

FINANCIAL ANALYSIS OF A PARTIAL MANUFACTURING
PLANT CONSOLIDATION

by

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ABSTRACT

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Company XYZ's Menomonie, WI facility is a manufacturing plant that final assembles electronic industrial products. The Menomonie, WI plant builds two main product families, belonging to two different business groups. Product A is a family of controllers built for the CCF business group, headquartered in Baltimore, MD. Product B is a family of graphical display terminals built for the Terminal (TCF) business group, headquartered in Madison, WI.

The CCF business group currently manufactures its products in three different manufacturing plants. They have proposed to consolidate their manufacturing into two plants. If this proposal materializes, all CCF products manufactured in Menomonie, WI would be transferred to a Baltimore, MD manufacturing location.

This research paper will analyze the financial impact to the remaining TCF product families if the CCF business transfers their products out of the Menomonie facility. This research was conducted by reviewing relevant literature regarding manufacturing costing systems, followed by a thorough analysis of Company XYZ financial data to determine the resulting financial impact of the proposed consolidation, to the Menomonie, WI facility.

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Chapter 1

Statement of the Problem

Purpose of the Study

The purpose of this study is to determine the financial impact of a partial plant consolidation involving Company XYZ's Menomonie, WI facility. Although there are many aspects to be considered when intra-company transfers of manufacturing lines are proposed, this study will focus on the post-transfer financial impact to the remaining products manufactured in the Menomonie, WI facility.

Objectives

The goals of the study are as follows:

- 1.0 Analyze the current financial structure of the Menomonie, WI facility to determine the post-transfer burden rates of the remaining products.
- 2.0 Provide recommendations to minimize any financial adverse effects on the remaining products manufactured in the Menomonie, WI facility.

Background and Significance

Company XYZ's Menomonie, WI facility is part of a large company consisting of 450 global manufacturing, customer support, and sales locations. There are multiple business groups within the company that support several industrial product families. The Menomonie, WI facility manufactures product for two different business groups, the Terminal (TCF) business and the Controller (CCF) business.

The TCF business group is headquartered in Madison, WI. All TCF Engineering, Marketing, Purchasing and Finance support is located in Madison. The Menomonie, WI plant is the only manufacturing location for TCF products.

The CCF business group is headquartered in Baltimore, MD. All CCF Engineering, Marketing, Purchasing and Finance support is located in Baltimore. The Menomonie, WI plant is one of three manufacturing locations for CCF products.

The Menomonie, WI facility opened in 1994 to house the manufacturing of a family of small controllers belonging to the CCF business. In 1996, the TCF business was in need of a manufacturing facility to produce its new family of terminals, as well as several of its legacy terminal products. At that time, the plant reported to the TCF business. In 1997 the TCF business expanded the Menomonie facility from 40,000 square feet to its current size of 80,000 square feet, to accommodate the new TCF products.

In 1999, a company-wide reorganization transferred responsibility of the Menomonie, WI facility from the TCF business to the CCF business. With this reorganization, the only change the Menomonie, WI facility saw was their reporting relationship to a different business.

The CCF business has two other manufacturing locations, one located in Maryland and one in Alabama. Since the reorganization that aligned the Menomonie, WI facility under the CCF business, the utilization of the original two CCF business manufacturing plants has decreased, resulting in extra capacity in both plants. Because the Alabama plant currently builds circuit boards for the CCF family of products

assembled in the Menomonie, WI facility, the CCF business has proposed consolidating the entire production of small controllers into the Alabama facility.

The proposed consolidation would have profound effects on the Menomonie, WI facility. Although the CCF business products only consume about 20% of the floorspace in the Menomonie, WI facility, the CCF business products employ about 50% of the workforce and generate about 40% of the Menomonie, WI facility's revenue.

Limitations of the Study

The proposed partial consolidation of the Menomonie, WI facility's CCF products into the Alabama facility involves a significant number of issues that will not be addressed in this study. These issues include a wide variety of human resource concerns and costs, including a reduction in the work force and severance costs. In addition to human resources, this study will not address the costs of the transfer, including both physical move expenses as well as labor expenses related to training, engineering, and administrative support for the transfer.

This study will not draw any conclusions about the overall cost justification of the transfer. It will however provide a detailed analysis and picture of the resulting financial impact to the remaining TCF products, if the CCF business transfers its products out of the Menomonie, WI facility.

Definition of Terms

Absorption Costing: A costing approach in which all manufacturing costs are charged to the product.

Activity Based Costing: (i.e. ABC) an overhead cost allocation system that allocates overhead to multiple activity cost pools and assigns the activity cost pools to products or services by means of cost drivers that represent the activities used.

Allocation Base: A characteristic of the cost object used to distribute indirect costs.

Cost Allocations: The distribution of indirect costs among cost objects.

Cost Behavior: The study of how specific costs respond to changes in the level of activity within a company.

Cost Benefit Analysis: The process of making decisions by comparing the costs and benefits of alternative choices.

Cost Driver: Any factor or activity that has a direct cause-effect relationship with the resources consumed.

Cost Object: An item to be costed for decision-making purposes.

Direct Cost: Costs that can be directly traced to a single cost object.

Direct Labor: The work of factory employees that can be physically and conveniently associated with converting raw materials into finished goods.

Direct Materials: Raw materials that can be physically and conveniently associated with manufacturing the finished product.

Fixed Cost: Costs that remain the same in total regardless of changes in the activity level.

Indirect Cost: Costs that are associated with more than one cost object.

