal interviews with key members of the
staff in Cardiac Systems Global Purchasing Organization and in other business lines, and a review of the internal regulatory documentation for supplier management processes.

5.1.1. Informal Interviews

A series of interviews was conducted with key staff members inside Cardiac Systems Global Purchasing Organization and within purchasing organizations at other business lines. The primary objective of each interview was to identify each respondent’s view of the positive and negative aspects of current supplier management systems, define the information they required to manage those suppliers, and discuss how they allocated their time to various supplier management activities. The interviewees were selected to ensure a variety of views were provided. Interviewees were selected to represent the following groups:

- Supplier managers from Cardiac Systems Global Purchasing Organization and other Trzepacz Medical Group businesses
- Buyers from Cardiac Systems Global Purchasing Organization
- Material quality engineers from Cardiac Systems Global Purchasing Organization
- Process management and improvement personnel from Cardiac Systems Global Purchasing Organization

These interviews provided a basic understanding of the way supplier management is performed in the Cardiac Systems Global Purchasing Organization.

5.1.2. Process Documentation Reviews

Regulatory considerations require Cardiac Systems Global Purchasing Organization and other Trzepacz Medical Group business lines to document the processes they use for a variety of activities, including supplier management. These documents provide a convenient source of
information regarding the supplier data management processes within Cardiac Systems Global Purchasing Organization and other Trzepacz Medical Group business lines. The following four processes proved particularly useful:

- **Cardiac Systems Supply Planning Data Management Process**: This process document describes supplier data management as it relates to Cardiac Systems’ product engineering database tool and enterprise resource planning system.

- **Cardiac Systems Supplier Management Tool Process**: This document describes supplier data management as it relates to Cardiac Systems’ supplier quality management database tool.

- **Trzepacz Medical Group Supplier Evaluation and Selection Processes**: This draft document reflects the input of several Trzepacz Medical Group business lines, including Cardiac Systems, and identifies the data collected to support qualification of a supplier.

- **Supplier Categorization Process**: This software package and documentation from another Trzepacz Medical Group business line describes a process based on the Trzepacz Supply Market Management approach for categorizing suppliers.

These processes augmented the interview results to provide the background necessary to begin the analysis of Cardiac Systems’ supply base. The next section discusses the first step in the data collection process: a necessary change to Cardiac Systems’ data management approach.

### 5.2. Supplier Data Management Process Refinement

The results of the interviews and process document reviews indicated a number of supplier data management issues made existing supplier data unsuitable for supply base analysis. It was therefore necessary to develop a revised supplier data management process, and use it to refine existing supplier data for analysis. This was accomplished by mapping current data management processes, identifying gaps in the processes, and identifying the necessary refinements.
These refined supplier data management processes provided the data necessary to analyze the current supply base.

5.3. Supply Base Segmentation Analysis

Using available data from existing Cardiac Systems Global Purchasing Organization systems, the Cardiac Systems supply base was sorted into basic categories of active and inactive suppliers. This basic categorization, in turn, enabled a more thorough analysis of the active portion of the Cardiac Systems supply base according to the Trzepacz Supply Market Management approach. This resulted in a classification of the business relationships between Cardiac Systems and each supplier, with each supplier being sorted into one of the four categories defined by the Trzepacz process. The approach used to complete each step of this analysis is discussed below. As described in Chapter 4, the Trzepacz Supply Market Management approach relies on analysis of the supplier business relationship from the buyer and supplier perspectives, and combines the two perspectives to determine the degree of alignment.

5.3.1. Analysis From the Buyer’s Perspective

According to the Trzepacz process, the buyer’s perspective on the business relationship with a specific supplier is defined by the relative spend at the supplier and the risk associated with the material purchased.

5.3.1.1. Relative Spend

Relative spend is the percentage of Cardiac Systems Global Purchasing Organization’s total material spend allocated to the supplier. This requires data on the amount spent with a given
supplier and the total amount spent on material by Cardiac Systems. This data was available within the Cardiac Systems Global Purchasing Organization databases. Any supplier representing greater than 0.5% of Cardiac Systems’ total material spend was rated as a “High” relative spend supplier. Less than 0.5% of total spend resulted in a “Low” rating. The 0.5% was selected to be consistent with the processes used at other Trzepacz Medical Group business lines.

5.3.1.2. Supply Risk

The risk associated with the material purchased was defined by the impact the purchased part has on the functionality of the final product. Cardiac Systems’ quality system requires ranking each purchased part according to patient safety risk, and supplier risk is ranked according to the highest risk material purchased from a specific supplier. Supplier risk rating data was available in the Cardiac Systems Global Purchasing Organization databases.

It would be desirable to use an indicator of the supplier’s financial stability, such as the Altman Z-score, as part of the risk rating. However, the data necessary to complete this analysis was not available or readily obtainable. As a result, only the Cardiac Systems quality system risk rating was used as the measure of supplied material risk.

5.3.2. Analysis From the Supplier’s Perspective

The Trzepacz process defines the supplier’s perspective on the business relationship by the relative value to the supplier of Cardiac Systems’ business and the overall attractiveness of the customer. In general, it would be ideal to have suppliers provide their assessment of these two

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areas directly. However, this was not possible as part of this project. The supplier’s perspective was therefore approximated using available data.

