Enablers and Barriers to Successful Implementation of Activity-Based Costing In the Defense Aircraft Industry

by

Eto Otitigbe

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Signature of Author: __________________________

Department of Mechanical Engineering
May 7, 1999

Certified By: __________________________

Wesley L. Harris
Professor of Aeronautics and Astronautics
Thesis Supervisor

Accepted by: __________________________

Ernest G. Cravalho
Professor of Mechanical Engineering
Chairman, Undergraduate Thesis Committee
May 7, 1999
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Eto Otitigbe

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ABSTRACT

Activity-Based Costing, ABC, is a strategic cost-allocation method that provides enterprises with better understanding of how cost flows through their organizations. This report analyzes the implementation of ABC within various enterprises. Through case study analysis, the difficulties that arise with the implementation of ABC are revealed. The enablers and barriers to implementation of ABC are also obtained. This analysis provides guidance to optimal ABC implementation strategies. These strategies are applicable, in general, to the United States defense aircraft industry.

Thesis Supervisor: Wesley L. Harris
Title: Professor of Aeronautics and Astronautics
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Thank you Jehovah.

I dedicate this and all my work to the people that inspire, discourage, support, challenge, and move me.

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1.0 Introduction

Increased demands from the United States Department of Defense, DOD, for higher quality yet lower cost products have given rise to competition among aerospace and defense contractors. To meet these demands many companies must devise plans to manufacture and operate in a more efficient manner. The Lean Aerospace Initiative, LAI, is a partnership among industry, government, labor and MIT aimed at incorporating the lean manufacturing paradigm into both the United States defense aircraft industry and government operations. Lean manufacturing aims to streamline the steps taken to fabricate a product or provide a service. If a quality product can be made and disseminated quickly and inexpensively then the entire manufacturing process becomes leaner.

The LAI is currently analyzing Activity-Based Costing, ABC, as means for meeting the DOD’s competitive demands and implementing lean manufacturing principles. ABC is a cost accounting system that assigns a cost to a product as activities are performed upon it. ABC systems identify the hidden costs and organize the general overhead costs which traditional cost systems overlook. Many enterprises have successfully implemented ABC into their manufacturing operations. Some of these enterprises are members of the LAI while others have similar product lines or manufacturing operations as LAI members. The similarities and differences in their implementation of ABC and subsequent uses of this method prove that, with an ABC system in place, enterprises can progress towards leaner manufacturing operations.

Despite the benefits using an ABC system, certain difficulties arise in the implementation of this cost accounting method. In order to avoid major implementation
related difficulties it is important to outline the general steps necessary to implement ABC and identify the common enablers and barriers to successful implementation.

2.0 BACKGROUND

2.1 Problems with Traditional Cost Accounting Systems

Traditional cost accounting and allocation systems have not been successful in determining the real cost of a product or manufacturing operation. Since these cost systems were set up to produce external finance reports in early manufacturing operations they do not account for the factors that drive cost in modern manufacturing. Many companies traditionally used the cost of direct labor and materials to determine the cost of their products and allocate overhead to various operations. Today, with increased automation and multiple product lines in a single company, these two factors represent a small fraction of corporate cost.¹

Sources of waste are not identified by traditional cost systems that assign costs according to the cost of inventory and goods sold. This method does not account for the hidden costs, which arise from customer demands, supplier relationships, range of products or services and complexity of manufacturing operations.

Several limitations of traditional cost accounting systems led to inaccurate product and process costs. Managers relied on accounting information to make strategic business decisions. However management could not make timely decisions because financial data was reported each quarter or year. A new system of cost accounting is needed that will aid

¹ Cooper and Kaplan, pg. 96.
enterprises in controlling the cost of operations and adapting to their changing environments.

2.2 Activity-Based Systems

An activity-based system combines financial and non-financial data in order to allocate cost. ABC systems form connections between cost and operations or activities that are performed within a company. ABC systems can be used to measure internal performance and obtain more accurate product and customer costs.