Indirect Labor: Work of factory employees that has no physical association with the finished product, or it is impractical to trace the costs to the goods produced.

Indirect Materials: Raw materials that do not physically become part of the finished product or cannot be traced because their physical association with the finished product is too small.

Job Order Cost System: A cost accounting system in which costs are assigned to each job or batch.

Manufacturing Overhead: Manufacturing costs that are indirectly associated with the manufacture of the finished product.

Opportunity Cost: The potential benefit that may be obtained from following an alternative course of action.

Partial Absorption Costing System: A costing approach in which all variable overhead is allocated to products, but only the fixed cost of overhead resources used are allocated to products.

Practical Capacity: The highest rate at which an organization can operate without a rise in congestion.

Process Cost System: A system of accounting used by companies that manufacture relatively homogeneous products through a series of continuous processes or operations.

Variable Cost: Costs that vary in total directly and proportionately with changes in the activity level.

Variable Costing System: A costing approach in which only variable manufacturing costs are product costs and fixed manufacturing costs are period costs (expenses).

Chapter 2

Review of Literature

Historical Perspective

Procedures and rules for manufacturing cost accounting have grown in significance since the Industrial Revolution, when manufacturing became a key economic activity. This growth has resulted in managers becoming more and more distant from shop-floor activities. According to Riggs (1994), it was during this time that managers began to “question things like what does a product cost, how efficient is a section of the manufacturing department, should a product be redesigned, or phased out, or promoted more aggressively than a related product.”

Most of today’s standard cost accounting procedures were developed prior to 1925. According to Riggs (1994), “these procedures are built around three product expenses: direct material, direct labor, and overhead.” During that time period, overhead was low when compared to direct labor and material, resulting in product costs that were dominantly variable. Because of that, cost accounting procedures that were developed then provided relatively useful information to managers.

Riggs (1994) states that since that time period, manufacturing has changed a great deal, but unfortunately not much has changed regarding cost accounting procedures. Although it has become progressively less satisfactory, industry standard still defines product expenses by using direct material, direct labor, and overhead.

Manufacturing Costs Overview

Manufacturing is a process that converts raw materials into finished goods. According to Weygandt, Kieso, and Kimmel (1999) “manufacturing costs are typically classified as either direct materials, direct labor, or manufacturing overhead.”

Manufacturing processes use basic materials and parts that are referred to as raw materials. If these raw materials become physically associated with the finished product during the manufacturing process, they are called direct materials. If these raw materials do not become physically associated with the finished product, they are considered indirect materials. “Indirect materials (1) do not physically become part of the finished product, such as lubricants, rosin, and polishing compounds used in the manufacturing process, or (2) cannot be traced because their physical association with the finished product is too small in terms of cost, such as cotter pins, lock washers, and the like” (Weygandt et al., 1999). Indirect materials are accounted for as manufacturing overhead.

Direct labor refers to those labor costs that directly result from the conversion of raw materials into finished goods. According to Garrison & Noreen (2000) “direct labor is sometimes called touch labor, since direct labor workers typically touch the product while it is being made.” Labor costs that do not result from the creation of products, or can only be traced at great cost and inconvenience, are called indirect labor, and are handled as manufacturing overhead, just like indirect materials.

Manufacturing overhead consists of manufacturing costs that are not direct materials or direct labor, but are costs indirectly associated with the manufacture of finished product. Weygandt et al. (1999) state “manufacturing overhead includes indirect materials, indirect labor, maintenance on production equipment, utilities, taxes, depreciation, and insurance on manufacturing facilities.” Costs associated with its selling

and administrative functions are not included as part of manufacturing overhead.

According to Garrison & Noreen (2000) “only those costs associated with operating the factory are included in manufacturing overhead.” Terms that are synonymous with manufacturing overhead include indirect manufacturing cost, factory overhead, and factory burden.

Classifications for Cost Behavior

Cost behavior refers to how a cost will change when the level of business activity also changes. Garrison & Noreen (2000) state “as the activity level rises and falls, a particular cost may rise and fall as well, or it may remain constant.” Understanding cost behaviors help management anticipate cost changes and make more informed decisions. Costs are usually categorized as either variable or fixed.

According to Garrison & Noreen (2000) “a variable cost is a cost that varies, in total, in direct proportion to changes in the level of activity. For example, if the level of activity increases 10%, total variable costs will increase 10%. In a manufacturing company, the best examples of variable costs include direct materials and direct labor. Weygandt et al. (1999) state “variable cost may also be defined as a cost that remains the same per unit at every level of activity.” Labor intensive companies are likely to have many variable costs. Machinery or equipment intensive companies are likely to have relatively few variable costs.

According to Weygandt et al. (1999), “fixed costs are costs that remain the same in total regardless of changes in the activity level.” In a manufacturing company, the best examples of fixed costs include property taxes, insurance, rent, supervisory salaries, and depreciation on buildings and equipment. Because fixed costs remain constant, unit costs

will increase as unit volumes decrease, due to the fixed costs being spread over fewer units. Weygandt et al. (1999) states “the trend in many manufacturing companies is to have more fixed costs and fewer variable costs.” This seems to be a result of the increased use of automation and less use of employees. Less employees usually result in increased fixed costs (depreciation and lease charges) and lower variable costs (direct labor costs).

Cost Objects

According to Garrison & Noreen (2000), “a cost object is anything for which cost data are desired, including products, product lines, customers, jobs, and organizational sub units.” To assign costs to cost objects, costs are classified as either direct or indirect costs. Direct costs can be easily associated with a particular cost object, and is not limited to direct materials or direct labor. Indirect costs cannot be easily associated with a particular cost object. Garrison & Noreen (2000) state “to be traced to a cost object such as a particular product, the cost must be caused by the cost object.”