5.3.2.1. Relative Value

The relative value of Cardiac Systems’ business was determined by the amount spent at the supplier relative to the supplier’s total revenues. The amount spent at each supplier was available in Cardiac Systems Global Purchasing Organization databases, and the supplier’s total revenues were found using commercially available business databases. It should be noted that the total revenue figures shown in these databases for privately owned suppliers are approximate in some cases, but this was not found to significantly impact the analysis.

If Cardiac Systems represented more than 0.5% of the supplier’s total revenue, the business relationship was rated as “High” relative value. If Cardiac Systems’ business represented less than 0.5% of the supplier’s total revenue, the relationship was given a “Low” rating. This cutoff value was selected to be consistent with the buyer’s perspective analysis described in Section 5.3.1.

5.3.2.2. Trzepacz Medical Group Attractiveness

Evaluating the overall attractiveness of Cardiac Systems as a customer was less straightforward. No standard attractiveness rating exists, so a combination of factors was considered. The number of competitors for the supplier in the supply base and the size of the supplier relative to Trzepacz Medical Group were the only relevant quantitative factors available to support this analysis.
If the supplier is a single-source provider of material to Cardiac Systems, the supplier has greater leverage in the business relationship and the relationship is more attractive. If the supplier is small relative to Trzepacz Medical Group in terms of total revenue, Trzepacz Medical Group is likely to be more attractive as a customer.

To make up for the lack of conclusive data for this analysis, a panel of experienced supplier managers reviewed the results to ensure they were realistic. If the manager’s experience indicated the supplier was responsive and willing to actively work with Cardiac Systems, it was assumed the relationship was attractive from the supplier’s perspective. If the supplier had little interest in working with Trzepacz Medical Group, it was assumed the relationship was less attractive.

While input from the suppliers would have been extremely helpful for this portion of the analysis, it simply was not feasible to obtain input from over 800 suppliers for this project.

5.3.3. Combined View

One the business relationship with each supplier was evaluated from both the buyer’s and supplier’s perspective, the two views were mapped together as described in Chapter 4. This provided an evaluation of the alignment between Cardiac Systems and the supplier.

5.4. Purchasing Margin Analysis

This final step in the analysis illustrates an implementation of the key approach described by this thesis. Specifically, this portion of the analysis describes how each supplier’s contribution to Cardiac Systems’ profits was determined, particularly with respect to the cost of managing the
supplier. This method was developed to differentiate suppliers based on the profit they provide to the business.

The method proposed here introduces the idea of “purchasing margin”. The purchasing margin for a supplier is the difference between the profit enabled by a supplier’s product and the cost of managing the supplier in the purchasing department. Purchasing margin provides an approximate measure of a supplier’s overall value to the business in a way that can be compared to other suppliers.\(^{17}\) By determining this purchasing margin for each supplier, it is possible to differentiate between those suppliers that provide more or less benefit to the business than they absorb in management cost.

The purchasing margin for a supplier is defined as

\[
M_{purchasing} = \frac{P_{supplier} - C_{supplier}}{R_{supplier}}
\]

Where \(P_{supplier}\) is the profit enabled by the supplier, \(C_{supplier}\) is the cost of managing the supplier, and \(R_{supplier}\) is the revenue enabled by the supplier.

From a purchasing perspective, the profit enabled by the supplier is best defined as gross margin on purchased material. When multiple products are involved, this relationship is

\[
P_{supplier} = \sum_{All\ Products} (GM \times R_{supplier})
\]

where

\(^{17}\) A negative purchasing margin does not necessarily indicate the supplier provides no value. Clearly, there may be cases where suppliers have a negative purchasing margin but are still valuable due to the nature of the critical parts they provide.
\[ GM = \frac{SP_{\text{product}} - C_{\text{material}}}{SP_{\text{product}}} \quad \text{and} \quad R_{\text{supplier}} = \frac{C_{\text{material}}}{1 - GM} \]

where \( GM \) is the gross margin on material for the final product, \( C_{\text{material}} \) is the cost of the purchased material used in the product, and \( SP_{\text{product}} \) is the selling price of the final product.

Substituting for \( P_{\text{supplier}} \) in the \( M_{\text{purchasing}} \) equation yields

\[ M_{\text{purchasing}} = \frac{\sum \left( GM \times R_{\text{supplier}} \right) - C_{\text{supplier}}}{\sum R_{\text{supplier}}} \]

or

\[ M_{\text{purchasing}} = GM_{\text{overall}} - \frac{C_{\text{supplier}}}{\sum R_{\text{supplier}}} \]

where \( GM_{\text{overall}} \) is the average gross margin for all products.

The purchasing cost of managing a supplier, \( C_{\text{supplier}} \), is the incremental cost associated with managing the specific supplier. If the total cost of the purchasing organization is represented as

\[ TC_{\text{purchasing}} = \sum_{\text{All Suppliers}} C_{\text{supplier}} + C_{\text{fixed}} \]

where \( C_{\text{fixed}} \) is the fixed cost of the organization, which is assumed to be the organizational cost not associated with suppliers, then \( C_{\text{supplier}} \) is the incremental cost of managing a specific supplier. The cost of managing a specific supplier is determined by the activities necessary to manage the supplier and the cost associated with those activities, so
\[ C_{\text{supplier}} = \sum_{\text{AllActivities}} A_{\text{management}} \times C_{\text{activity}} \]

where \( A_{\text{management}} \) is the management activity required for the supplier, and \( C_{\text{activity}} \) is the cost of the activity.