2.2.1 Classification of Activities

Activities are any operations involved in producing a product or providing a service. They are commonly defined as “the processes that meet a particular work need of the organization. A unit of work that takes place within the organization and consumes resources.” ² There are five basic types of activities: organization and facility support activities, process activities, process-support activities, customer, or market related activities, and product or product line related activities.

- **Organization and Facility Support Activities** such as sanitation or air conditioning are responsible for the general management of activities and the physical space where all the other activities would take place.

- **Process Activities** are the activities carried out by an enterprise that have a direct relation to the products or services they provide. These activities may be further classified as unit-level activities and batch level activities.
a) **Unit Level Activities** are performed in the same way for each unit of service or production. Machining a feature into a part is an example of a unit-level activity, this must be done repeatedly in the same manner for a volume of specific work.

b) **Batch Level Activities** are performed for a group of units for production. Machine setup for these parts is a batch-level activity, it can be done once for any volume of work.

- **Process Support Activities** provide support to the activities that directly influence an enterprise’s products or services. These could include machine maintenance and operator scheduling.

- **Customer or Market Related Activities** are any costs that are associated with a company’s customers, product distribution and marketing. These activities tend to vary with the demands of the customer. They are also subject to change with changes in a particular customer’s functional requirements for a product or service.

- **Product or Product Line Related Activities** are those activities that exist to provide support to a company’s product or service; such as company-wide maintenance centers.

### 2.2.2 The ABC Model

The business processes of an enterprise are defined by the grouping of the various activities that result in a finished product or service. These groups, which are called

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2 Institute of Management Accountants pgs. 22-23
activity centers, serve as the focal point for an ABC model. The model allows enterprises to track the flow of costs from raw materials through the activity centers to the final product. At the same time, the model shows how information flows throughout the business process. These two views, which form the ABC Cross, are called the cost view and the process view respectively. See Fig. 2.1: ABC Model.

![ABC Model Diagram](image)

Figure 2.1: ABC Model

In the cost view, resources move through activity centers to become finished products. A cost rate is assigned to an activity center by resource drivers. Resource drivers are the number of resources consumed by an activity center. In ABC resources, are input costs such as raw materials, outsourcing, or purchased components.4

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3 Benke, pg. 61.
4 Institute of Management Accountants pg. 16
A finished product or service is the called the cost object. A cost is allocated to a
cost object by an activity driver. Activity driver measures the number of times that a
single activity is used to create a cost object.⁵

The process view of ABC produces performance metrics. These metrics consist of
financial and non-financial data that determine the quality of the activities performed.
These end results, called performance measures, can be used to discern whether or not the
needs of the internal and external customers have been met.⁶ At the beginning of the
process view are cost drivers. Cost drivers are factors that create or influence cost.⁷

Figure 2.2 shows how a cost is allocated to a product through ABC. Once an
activity is identified a performance measure is set for that activity. The performance
measure is determined by measuring operations such as throughput. Next a cost driver is
set. The cost driver is a rate of cost. This may come from such things as labor, equipment
use or energy consumption. Then the activity cost is determined by multiplying
performance measure and the cost driver. Finally a product cost is obtained by adding all
the activity costs that result in a finished product.

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⁵ Compton pg. 34
⁶ Institute of Management Accountants pg. 23
⁷ Brimson, pg. 52.
3.0 Strategies for Successful Implementation of ABC

Successful implementation of ABC is achieved if the proper steps are followed. These steps are obtained by analyzing the varied implementation methods of companies that mirror the manufacturing operations of LAI members. Case studies of seven companies were used to identify the enablers and barriers to implementing ABC. These
enablers and barriers were then used to identify factors that drive ABC implementation efforts.