Allocating Indirect Costs

Cost allocation is a method of assigning indirect costs to cost objects (Morse and Zimmerman, 1997). Indirect costs are related back to cost objects through cost drivers, which are chosen to reflect the cause of the indirect costs.

Choosing cost drivers to trace indirect costs is usually only appropriate if the cost driver is chosen to help make planning decisions related to the cost driver. According to Morse & Zimmerman (1997), “allocating indirect costs through cost drivers is not necessarily best for the organization when control and external reporting issues are considered.” Choosing a cost allocation method is subjective, and involves ethical

considerations. One attribute of cost allocations used for control purposes is that they can adversely affect certain managers and benefit others. Additionally, cost allocation methods may be advantageous when used for external reporting, as they may result in the advantage of more profit for the organization, or they may result in a disadvantage of external parties such as customers or the taxing authority.

Benefits for Allocating Costs

According to Morse & Zimmerman (1997) there are three categories of benefits for allocating costs. These benefits include the satisfaction of external requirements, planning purposes, and control purposes.

Many times, management accounting decisions related to allocations are based on external demand for information. This external demand often comes from outside parties such as shareholders or governmental bodies. Allocated indirect costs play a critical role in each of these situations.

Managers are able to make better decisions through the analysis of indirect cost allocations. This information is key for planning purposes. According to Morse & Zimmerman (1997), “the allocation of indirect costs provides a better measure of the opportunity cost of providing a product or service, and also serves as a communication mechanism to let managers know how their actions are affecting costs in the rest of the organization.”

Morse & Zimmerman state that “motivation and control are also likely explanations for the prevalence of cost allocations within organizations.” Sometimes, cost allocations have the ability to control managers through the effect of cost allocations on performance measures. Cost allocations also allow managers to monitor each other.

This will typically affect the managers' behavior, which is how the choice of allocation method becomes a tool for controlling managers.

Basic Steps in Cost Allocation

According to Morse & Zimmerman (1997), all indirect cost allocation methods are composed of the same series of five steps:

The first step involves defining the cost objects. The organization must decide what departments, products, customers, suppliers, or processes should receive the indirect costs. Step two involves accumulating indirect costs in cost pools. Cost pools accumulate indirect costs that are caused by the common use of a resource such as a machine, building, administrative service, or a department. The third step involves choosing an allocation base. An allocation base is a measurement of a characteristic used to distribute indirect costs of a cost pool to cost objects. The fourth step involves estimating an application rate. The application rate is typically the ratio of estimated dollars in the cost pool to estimated total usage of the allocation base. The final step involves allocating indirect costs based on use of the allocation base. Once the application rate for the allocation base is estimated, indirect costs are allocated to the cost objects as the cost objects use the allocation base (Morse and Zimmerman, 1997).

Traditional Absorption Costing Systems

Absorption costing is a widely used allocation system involving the allocation of variable and fixed overhead costs to cost objects, which are the products. In most manufacturing facilities, all manufacturing fixed and variable overhead is usually

allocated to the products built in that particular facility. Financial reporting and the determination of inventory valuation are typical uses for absorption cost systems. The two basic types of absorption systems are job order systems and process cost systems (Morse & Zimmerman, 1997).

Job Order Costing Systems

Job order costing systems are most effective when many different products are produced each period. Jobs are completed to fill a specific customer order or to replenish inventory, and each job order typically has its own distinguishing characteristics. According to Weygandt et al., the main objective of a job order costing system is to compute the cost per job. The job and its associated costs are identified at each point in the manufacturing process, and the job order costing system measures costs for each completed job, as opposed to set time periods.

Process Cost Systems

According to Weygandt et al., “process cost systems are used when a series of connected manufacturing processes or departments produce a large volume of uniform or relatively homogeneous products.” With process costing, costs are assigned to products are identical because the flow through a series of similar manufacturing steps or processes. In order to maintain control, these processes are usually organized into separate cost centers.

Costs are associated with the same product for costing purposes. Weygandt et al. (1999) state “the cost allocation is not among different products but among units still in work-in-process inventory and units transferred out of the plant to finished goods inventory or cost of goods sold.”

When comparing process costing to job order costing, process order costing is inherently simpler and less costly to maintain because job order costing has to account for separate batches. Conversely, the information provided is much less useful for decision making because it is in an aggregate form (Morse & Zimmerman, 1997).

Process costing becomes more difficult when accounting for work-in-process (Morse & Zimmerman, 1997). The department's output must be determined in equivalent units, to compute the costs in a department. According to Garrison & Noreen (2000) when using "the weighted average method, the equivalent units for a period are the sum of the units transferred out of the department during the period and the equivalent units in ending work in process inventory at the end of the period."

A production report is the typical method to summarize activity in a process costing department. According to Garrison & Noreen (2000), there are three separate (though highly interrelated) parts to a production report.

The first part is a quantity schedule, which includes a computation of equivalent units and shows the flow of units thorough a department during a period. The second part consists of a computation of costs per equivalent unit, with unit costs being provided individually for materials, labor, and overhead as well as in total for the period. The third part consists of a cost reconciliation, which summarizes all cost flows through a department for a period (Garrison, and Noreen, 2000).