Combining these factors to determine the overall purchasing margin for a supplier yields

\[ M_{\text{purchasing}} = G M_{\text{overall}} - \frac{\sum_{\text{AllActivities}} A_{\text{management}} \times C_{\text{activity}}}{\sum_{\text{AllProducts}} R_{\text{supplier}}} \]

In the case of Cardiac Systems Global Purchasing Organization, the data necessary to complete this analysis was obtained from a combination of interviews, budget analysis, and the Cardiac Systems Global Purchasing Organization supplier data management databases. Interviews with members of the Global Purchasing Organization staff provided data on the key activities necessary for managing suppliers as well as the average gross margins and profits for Cardiac Systems products. Budget analysis revealed the costs associated with key supplier management activities. Cardiac Systems Global Purchasing Organization supplier management databases provided data on the materials purchased from each supplier, the cost of materials purchased from each supplier, and the number and type of management activities required (e.g. number of quality issues requiring resolution, number of transactions, etc).

This data made it possible to calculate the purchasing margin associated with each supplier, and identify those suppliers that cost more to manage than they provide in profit. This analysis was then combined with the previous supplier segmentation analysis based on the Trzepacz Supply
Market Management approach to identify differentiated management approaches for key groups of suppliers.

5.5. Summary

The analytical approach described in this section illustrates the practical steps necessary to implement a profit-based approach to supply base segmentation. First, actions are required to ensure the appropriate data is available and maintainable. Second, a segmentation based on measures of “strategic alignment”, such as the approach outlined by the Trzepacz Supply Market Management policy, can be used to sort suppliers into general categories. Finally, the profit contribution and management cost, or purchasing margin, associated with each supplier can be determined to provide a quantitative basis for differentiating between suppliers.

The next chapter describes the results of the analysis performed at Cardiac Systems Global Purchasing Organization, to illustrate the value provided by this approach.
6. Analytical Results

This chapter outlines the results of each analytical step described in Chapter 5. In the final section, the particular insights provided by the purchasing margin analysis are discussed.

6.1. Interviews and Review of Process Documentation

The first step in the analysis consisted of a series of interviews and process documentation reviews, as described in Chapter 5.

6.1.1. Informal Interviews

A series of informal interviews was conducted to develop an understanding of the current supplier management processes and the key roles played by each group in Cardiac Systems Global Purchasing Organization. The interviews yielded three key groups of findings regarding the positive and negative aspects of the current supplier management systems and the current allocation of Global Purchasing Organization resources for supplier management. Each of these is discussed below.

6.1.1.1. Current Supplier Management Processes

Members of Cardiac Systems Global Purchasing Organization and other Trzepacz Medical Group business lines consider Cardiac Systems Global Purchasing Organization’s supplier quality management system to be strong. The supplier quality system is considered to be well developed and implemented. However, most individuals interviewed noted the current supplier
management systems are lacking in more “business-oriented” aspects. Many individuals noted the need to improve performance in this area, but expressed concern that increased emphasis on supplier business management could strain Global Purchasing Organization resources.

6.1.1.2. Supplier Data Accessibility and Accuracy

Supplier managers noted it was difficult to access the complete set of data necessary for their job. Managers noted they may need to access as many as six different data repositories over the course of a supplier’s business relationship with Cardiac Systems. Also, individuals noted several initiatives were underway to correct supplier data inconsistencies between information technology tools. This initiative required significant time and effort within Global Purchasing Organization.

6.1.1.3. Resource Allocation and Global Purchasing Organization Cost Drivers

Members of the Cardiac Systems Global Purchasing Organization staff were also asked to identify the key cost drivers and resource allocations for supplier management. They identified four key points regarding the cost of managing suppliers in the Global Purchasing Organization:

- **Buyer Resources:** The cost of managing a supplier from the perspective of the buyer groups depends primarily on the number of parts purchased from the supplier. While some parts require more effort than others, the cost of managing most suppliers is generally proportional to the number of parts purchased. A manager of one of the buyer groups agreed the entire cost associated with the buyer groups was accounted for by the number of parts. If no parts were being purchased, there would be no buyers.
- **Materials Engineer Resources:** The cost of managing a supplier from the perspective of the materials engineering groups depends on the number of quality issues associated with that supplier. Some types of parts and quality issues require considerable effort to resolve while others do not, but in general, it is the number of quality issues that drive the incremental engineering cost of managing a supplier. Only a portion of the engineering group’s total resources are directly associated with managing quality issues at suppliers, however. Other activities associated with the quality and regulatory system in Cardiac Systems Global Purchasing Organization would require a significant portion of the materials engineering resource to be in place even if there were no supplier quality issues. A materials engineering manager estimated 60% of the materials engineering groups’ costs are proportional to the number of quality issues at suppliers.

- **Supplier Manager Resources:** The supplier management group’s primary responsibility is managing relationships with suppliers on a day-to-day basis. As a result, the costs and resources in the supplier management group are proportional to the number of suppliers. Not all suppliers require the same amount of management attention, however. While there is variation in the time spent managing different types of suppliers, the most significant difference is between suppliers actively providing materials to Cardiac Systems and those that are “inactive” but still require some amount of oversight. Approximately 80% of the supplier managers’ time is spent managing active suppliers (i.e. suppliers that provided material within the past 12 months), and the remaining 20% is spent managing inactive suppliers.

- **Other Cardiac Systems Global Purchasing Organization Resources:** Most other resources within Cardiac Systems Global Purchasing Organization are not directly related to the number of suppliers. The number and cost of Cardiac Systems staff and process improvement groups may be loosely connected to the size of the supply base, but the connection is not well defined.