The primary selection criteria for companies was whether or not they were DOD contractors or stakeholders in the LAI. Then companies with product lines or manufacturing operations similar to these two groups were chosen. The third criteria for selection depended on the company’s use of the ABC system. If their desire for the system mirrored the desires of companies involved with the DOD then they were selected. Five companies that fit these criteria are: Advanced Micro Devices, Caterpillar, Inc., Hughes Aircraft Company, the Lord Corporation, and Siaide Manufacturing, Inc.

In order to contrast the use and implementation procedures of manufacturing enterprises with other types of companies case studies of Pennsylvania Blue Shield, PBS, and Southwestern Ohio Steel, SOS, were analyzed. PBS is a large service organization that provides health insurance to a diverse customer base. SOS is a steel production facility.

The following case studies have been summarized from various highly detailed reports. The origin of the case studies may be found in the footnotes.

3.1 Case I : Advanced Micro Devices, AMD\textsuperscript{8}

AMD was analyzed because it demonstrated how a large company with many complex products implemented ABC. AMD is a global supplier of integrated circuits for the personal and networked computer and communications markets. The company reported revenues of $2.4 billion in 1997 and has approximately 12,700 employees

\footnote{8 Cooper et al., pgs. 41-61.}
worldwide. AMD produces processors for Microsoft and Windows compatible PCs, flash memories, products for communications and networking applications, and programmable logic devices.9

In the mid-1980’s AMD was a leader in the semiconductor industry, then market maturity and industry saturation led to major problems. An increased number of semiconductor companies began to appear in the US and Japan, making the semiconductor industry highly competitive. AMD’s return on sales fell from 10% in 1983 to 0.7% in 1985; net profits also dropped from $61 million to $5.6 million. AMD’s management aggressively sought ways to remain competitive.

AMD is comprised of three major groups: Sales & Marketing, Manufacturing, and the product line divisions. The Manufacturing Group is split into three specialized types of facilities for production: wafer fabrication, assembly manufacturing, and test and mark. A finalized product must pass through each of these facilities. A silicon wafer begins in the fabrication plant, where it is processed into dies and circuit designs are etched into these dies. The wafer is then transported to an assembly/ manufacturing plant where lead frames and packages are attached. Finally the wafer is completed in the test and mark facilities, where they are tested, marked and packaged. This physical division of processes led to several cost accounting complications.

AMD’s cost system did not provide an accurate view of the manufacturing process. This system was based on direct labor and machine run rates. At the time, AMD was using JIT cells to manufacture high volume products and non-JIT cells for low volume products. The system had no way to compare the efficiency of these operations. It

9 http://www.adm.com
also had no method for dealing with product transport between facilities, resulting in many redundant cost distortions.

The AMD finance director felt that an ABC system could adapt to the manufacturing and market changes that were affecting the company. The proposed uses for an ABC system were to improve management of the multiple product lines, make better product design decisions and increase manufacturing efficiencies by comparing the JIT and non-JIT cells. ABC implementation across the entire company would be very costly and time consuming. In order to justify a move to an ABC system, a pilot project was selected.

3.1.1 Steps to Implementation

The finance director’s first step to implementation was to obtain management commitment to the project. He spent three months making presentations and circulating information to senior management to lobby for support.

After the management buy-in, an assembly operations facility in Penang, Malaysia was chosen as a pilot site for the project. This plant was AMD’s largest manufacturer with approximately 400 employees. Although Penang produced AMD’s latest and most complex microprocessors the overall manufacturing environment was less complex than other facilities. Penang’s plant management was already interested in using an ABC system.

A project steering committee and a multifunctional project team were selected to complete the process. The steering committee was responsible for developing the scope of the project and resolving any major issues that arose. It consisted of the Penang plant
manager, controller, department managers and the AMD financial director. The project team was responsible for a majority of the ABC project such as interviewing, setting up the model and collecting driver information. The team consisted of the Penang section head of repair and maintenance and representatives from industrial engineering, product engineering, MIS, quality analysis, cost accounting and two consultants. The consultants made two plant visits to assist in training and driver selection. A total of 2.5 full time employee hours was used to complete the project over a 16 week period.