Problems with Absorption Cost Systems

According to Morse & Zimmerman (1997), absorption cost systems have always been criticized for producing misleading information and creating incentives that are

inconsistent with the objectives of the company. Despite these criticisms, Morse & Zimmerman report that absorption cost systems are still the predominant systems in use in manufacturing firms today.

Incentive to Overproduce

The average product cost in an absorption based costing system is determined by dividing the variable and fixed costs of making a product by the number of units produced. Morse & Zimmerman (1997) state that the “average cost exhibits some strange qualities that are not necessarily consistent with the opportunity costs of making the product.” The reason for this is because as long as the variable cost is constant, the average cost per unit decreased, because the fixed costs are spread over more units.

According to Morse & Zimmerman (1997) managers who are evaluated based on the average cost per unit produced, have an easy way of reducing the average cost per unit using this type of costing system. The answer is to increase the number of units produced, provided there are no capacity constraints. As long as the extra product can be sold, this is not necessarily a bad thing. Unfortunately, that is not always the case, and excess inventory can lead to increased storage and handling costs.

According to Morse & Zimmerman (1997), there are several ways to mitigate this incentive to overproduce. This can be accomplished by charging managers large amounts for holding inventory. This “tax” is usually enough incentive to reduce or eliminate the desire to overproduce. A second method to avoid overproduction is by defining a policy that prohibits such actions. Still another approach is to redefine the performance measures that evaluate managers, or to adopt just-in-time production systems (JIT) to help reduce inventory levels.

Underuse of Allocation Base Used to Allocate Fixed Costs

In absorption costing systems, fixed and variable overhead costs are allocated to products through an allocation base. The allocation of overhead costs acts like a tax on the allocation base. According to Morse & Zimmerman (1997), “managers who are evaluated based on product costs will use less of the allocation base because allocated costs increase product costs and act as a tax on the manager.”

Morse & Zimmerman (1997) state “cost allocations lead to good planning decisions if the allocated cost approximate the opportunity costs of using the allocation base.” This is based on the idea that fixed cost allocations to products through the usage of allocation bases are unlikely to approximate the opportunity costs of using indirect resources.

Misleading Product Costs

According to Morse & Zimmerman (1997):

If the allocation of fixed costs does not represent the opportunity costs of using the allocation base, product costs calculated by the absorption costing system will not approximate the opportunity cost of making the products. If product costs from the accounting system do not represent opportunity costs, managers using those reported product costs are likely to misprice products and choose inappropriate product mixes.

Morse & Zimmerman (1997) define the death spiral as a common example of misusing product costs from full absorption cost systems. The death spiral occurs when a company drops products because its cost is greater than its price. When this happens, fixed overhead that was previously allocated to the dropped product is redistributed to the

remaining products. This leads to other products appearing to be unprofitable because of the increased overhead is spread over fewer units. Inevitably, more products are dropped, resulting in more overhead being allocated to the remaining products. This cycle could theoretically continue until the organization has no profitable products left.

Alternatives to Traditional Absorption Costing Systems

Due to the many criticisms of absorption costing systems, alternative costing methods have been suggested and are becoming increasingly popular. These systems have been developed to overcome specific problems in making planning and control decisions. Three of these alternatives to the traditional costing systems are allocating overhead based on practical capacity, variable costing, and activity-based costing.

Allocating Overhead Based on Practical Capacity

One alternative to a full absorption costing system is a partial absorption costing system. According to Morse & Zimmerman (1997), “under this system, all variable overhead is allocated to products, but only the fixed cost of overhead resources used are allocated to products.” In this type of costing system, fixed costs related to unused overhead resources (excess capacity) are expensed during that period instead of becoming part of the product cost through allocations. The formula used to calculate the application rate for allocations of overhead based on capacity used to divide the expected fixed overhead costs by the practical capacity of the allocation base. Morse & Zimmerman state “the practical capacity is the maximum level of operations that can be achieved without increasing costs due to congestion.”

There are several advantages in using the practical capacity of the allocation base to determine the application rate. The product costs generated from this practical

capacity system are much closer to the opportunity cost than the traditional system, since the cost of excess capacity is not spread over the existing projects which are usually not part of the product. Fixed costs will not change with changes in production volumes, therefore decisions about keeping or dropping products would not change the existing product costs. According to Morse & Zimmerman (1997) yet another advantage is this system provides a measure of the cost of unused capacity as opposed to the traditional absorption costing system, in which the cost of unused capacity is included in the product cost and not easily identified.

There are some disadvantages to allocating costs using the practical capacity model. According to Morse & Zimmerman (1997), the practical capacity system does not alleviate the incentive to overproduce. When only some fixed costs are allocated, managers will also tend to underuse the allocation base. Once operations have started, the usage of the allocation base is usually taxed at a higher rate than the opportunity cost of using the overhead resource. If these allocation rates are higher than the opportunity cost of using the indirect resource, managers will tend to use the indirect resource less than they would if the opportunity cost of using the indirect resource were allocated.

Variable Costing

Variable costing assigns only variable manufacturing costs such as direct materials, direct labor, and variable overhead to the cost of the product. Fixed overhead is excluded from the product cost because it is treated as a period cost, not a product cost. According to Hansen (1990) “all the fixed overhead of a period is seen as expiring that period and is charged in total against the revenues of the period.”

Hansen (1990) states “because of the different ways of treating fixed overhead, variable costing methods generate differences in reported incomes.” When production is greater than sales, income appears to be greater with absorption costing because the amount of fixed overhead attached to the units flowing into inventory. When sales exceed production, variable costing income appears to be greater than absorption costing income by the amount of fixed overhead flowing out of inventory. When sales and production are equal, both methods generate the same reported income.