This information on key cost drivers was combined to provide the coefficients necessary to calculate the cost of managing specific suppliers. This cost is a necessary element in the
purchasing margin analysis. The cost drivers described above are summarized in the following table.

<table>
<thead>
<tr>
<th>Group</th>
<th>Key Cost Driver</th>
<th>Resulting Cost Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Engineering</td>
<td># of Quality Issues</td>
<td>(40% of Total Global Purchasing Organization Eng. Cost) / (Total # of Supplier Quality Issues)</td>
</tr>
<tr>
<td>Buyers</td>
<td># of Parts Purchased</td>
<td>(100% of Total Global Purchasing Organization Procurement Cost) / (Total # Parts Purchased)</td>
</tr>
<tr>
<td>Supplier Managers</td>
<td># of 12-Month Active BOM Suppliers</td>
<td>(80% of Total Global Purchasing Organization Sourcing Cost) / (Total # of 12-Month Active BOM Suppliers)</td>
</tr>
</tbody>
</table>

6.1.2. Review of Process Documentation

Reviews of key process documents from Cardiac Systems and Trzepacz Medical Group primarily provided information about the information technology tools used in Cardiac Systems Global Purchasing Organization and other purchasing groups within Trzepacz Medical Group. These reviews resulted in four primary groups of findings, each of which is discussed below.

6.1.2.1. Cardiac Systems Information Technology Tool Findings

Cardiac Systems Global Purchasing Organization uses three different information technology tools and databases on a routine basis, as illustrated in Figure 5. The product data management tool contains engineering information about manufactured and purchased materials, including a list of qualified suppliers for purchased materials. Some of the data in this system is linked to the Cardiac Systems enterprise resource planning system. The enterprise resource planning system, in turn, feeds certain data to the supplier quality management system. There are no connections between the product data management tool and the supplier quality management
tool. Similarly, the supplier quality management tool cannot feed data to the enterprise resource planning system.

The use of three relatively isolated information technology tools creates challenges and inefficiencies for Cardiac Systems Global Purchasing Organization. For example, Global Purchasing Organization personnel must enter and maintain identical supplier data in multiple systems. Even relatively basic supplier data, such as the company’s name and address, can easily be entered inconsistently in the systems by a well-intentioned but busy supplier manager. There is considerable user effort and initiative required to enter data multiple times into systems that are not linked.

6.1.2.2. Global Purchasing Organization Process Documentation Findings

In accordance with regulatory requirements, personnel in Cardiac Systems Global Purchasing Organization are required to be trained on and follow the procedures outlined in the appropriate process documentation. This makes the development and design of these process documents an important factor in the overall efficiency of Global Purchasing Organization.
The current Cardiac Systems Global Purchasing Organization process documents are written to inform users how to interact with individual Global Purchasing Organization information technology tools. While these detailed procedures are absolutely necessary, they do not reflect the fact that the complete work process requires users to interact with all three Global Purchasing Organization information technology tools. The processes do not inform users when they should enter data into both the enterprise resource planning system and the supplier quality management system, for example.

Another apparent gap in the current Global Purchasing Organization process documentation concerns removing suppliers from the systems. While there is some information regarding the steps necessary to prevent use of a supplier in the enterprise resource planning system, there is no instruction for deleting suppliers from the supplier quality management system. This gap is understandable, since these process documents were written to support bringing the information technology tools on-line. In that environment, the focus would clearly be on adding suppliers to the system, not deleting them. However, the current need to reduce the supply base increases the importance of removing suppliers from the system.

6.1.2.3. Supplier Status Categories

A review of software and process documentation from another Trzepacz Medical Group business line provided useful information regarding how types of active and inactive suppliers can be categorized within the regulatory environment. This categorization provides a top-level breakdown of the supply base by differentiating on the basis of activity type and frequency. While the current Cardiac Systems Global Purchasing Organization quality management system only distinguishes between suppliers that are “in” or “out” of the system, this new set of status
categories enables less active management for less active suppliers in other Trzepacz Medical Group business lines. The following key status categories for active and inactive suppliers were identified:

- **Potential:** Potential suppliers are not released to provide any materials or products, but are being considered for future business. They do not currently require management.
- **Active Bill of Material:** These suppliers currently provide materials for active products.
- **Active General:** Supplier is released for supply of non-product related services or materials, such as office supplies.
- **Blocked for New Business:** These suppliers are released to continue providing their current materials, but no new materials may be sourced with them. The buyer has elected to effectively phase-out the relationship with this supplier.
- **Support Only:** These suppliers are only released to provide replacement and service parts for discontinued or other products. Business with these suppliers tends to be sporadic, but can extend for the entire ten to twelve year product support cycle.
- **Deleted:** These suppliers are removed from the system, and require no management.

In cases where suppliers provide materials or services in multiple mutually exclusive status categories, they are managed in accordance with the most stringent requirements.

6.1.3. Interview and Process Documentation Summary

The combination of the interviews and process documentation reviews described above provided an essential set of background information necessary to analyze the Cardiac Systems supply base. In particular, it provided information on the key cost drivers in the purchasing organization.
and identifies problems in the supplier data management process employed in Cardiac Systems. The next step in the analysis was to explore the issues associated with data management further, and develop a revised system to provide the data needed for subsequent supply base analysis.