Even though variable costing cannot be used for external reporting, it has a number of benefits for internal managerial applications. According to Hansen (1990), “performance evaluation, segment reporting, and planning and control are all enhanced by the cost information produced by a variable costing system.” This implies that both variable and absorption costing methods should be used at the same time within a company. More than one type of cost system is typically necessary because cost management may have different requirements than financial reporting.

The rationale for variable costing centers on the conceptual idea that these costs are incurred whether a company operates at zero or 100% of capacity. Because of this, proponents of variable costing argue that these costs should be expensed in the period in which they are incurred (Weygandt et al., 1999).

Weygandt et al. (1999) state “supporters of absorption costing defend the assignment of fixed manufacturing overhead costs to inventory on the basis that these costs are as much a cost of getting a product ready for sale as direct materials or direct labor.” Because of this, these costs should be matched with revenues when a product is sold.

As mentioned above, variable costing is acceptable only for internal use by management. According to Weygandt et al. (1999) “it cannot be used in determining product costs in financial statements prepared in accordance with generally accepted accounting principles because it understates inventory costs.” To get around this issue, a company will typically use absorption costing for its work in process and finished goods inventories, as well as for income tax purposes.

Activity Based Costing

According to Weygandt et al. (1999) “activity based costing (ABC) allocates overhead to multiple activity cost pools and assigns the activity cost pools to products by means of cost drivers.” An activity is any event, action, transaction, or work sequence that causes a cost during the production of a product. A cost driver refers to any activity that has a direct cause-effect relationship with the resources consumed.

ABC begins by allocating costs to activities, and then to the products that use those activities. The theory behind ABC cost allocation is very straightforward, products consume activities and activities in turn consume resources.

According to Weygandt et al. (1999), ABC allocates overhead in a two-stage process:

In the first stage, overhead is allocated to activity cost pools, each of which is a distinct type of activity, rather than to departments. In the second stage, the overhead allocated to the activity cost pools is assigned to products using cost drivers which represent and measure the number of individual activities undertaken or performed to produce products or render services.

Although there are several benefits to using ABC, the primary one is more accurate product costing. ABC typically assigns overhead product costs to more cost pools. Instead of one plant-wide pool and a single cost driver, ABC utilizes numerous activity cost pools with more relevant cost drivers. According to Weygandt et al. (1999), “costs are assigned more directly on a basis of the portion of multiple cost-driven activities that can be traced to each product.” This allows ABC enhanced control over overhead costs. Many overhead costs can be traced directly to activities, which result in some indirect costs becoming direct costs. This forces managers to become more aware of their responsibility to control the activities that generate those costs. ABC should also leads to better decisions, through more accurate product costing. More accurate product costing should in turn result in managers setting selling prices that achieve or surpass desired product profitability levels. Finally, more accurate cost data should aid in deciding whether to make or buy a product part or component.

Weygandt et al. (1999) state “activity based costing does not, in and of itself, change the amount of overhead costs, but it does in certain circumstances allocate those costs in a more accurate manner.” This ability for costing to become more realistic, more accurate, and better understood, allows managers to better understand cost behavior and resulting in increased profitability.

Even though ABC systems often provide better product cost data than traditional systems, they have certain limitations. ABC can be an expensive costing system to adopt. According to Weygandt et al. (1999), “many companies are discouraged from using ABC by the higher cost of identifying multiple activities and applying numerous cost drivers.” Another limitation involves the complexity of activity based costing

systems. Most ABC systems are more complex than traditional costing systems, and some are significantly more complex. Not all companies can justify the ABC. For some companies, the costs of ABC outweigh the benefits, and they find their existing system is sufficient. Another major limitation of ABC is that some arbitrary allocations still continue. According to Weygandt et al. (1999) “even though more overhead costs can be assigned directly to products through multiple activity cost pools, certain overhead costs remain to be allocated by means of some arbitrary volume-based cost driver such as labor or machine hours.”

Making Planning Decisions

According to Morse & Zimmerman (1997), “one of the major roles of management accounting is to provide information for making planning decisions.” The goals of a company determine the criteria for making these decisions. The aspects of a decision that will help the organization achieve its goals are called benefits. Benefits are seldom achieved without a cost. The cost of a decision is determined by the amount of organizational resources utilized to achieve a benefit.

Cost/Benefit Analysis

According to Morse & Zimmerman (1997) “cost/benefit analysis is the process of analyzing alternative decisions to determine which decision has the greatest expected benefit relative to its costs.” In order to make a decision, a company must evaluate all choices and choose the alternative with the greatest net benefits. Even though sometimes the benefits and costs are not always easily identified and measured, managers should use cost/benefit analysis to make organizational decisions.

One method to simplify the analysis is to compare only those costs and benefits that are different among the alternative decisions. The difference in benefits is referred to as the differential benefit and the difference in costs is referred to as the differential cost. Comparing only the differential benefits and costs will lead to the same decision because the remaining costs and benefits are not affected by the decision.

Problems in Identifying Benefits and Costs

The benefits related to a particular decision depend on the goals of the organization. It is often hard to identify and measure the progress toward some goals. Benefits are often measured in terms of cash inflows. Very often, the cash inflow from a decision must be estimated, and cash flows from different time periods must be adjusted for the time value of money before they are accumulated. Benefits such as learning and training, improved working environment, and greater worker satisfaction are difficult to identify and measure in terms of dollars, because they do not always have obvious monetary implications. Most often, these benefits have monetary consequences in later years. Morse & Zimmerman (1997) state “costs are the use of organizational resources.” Costs are easy to identify and measure when cash is the resource being used, but measuring the cost of using noncash resources is a problem. The best way to understand these problems involve the concept of opportunity cost.

Opportunity Cost

According to Morse & Zimmerman (1997) “using the resources of an organization, whether the resource is cash, inventory, buildings, or employee time, leads to forgone opportunities.” A resource used for one purpose cannot be used for another purpose. Because cost is defined as the use of resources, the measurement of costs is

based on the forgone opportunities of using those resources for other purposes. The value of the forgone opportunity is the opportunity cost of using resources elsewhere.

The next best use of the resource should be identified and used to measure opportunity cost. These forgone opportunities of using a resource include selling the resource or using the resource for another project. According to Morse & Zimmerman (1997):

If the next best use of the resource is to sell the resource, the sales price of the resource is the opportunity cost of using the resource. If the use of the resource means that further resources must be purchased for other projects, the cost of replacing the resources is the opportunity cost. If the next best use of the resource is for another project and replacement is not feasible, then the loss in value to the organization of not being able to do the other project is the opportunity cost.

The Future of Manufacturing Cost Accounting

According to Riggs (1994) “today’s typical cost accounting framework has changed little from the framework developed during and following the Industrial Revolution, even as large-scale manufacturing displaced owner-managed craft activities.” In the past, direct labor and material dominated the costs of products. Typically, indirect costs were substantially less significance. Today’s modern manufacturing incorporates much greater automation. This has changed employee relations practices, and created few deterministic expenses. This fact has substantially altered the mix of direct and indirect expenses. Riggs (1994) states “as a result some of the preoccupation with manufacturing costs to the exclusion of other categories of expenses is increasingly

inappropriate, as are certain of the traditional cost accounting procedures, particularly those used to absorb overhead into individual products and services.”

Chapter 3

Research Methodology

The research methodology used for this field problem involved a literature review, a financial analysis, and recommendations regarding the proposed partial plant consolidation.

The goals of the study are to:

- 1.0 Analyze the current financial structure of the Menomonie, WI facility to determine the post-transfer burden rates of the remaining products.
- 2.0 Provide recommendations to minimize any financial adverse effects on the remaining products manufactured in the Menomonie, WI facility.

The methodology began with a literature review of manufacturing costing systems and characteristics. The review focused on traditional absorption costing systems, and in particular, process cost systems. The literature review also explored problems with traditional absorption costing systems, followed by a review of alternatives to traditional absorption costing systems. The last part of the literature review discussed the relationship of cost accounting systems to making planning decisions.

Following the literature review, the study continued with a financial analysis of Company XYZ's Menomonie, WI facility. This analysis was based on the past six months of actual expenses related to the Menomonie, WI facility. The analysis process focused on determining what expenses were fixed, and would remain with the facility after the CCF business was transferred out of the Menomonie, WI facility. This analysis

will provide a re-calculation of the burden rate of the remaining products manufactured in the Menomonie, WI facility.

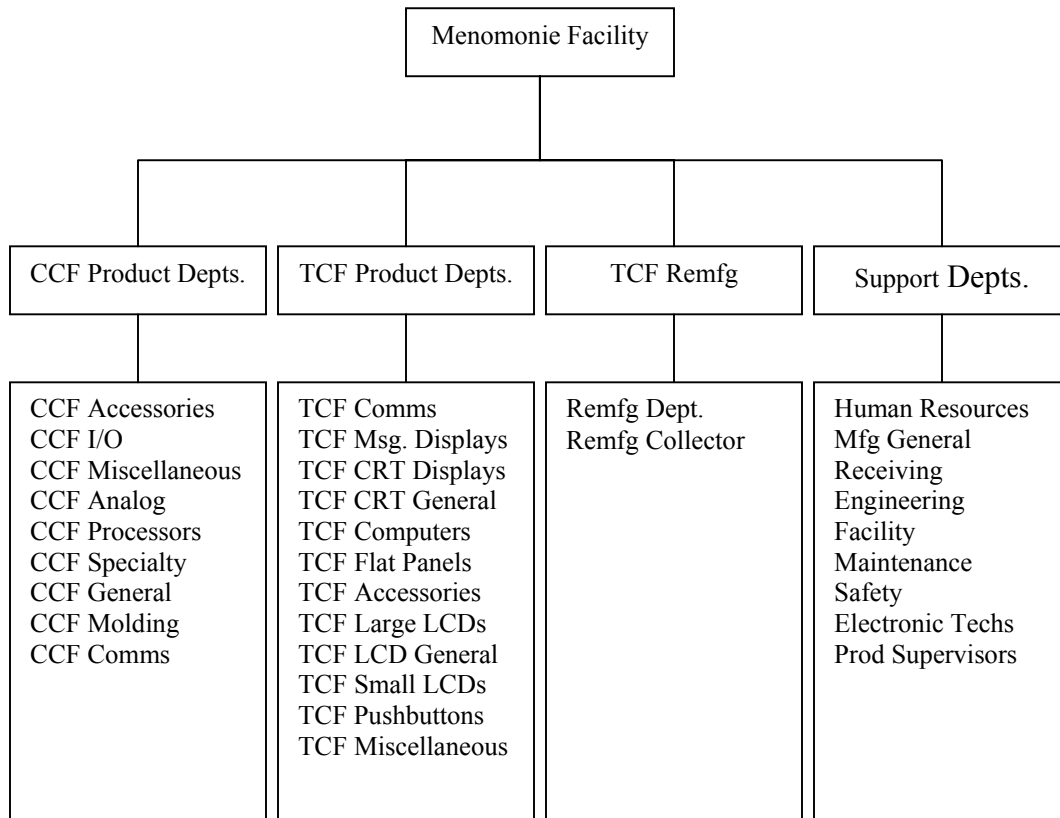
Finally, using the information obtained through the literature review and financial analysis, recommendations will be provided to Company XYZ relative to minimizing the financial impact of the consolidation, to the remaining products manufactured in the Menomonie, WI facility.