6.2. Supplier Data Management Process Revision

Interviews and process reviews indicated a revision to the supplier data management process was necessary to support accurate analysis of the supply base. A short summary of the revision is provided as an example of the practical issues that may affect implementation of any supply base analysis.

Figure 5, repeated here, illustrated the roles and interconnections between the three key supplier management information technology tools in the Cardiac Systems Global Purchasing Organization. These three tools are used by different groups within the organization, and there is limited connectivity between the tools. This creates the opportunity for inconsistencies in even elementary supplier data, such as supplier name or address. With over 800 suppliers in the systems, it is extremely difficult to identify and track inconsistencies without some type of automated process.
These issues complicated analysis of the supply base, since the analysis relied on potentially inconsistent data from all three systems. As a result, it was necessary to revise the supplier data management process to ensure accurate data was available. In addition, it was possible to incorporate improvements to the systems to include the supplier status categories outlined in section 6.1.2.3. These categories were later used to support segmentation of the supply base.

The revised data management process is illustrated in Figure 6. The revised process provides more complete connectivity between the systems, and includes error checking routines to ensure reliable data.

With this revised supplier data management approach, it was possible to begin analysis of the supply base. The results of those analyses are discussed in the following sections.

6.3. Supply Base Segmentation

The supply base segmentation analysis consisted of two key parts. First, the Cardiac Systems supply base was sorted into the supplier status categories described by the proposed supplier data
management processes. Second, the active supply base was analyzed using the Trzepacz Supply Market Management Approach. Each of these is discussed in turn.

6.3.1. Supplier Status Categories

First, the results of interviews and discussions with Global Purchasing Organization staff were used to identify the criteria for each status category. The results of these discussions indicated it was most appropriate to determine status classification by the type of material the supplier provides and the frequency of the material purchases. The criteria used for each category are summarized below:

- **Potential**: Potential suppliers are not released to provide any materials or products, but are being considered for future business. Suppliers included in the system but associated with prototype of similar development parts were classified as potential.

- **Active Bill of Material (BOM)**: These suppliers currently provide materials for active products. There were two types of suppliers that were classified as active. First, suppliers that provided material to Cardiac Systems within the past 12 months were considered active, since that period of time encompasses most active product manufacturing cycles in Cardiac Systems. Second, suppliers that had not provided material within the past 12 months but were listed as the selected supplier for a future material purchase were classified as active. This latter set of suppliers was grouped together in a category called “Active Zeroes”.

- **Blocked for New Business**: No clear criteria were identified for this category, since current data do not support it. In the future, Global Purchasing Organization will block suppliers at the discretion of supplier managers and quality engineers.

- **Support Only**: These suppliers are only released to provide replacement and service parts for discontinued or other products. Suppliers associated with
discontinued products or other materials no longer in production were classified as support only.

Data from the supplier management information technology tools were used to sort suppliers according to the categories outlined above. The results of the supply base segmentation by status category were:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential</td>
<td>10 Suppliers</td>
</tr>
<tr>
<td>Support Only</td>
<td>90 Suppliers</td>
</tr>
<tr>
<td>Total Active BOM</td>
<td>727 Suppliers</td>
</tr>
<tr>
<td>Active Distributors</td>
<td>66 Suppliers</td>
</tr>
<tr>
<td>Active Zeroes</td>
<td>310 Suppliers</td>
</tr>
<tr>
<td>12-Month Active BOM</td>
<td>417 Suppliers</td>
</tr>
</tbody>
</table>

These status categories made it possible to focus the rest of the supply base segmentation analysis on the most interesting group of suppliers: the 12-Month Active Bill of Material suppliers. This group of 417 suppliers includes the suppliers Cardiac Systems Global Purchasing Organization recently purchased material from. This group of suppliers was first analyzed according to the Trzepacz Supply Market Management approach, then they were analyzed for profitability according to the approach proposed in this thesis. Those analyses are discussed in the following sections.

6.3.2. Trzepacz Supply Market Management Analysis

Using the approach described in section 5.4 the 417 12-Month Active Bill of Material suppliers were sorted into the four key categories describing the degree of alignment between Cardiac Systems and the supplier. The results are shown in the following table, with the number in each box indicating the number of suppliers in that category.
These results were reviewed with Cardiac Systems Global Purchasing Organization staff to ensure the results were appropriate and reflected the relationship between Cardiac Systems and the supplier accurately.

The results show the majority of the companies that make up Cardiac Systems Global Purchasing Organization’s active supply base fall into the “Commercial” Category, where the business relationship is categorized by mutual indifference. Another significant portion falls into the “Limited Collaboration” category, where the supplier holds the relationship in higher regard than Cardiac Systems does. As would be expected, a smaller number fall into the “Strategically Aligned” category, where both parties consider the relationship to be core to their business. Finally, a small but significant number of suppliers fall into the “Not Preferred” category. These relationships are relatively risky for Cardiac Systems, since Cardiac Systems is purchasing important parts from an indifferent supplier.

The final step in analyzing the Cardiac Systems supply base was to apply the purchasing margin analysis described in Chapter 5. The results of that analysis are discussed in the following section.
6.4. Purchasing Margin Analysis Results

The final step of analysis for the Cardiac Systems supply base was to identify those suppliers that cost more to manage than they contribute in profit. This analysis used the purchasing margin analysis approach described in Chapter 5.

The key factors in this analysis for each supplier are the overall gross margin for Cardiac Systems products on a material cost basis, the revenue enabled by the supplier, and the Global Purchasing Organization cost of managing the supplier. Overall gross margins were determined by interviews with Global Purchasing Organization staff. The Cardiac Systems revenue enabled by each supplier was determined from the gross margin and the amount spent at each supplier, which was data available within the Cardiac Systems Global Purchasing Organization supplier databases.\(^{18}\)

The cost of managing each supplier was determined by identifying the activities that drive supplier management cost in Global Purchasing Organization, then determining the costs associated with each activity for a given supplier. As discussed in section 6.1, the key Global Purchasing Organization cost drivers and associated cost factors are:

<table>
<thead>
<tr>
<th>Group</th>
<th>Key Cost Driver</th>
<th>Resulting Cost Factor(^{19})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Engineering</td>
<td># of Quality Issues</td>
<td>(40% of Total Global Purchasing Organization Eng. Cost) / (Total # of Supplier Quality Issues)</td>
</tr>
<tr>
<td>Buyers</td>
<td># of Parts Purchased</td>
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<td>(80% of Total Global Purchasing Organization Sourcing Cost) / (Total # of 12-Month Active BOM Suppliers)</td>
</tr>
</tbody>
</table>

\(^{18}\) The values of the factors described are not included here due to the business sensitivity of the data.

\(^{19}\) The cost factor values are not shown due to the business sensitivity of the data.
The number of quality issues and parts purchased from each supplier was available in Cardiac Systems Global Purchasing Organization databases. This allowed the incremental cost of each supplier to be calculated.

The resulting analysis shows 115 of the 417 Active BOM suppliers have a negative purchasing margin. This indicates Cardiac Systems loses money by dealing with these suppliers, even when all non-purchasing and fixed costs are ignored. In total, these unprofitable suppliers absorb approximately €1,000,000 of annual Global Purchasing Organization cost. These results provide the basis for pursuit of more efficient supply base management, as discussed in Chapter 7.

The analysis also indicates some generalizations regarding the unprofitable suppliers are possible. This analysis shows suppliers providing a large number of low-value parts are likely to cost more to manage than they provide in profit. For example, one Cardiac Systems supplier provides a wide array of low-value labels, and had a number of quality issues in the past year. Costs associated with the high number of parts purchased and quality issues overwhelm the relatively small gross profit enabled by this supplier, making this supplier unprofitable for Cardiac Systems, even before the costs associated with assembly or sales are considered.

Conversely, suppliers providing more integrated assemblies with functionality important to the final product tend to be quite profitable for Cardiac Systems. These suppliers provide a smaller number of high value assemblies, and cost less to manage as a result.

When combined with the results of the Trzepacz Supply Market Management segmentation analysis, the results are even clearer. The following table illustrates this combination by showing the percentage of profitable suppliers in each category. Almost half of the suppliers in the
“Commercial” category, where a degree of mutual indifference characterizes the business relationship, are unprofitable. While suppliers in the other categories are generally profitable, suppliers in the “Strategically Aligned” category generate the largest total profit from a purchasing perspective.

<table>
<thead>
<tr>
<th></th>
<th>Supplier View</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Importance</td>
</tr>
<tr>
<td>Cardiac Systems View</td>
<td>Not Preferred: 95% Profitable</td>
</tr>
<tr>
<td></td>
<td>Strategically Aligned: 96% Profitable</td>
</tr>
<tr>
<td></td>
<td>Commercial:</td>
</tr>
<tr>
<td></td>
<td>58% Profitable</td>
</tr>
</tbody>
</table>

It is important to note this analysis is at a fairly high level, and could be refined. A proposed approach for refining the analysis is discussed in Chapter 8. Even without refinement, however, the analysis illustrates the magnitude of costs being allocated to unprofitable suppliers and provides a list of specific suppliers that do not appear to be contributing positively to the business.

6.5. Summary

The analytical results outlined in this chapter show the value of determining each supplier’s contribution to profit. Even when the analysis is performed at a high level, it provides a specific list of suppliers that are unprofitable before any costs outside of purchasing are considered. In
the case of Cardiac Systems Global Purchasing Organization, the analysis indicates over €1,000,000 is spent each year to manage suppliers that do not generate profit for the business.
7. Supply Base Management Implications

The analysis described in Chapter 6 is only useful to the extent it enables improved efficiency or increased profits at Global Purchasing Organization and across the supply base. This chapter describes how the results of the supply base analysis described in Chapters 5 and 6 can be used to improve bottom line performance. Particular attention is given to the utility of the purchasing analysis approach, but an overview of the management implications of more typical supply base segmentation approaches, such as the Trzepacz Supply Market Management approach, is provided for completeness.

7.1. Implications of Trzepacz Supply Market Management Segmentation

There are several references that discuss appropriate supply base management approaches based on supply base segmentation analyses similar to the Trzepacz Supply Market Management approach, and this chapter is only provides examples of those approaches.\(^{20}\)

The Trzepacz Supply Market Management segmentation analysis described in Chapter 5 results in four key categories of suppliers. This section outlines recommended management approaches for each of the key supplier groups in the Cardiac Systems supply base.

7.1.1. Strategically Aligned Suppliers

These are important suppliers that consider the buyer, in this case Cardiac Systems Global Purchasing Organization, to be a core customer. The business with this supplier represents both a large portion of Cardiac Systems’ total material spend and a large portion of the supplier’s total

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revenue. Accordingly, the relationship with these suppliers should be more involved and mutually beneficial than any other class of suppliers.