Chapter 4

The Study

The study began with an analysis of the current financial state of the products manufactured in the Menomonie, WI facility. Figure 1.0 defines the financial structure of the facility. There are thirty-two expense departments, divided into four groups. All nine departments in the CCF group represent the products to be transferred to the Alabama facility. All departments in the TCF product group, TCF remanufacturing group, and all support departments would remain in the Menomonie, WI facility following the consolidation.

Figure 1.0 Menomonie Facility Expense Department Structure.



An initial analysis was completed to determine the current burden rates of both the CCF and TCF product families. This analysis required the allocation of all support department expenses to the appropriate CCF, TCF, or remanufacturing department. All allocations of support expenses were based on the percentage of expense directly related to each area (see Table 1.0).

Table 1.0 Pre-Transfer Allocation of Support Department Expenses.

| Support Department | CCF | TCF | Remfg | Total |
|-------------------------------|------------|------------|--------------|--------------|
| Human Resources | 42% | 48% | 10% | 100% |
| Mfg General | 42% | 48% | 10% | 100% |
| Receiving | 35% | 50% | 15% | 100% |
| Engineering | 24% | 56% | 21% | 100% |
| Facility | 23% | 65% | 13% | 100% |
| Maintenance | 46% | 44% | 10% | 100% |
| Safety | 42% | 48% | 10% | 100% |
| Electronic Technicians | 24% | 37% | 39% | 100% |
| Production Supervisors | 38% | 58% | 4% | 100% |

Allocations for the Human Resources, Manufacturing General, and the Safety department were spread based on current headcount in each of the three areas. The Receiving department expenses were spread based on the average number of incoming pallets of material. Engineering, Maintenance, Electronic Technician, and Production Supervisor department expenses were spread based on the amount of time the personnel in each department spent supporting the three areas. Finally, the Facility expense department was spread based on the square footage of floorspace each of the three areas occupied.

Table 2.0, which is based on six months of actual expenses, shows the current burden rates for both the CCF and TCF product families. The Menomonie facility's current standard base rate is \$10.00 per hour. The resulting fully burdened cost per hour to produce CCF products in the Menomonie facility is \$47.10 per hour. The resulting

fully burdened cost per hour to produce TCF products in the Menomonie facility is \$61.30 per hour.

Table 2.0 Pre-transfer Menomonie Facility Burden Rates.

| Description | CCF | TCF | Remfg | Total |
|----------------------------------|--------------|--------------|--------------|---------------------|
| Standard Labor Credit | -\$1,142,216 | -\$1,263,347 | \$0 | -\$2,405,563 |
| Variable Expenses | \$2,676,972 | \$3,639,222 | \$6,200,488 | \$12,516,682 |
| Fixed Expenses | \$2,161,536 | \$3,681,796 | \$941,518 | \$6,784,850 |
| External Allocations | -\$597,448 | -\$835,711 | -\$8,229,375 | -\$9,662,534 |
| Total Department Expenses | \$4,241,060 | \$6,485,307 | -\$1,087,369 | \$9,638,998 |
| Total Burden Rate | 371% | 513% | | 401% |

The second half of the study involved determining the post-transfer TCF burden rate. This was accomplished by eliminating all the CCF production departments, and examining each support department to determine what expenses previously assigned to CCF production would remain following the transfer. Table 3.0 shows the post-transfer support department allocation splits.

Table 3.0 Post-Transfer Allocation of Support Department Expenses.

| Support Department | CCF | TCF | Remfg | Total |
|-------------------------------|-----|-----|-------|-------|
| Human Resources | 0% | 82% | 18% | 100% |
| Mfg General | 0% | 48% | 10% | 58% |
| Receiving | 0% | 50% | 15% | 65% |
| Engineering | 0% | 65% | 16% | 81% |
| Facility | 0% | 84% | 16% | 100% |
| Maintenance | 0% | 88% | 13% | 100% |
| Safety | 0% | 82% | 18% | 100% |
| Electronic Technicians | 0% | 37% | 38% | 75% |
| Production Supervisors | 0% | 76% | 4% | 80% |

Allocations from the Human Resources, Maintenance, and Safety departments were not reduced following the transfer. Due to the limited number of employees in those departments, those departments would not reduce headcount or eliminate expenses

following the transfer. This will result in 100% of their current expenses being spread to the TCF production and remanufacturing areas.

The General Manufacturing and Receiving expense departments consist of variable expenses directly related to the production departments. This will allow the elimination of all previous CCF allocations from those departments. The TCF production and remanufacturing allocations from those departments will remain identical to their pre-transfer allocations.

Following the transfer, the Engineering department will release 20% of its personnel, and spread the CCF support of two other engineers completely to TCF production and remanufacturing. This will increase the total Engineering allocation to the TCF production and remanufacturing by 4%.

Following the transfer, the Electronic Technician department will release 25% of its personnel. Because these technicians support a very small portion of remanufacturing, the overall remaining Electronic Technician allocation to the remaining TCF departments will decrease by 1%.