The relationship between suppliers and buyers in this category should be characterized by significant investment for the purpose of improving long-term profitability. Both the supplier and the buyer should have incentives to work together for mutual benefit. For example, these suppliers should be involved early in product development activities and be given access to relevant data regarding the performance of the supply chain. Routine meetings should occur among high-level managers from both organizations, and long term strategic plans should be shared openly. In short, this group of suppliers requires significant management attention, but also provides the most overall profit.

7.1.2. Not Preferred

This group of suppliers presents a high-risk situation for the buying organization. In this case, Cardiac Systems Global Purchasing Organization is purchasing important materials from a group of suppliers that regards Cardiac Systems Global Purchasing Organization with antipathy or disdain. Ideally, no suppliers would fall into this category. When some do, as is the case with Cardiac Systems Global Purchasing Organization, significant action should be taken to either re-source the purchased materials at a different supplier or improve the nature of the business relationship. In most cases, development of an alternative source of supply would be appropriate.

7.1.3. Limited Collaboration

This group of suppliers represents an opportunity for the buying organization. These suppliers consider the buying organization to be an important and attractive customer, but they do not
currently provide important materials. These suppliers are likely to be receptive to innovative supplier management approaches as they try to win more business. They are likely to be willing to experiment with increased service levels and cooperation. The key management approach for these suppliers is providing them with enough data to enable them to innovate and improve overall profitability. These suppliers represent a tremendous resource for innovation and support in the supply chain.

7.1.4. Commercial

Commercial suppliers provide relatively low-value materials, and the business relationship between the buyer and supplier is not considered critical by either party. The basic management objective for these suppliers is to reduce management costs as much as possible. Examples of mechanisms for accomplishing this include establishing reverse-auction or e-ordering systems, changing order patterns, or consolidating materials at a smaller number of distribution suppliers. While other groups of suppliers are well positioned to improve profit by modifying service levels, these suppliers are generally only capable of reducing costs.

7.1.5. Trzepacz Supply Market Management Analysis Review

The management implications of typical supply base segmentation analyses, such as the Trzepacz Supply Market Management approach, help avoid the inefficiencies associated with a “one size fits all” approach to supplier management. However, there are two practical issues that complicate the implementation of this type of segmentation. First, there is a tendency for supply base managers to turn this type of segmentation into an evolutionary supplier lifecycle model. In this type of model, all suppliers would start out as “Commercial”, and evolve towards
“Strategically Aligned” over time. This common misinterpretation distorts the intent of the segmentation analysis, and forces all suppliers to adhere to a set evolution regardless of the impact on the bottom line.

The second shortcoming of this type of segmentation is the complexity of the metrics used to develop it. It is not clear how a supplier should work to improve performance if their categorization is based on factors such as “attractiveness”, as is the case with the Trzepacz Supply Market Management approach.

The next section shows how purchasing margin analysis can be used in conjunction with a typical segmentation analysis to help alleviate these two concerns.

7.2. Purchasing Margin Analysis Implications

The purchasing margin analysis described in Chapter 5 provides a clear, quantifiable metric to evaluate supplier performance and set improvement targets. The analysis shows the degree to which a supplier’s contribution to profit exceeds the cost of managing them.

The management implications of the analysis differ depending on whether a given supplier has a negative or positive purchasing margin. Each of these cases is discussed in turn below.

7.2.1. Negative Purchasing Margin Suppliers

There are two basic approaches to working with negative purchasing margin suppliers. The first option is to offer the supplier the opportunity to improve their position by generating a positive return for the buying organization. The ability and willingness of suppliers to develop creative ways to improve profitability should not be underestimated. This approach takes advantage of
the quantitative metric provided by the analysis by focusing both the customer and the supplier on bottom-line performance. Both organizations can work together to decrease management costs, improve the type of service provided by the supplier to increase profits, or develop other creative ways to improve the profitability of the relationship.

The second approach to dealing with negative purchasing margin suppliers is to move them to a lower tier in the supply chain, i.e. make them a supplier to a supplier. For example, instead of purchasing both boxes and labels from unprofitable suppliers, the box supplier could manage the label supplier and apply the labels to the boxes before shipping them to the buying organization. By offering a higher-level assembly instead of a simple commodity product, the box supplier differentiates themselves and improves overall profitability by reducing management costs in the purchasing organization. This reduces the number of suppliers actively managed by the buying organization, thereby reducing costs and improving overall profitability.

The final approach to dealing with unprofitable suppliers is to eliminate them. In cases where other profitable suppliers are capable of providing the materials purchased from unprofitable suppliers, it may be advantageous to simply re-source the product to the profitable supplier and remove the unprofitable supplier from the supply base altogether. This improves overall profitability by reducing ongoing management costs, but will result in increased one-time costs associated with re-sourcing the materials.

7.2.2. Positive Purchasing Margin Suppliers

Once a supplier achieves a positive purchasing margin, the purchasing margin metric provides a useful measure of ongoing improvement. In particular, this metric can be used in combination
with a standard set of material cost reduction objectives to set annual improvement goals for the business relationship. Instead of focusing solely on supplier material costs, as is the case with many supplier improvement plans, the purchasing margin metric is a joint goal that requires attention from both the customer and the supplier. This type of joint objective can provide the basis for improved customer-supplier relationships across the supply base.