The Production Supervisor department will release 20% of its personnel, and spread the CCF support of one other supervisor completely to TCF production and remanufacturing. This will increase the total Production Supervision allocation to the TCF production and remanufacturing by 18%.

For the purposes of this study, the Facility expense department will not eliminate any expenses following the transfer of CCF products to the Alabama facility. Although there will be some reduction in utility expenses, they do not significantly affect the overall expenses in the Facility department because that department's expenses are

dominated by building depreciation and maintenance. Spreading the entire Facility expense department to the remaining TCF production and remanufacturing areas will increase their allocation from the facility by 23%.

Table 4.0, which is based on 6 months of actual expenses, shows the post-transfer burden rate of the TCF products. The increased expenses related to support functions that could not be eliminated with the transfer will cause the overall TCF burden rate to increase from 513% to 570%. This increased burden rate will raise the fully burdened cost per hour by \$5.70.

Table 4.0 Post-transfer Menomonie Facility Burden Rates.

| Description | CCF | TCF | Remfg | Total |
|----------------------------------|-----|--------------|--------------|---------------------|
| Standard Labor Credit | \$0 | -\$1,263,347 | \$0 | -\$1,263,347 |
| Variable Expenses | \$0 | \$3,801,097 | \$6,194,528 | \$9,995,625 |
| Fixed Expenses | \$0 | \$4,318,189 | \$932,729 | \$5,250,918 |
| External Allocations | \$0 | -\$912,773 | -\$8,246,127 | -\$9,158,900 |
| Total Department Expenses | \$0 | \$7,206,514 | -\$1,118,871 | \$6,087,643 |
| Total Burden Rate | | 570% | | 482% |

Table 5.0 shows the overall expense impact the TCF production and remanufacturing areas will have to absorb on an annual basis. Moving the CCF products to the Alabama facility will result in approximately \$1.4M of additional expense to be absorbed annually by the TCF business if the CCF business consolidates its manufacturing in Alabama.

Table 5.0 Annualized Expense Impact of Proposed Consolidation.

| Description | TCF | Remfg | Total |
|----------------------------------|-------------|-----------|--------------------|
| Variable Expenses | \$323,751 | -\$11,921 | \$311,829 |
| Fixed Expenses | \$1,272,787 | -\$17,578 | \$1,255,209 |
| External Allocations | -\$154,123 | -\$33,505 | -\$187,628 |
| Total Department Expenses | \$1,442,415 | -\$63,004 | \$1,379,410 |

Chapter 5

Conclusions and Recommendations

The purpose of this study is to determine the financial impact of a partial plant consolidation involving Company XYZ's Menomonie, WI facility. Although there are many aspects to be considered when intra-company transfers of manufacturing lines are proposed, this study focused on the post-transfer financial impact to the remaining products manufactured in the Menomonie, WI facility.

The goals of the study were:

- 1.0 Analyze the current financial structure of the Menomonie, WI facility to determine the post-transfer burden rates of the remaining products.
- 2.0 Provide recommendations to minimize any financial adverse effects on the remaining products manufactured in the Menomonie, WI facility.

Conclusions

The overall impact of consolidating the CCF product manufacturing from the Menomonie, WI facility into the Alabama facility will have a significant impact on the Menomonie, WI facility.

In terms of this study's objectives, the consolidation will increase the fully burdened rate of the remaining TCF products by \$5.70 per hour. This increase correlates to an annual increase in expenses to the TCF business of approximately \$1.4M.

Although this study was limited to the determining the financial impacts to the remaining products following the proposed consolidation, there are numerous other

aspects to be considered when consolidating manufacturing locations. These considerations include the ability to build enough stock to maintain customer service during the move, the actual cost of training the Alabama employees, moving the equipment, and the cost of severance for Menomonie, WI employees. It is imperative that all relevant aspects of a manufacturing consolidation be evaluated before a final decision is made.

Recommendations

Although Company XYZ has considered this consolidation, they have not yet made a final decision to move the CCF production from the Menomonie, WI facility. The question of consolidation stems from Company XYZ having too many underutilized manufacturing facilities.

Prior to making the final decision to consolidate manufacturing into the Alabama facility, the current CCF production expenses should be evaluated in the context of how they would affect the Alabama facility's burden rates. There must be enough savings realized in the transfer to not only save the \$1.4M annually, but also to provide a timely return on investment for the one-time transfer and severance costs.

It will be very difficult to reduce the amount of expenses left for the TCF products to absorb following the transfer, because the largest percentage of those expenses are related to the facility itself. These expenses include building and equipment depreciation and facility maintenance costs.

The other expenses that would remain for the TCF products to absorb are related to salaried support staff. Given time, there is opportunity to minimize the impact of these costs that would not transfer with the CCF products to Alabama. One method of

reducing those costs would involve the transition of support functions, such as Human Resources, to a shared service model. This model would reduce the redundancies in these types of support functions by centralizing company wide support, and reducing or eliminating local support. Company XYZ has already begun implementing some of these types of shared services. Partially extending that into the Safety and Engineering functions may help to reduce left over expenses if a consolidation did occur.

In summary, the overall recommendations for Company XYZ include a similar financial analysis to determine the resulting costs of the CCF manufacturing in Alabama. The CCF family should only be consolidated into the Alabama facility if their costs show favorable savings that offset the additional expenses to the remaining TCF products in the Menomonie, WI facility, as well as a favorable return on investment for the moving and severance costs.

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