7.3. Summary

Typical supply base segmentation approaches, such as the Trzepacz Supply Market Management approach, provide a useful mechanism for sorting the supply base into categories for the purpose of apply differentiated management. However, this type of segmentation does not provide a clear metric to evaluate or plan ongoing improvements to the customer-supplier relationship. A measure of the supplier’s contribution to profit, such as the purchasing margin analysis described in Chapter 5, provides this type of metric. In combination, these supply base segmentation and analysis approaches provide the basis for profit improvement across the supply base.
8. Refining the Purchasing Margin Analysis

The purchasing margin analysis outlined in Chapters 5 and 6 is a high-level approach designed to provide managers with a relatively simple tool for evaluating suppliers. It could be refined however, if there is a need for more detailed evaluation. Approaches for refining both the revenue and cost aspects of the analysis are discussed in this chapter.

8.1. Refining Revenue Allocations

The approach outlined in chapters 5 and 6 uses the amount of spend at a given supplier as the primary factor in allocating the buyer’s revenues to that supplier. This assumes the value added by the supplier is accurately represented by the price paid for material, and that purchased material was ultimately sold and not simply turned into finished goods inventory. In a make-to-order environment where material cost is the most significant factor in product cost, as is the case with Cardiac Systems, this assumption is reasonable.

In some cases however, a significant portion of the value added to the product may occur inside the buyer’s organization. For example a manufacturer that significantly transforms purchased materials in-house, rather than simply assembling them, may be adding more value than the supply base. In these cases, revenues should not simply be allocated to the supplier based on purchased material cost. The value added inside the buyer’s organization must be considered when the revenues are allocated to suppliers. The revenue allocations used in the profitability analysis should reflect the value-adding processes throughout the supply chain.
8.2. Refining Cost Analyses

The approach in Chapters 5 and 6 uses average values to determine the primary cost drivers within the purchasing organization, and applies those average values across the supply base. Clearly, the costs associated with some suppliers fall above or below those averages, depending on their particular performance. For example, a supplier that does not address quality issues well will have a cost-per-quality-issue that is higher than the average.

The cost factors used in the purchasing margin analysis could be refined to reflect the precise costs associated with each supplier. In many cases, however, such detailed data may not be available. If use of average values is not acceptable and a complete set of detailed cost data is not available, it may be appropriate to pursue a case-study approach to analyzing the costs. This approach is described in the next section.

In general, however, a detailed refinement of the cost factors should only be necessary if there is wide variation in the costs associated with each supplier. Even if some refinement is necessary, it should be sufficient to group suppliers with similar cost structures together and use group averages for the cost analysis. In most cases, average cost factors should be sufficient to indicate opportunities for improvement.

8.3. Refinement Through Case Study Analysis

While detailed information about the costs associated with every supplier may not be available, it may be possible to identify suppliers that are representative of different groups within the supply base. These representative suppliers could be used to evaluate the cost drivers and revenue contributions of suppliers in each group.
For this type of case study analysis, the manager should select one supplier as representative of each group. A detailed analysis of the costs associated with the representative supplier could be completed using a combination of interviews and analysis of available data. The resulting cost factors would then be applied to all of the suppliers within the representative’s group.

This approach is not as time-intensive as analyzing each supplier’s costs individually, but may be more accurate than simply using average cost factors across the entire supply base.

8.4. Summary

This chapter outlines potential refinements to the purchasing margin analysis described in Chapter 5. Depending on the diversity and complexity of a given supply base, these types of refinements may be advantageous. As with any set of potential refinements, managers will need to compare the effort required to pursue the refinements with the expected value of the additional insights they may provide.
9. Conclusions

There is no reason to believe the current trend toward outsourcing and increased supplier importance will diminish in the near future. As suppliers gain greater influence over companies’ business, the approach taken to select, maintain, and manage the supply base will have a greater impact on the company’s profit. It is appropriate therefore, to consider suppliers’ contribution to profit as a key differentiating factor among categories of suppliers.

This thesis outlines an approach to supply base management that considers suppliers’ contribution to profit relative to the cost of managing them. It builds upon previous work in supply base segmentation to provide purchasing and supply base managers with a tool that cuts through qualitative metrics to evaluate suppliers in terms that every CEO understands intuitively.

Beyond the obvious applications for purchasing and supply base managers, this tool is a concrete first step toward linking the entire supply chain through a set of profit metrics. A straightforward refinement of the analytical approach described here would allow managers to track suppliers’ contributions to profit on a product-by-product basis, and would help identify ways to improve the profitability of each product. Similarly, sales managers could focus marketing efforts on the most profitable products suppliers can provide. If that state were attained, it would be possible to envision an entire supply chain management system focused explicitly on the profit growth top management strives for, instead of being focused on a series of intermediate metrics that attempt to represent profitability obliquely.
The practical example described in this thesis serves to illustrate the benefits and challenges of the proposed approach for a company with a large, complex supply base. For instance, managers are likely to recognize the challenges associated with acquiring and maintaining the supplier data necessary for this type of analysis, but should take comfort in the fact that it is achievable. The example provided also shows that significant reductions in supply base management costs and improvements in overall profitability are possible with the proposed approach.

While the approach described here is merely a first step toward a profit-focused supply chain management system, it is an important step. The drive towards profit-focused supply chain management allows companies to leverage the specialized capabilities of key suppliers without sacrificing the focus on mutual profit that was previously enabled through vertical integration. In the long run, the companies that excel at profitable supply chain management will gain competitive advantage in the market.