The project team identified a 10 step implementation system:

1. **Define scope:** AMD needed to determine the number of products to be costed. Too many products may lead to cost distortions and complex models. The team costed all of Penang’s 120 packages in mark and 1200 devices in test.

2. **Conduct activity interviews:** AMD needed to determine the activities performed by indirect labor. The team conducted a total of 65 interviews.

3. **Collect labor activity data:** The team used forms to collect employee time per activity.

4. **Analyze nonlabor activity:** The team grouped all of the machines with similar processing characteristics and materials with similar usage characteristics into activity pools. The drivers for these costs were activities such as repair and maintenance and statistical process control.

5. **Analyze activities:** AMD identified a total of 35 major activities for product costing. Less significant activities were excluded or grouped with major activities using a Pareto analysis. Then the activities are verified by a
department manager and grouped into activity centers. Three separate models were built for assembly, test and mark areas.

6. **Activity driver interviews**: The team conducted interviews to identify drivers that linked costs to products.

7. **Develop activity driver quantities**: Information from databases, the general ledger, and budgets is used to determine how much and how many activities a product consumes.

8. **Load and run model**: The activity data was processed with PC-based ABC software.

9. **Verify and analyze data**: The project team spent four weeks verifying and analyzing the processed data.

10. **Continuous evolution**: Once in place the ABC system can be updated and altered to adapt to corporate changes.

### 3.1.2 Results

The ABC system proved to be a useful tool for AMD. The system revealed that the high volume products made in the JIT cells were profitable and the low volume products unprofitable. Profit from the high volume products supported the low volume products made in the non-JIT cells. The traditional cost system predicted that the average product cost of the low volume products was $0.48, whereas the ABC system proved that the average cost of the low volume products was $3.50.

ABC worked in AMD because it identified major costs that could be reduced by altering manufacturing practices. Major assembly costs came from scheduling, setup and
expediting. Steps towards streamlining manufacturing to decrease these costs were then taken. The system also proved that the various levels of SPC activities were redundant and costly. The system was further used to correct transfer prices between plants and prepare a plant annual budget. Once the ABC data was presented to senior management a commitment to implement ABC across the entire company began with the addition of two pilot sites in Asia followed by one in Austin, Texas. The pilot program used by AMD was a success because it allowed the company to identify its own organizational complexities. This would make future efforts to implement ABC easier.

3.2 Case II. Caterpillar, Inc.

Caterpillar, Inc. is currently the world’s largest manufacturer of construction equipment and leading global supplier of diesel engines. A majority of these large, complex products are made of plate steel and a wide variety of purchased components. As an international manufacturer, it was necessary for Caterpillar to analyze the cost of identical products that were produced at different locations.

Caterpillar’s current cost system could only identify the costs of easily traceable activities, such as direct labor hours, or material costs. The system did not include drivers of cost such as machine tool energy consumption, setup, machine repair, and manufacturing support activities. Caterpillar needed a cost system that could identify the activities consumed by products and assign reliable costs to each of these activities. The entire organization needed to develop ownership of the cost system and a desire to update it continuously. Caterpillar turned to ABC as a cost system that could mirror the
in each of these activity pools: variable pools and period pools. An additional category for general overhead was also included in the system.

The large and complex parts used in Caterpillar products require a great deal of raw materials and purchased parts. JIT principles were introduced to address the logistical problems that arise with these parts and activities. The logistics activity pool included all the costs incurred when materials were bought, transported, received and handled. This pool was broken down into five sub pools:

1. **Unformed material costs** included the cost of obtaining unformed materials.

2. **Unformed weight moved costs** dealt with the cost of moving unprocessed materials within the factory.

3. **Weight base costs** were the activities performed on processed materials at shipping and receiving docks and in storage areas.

4. **Weight moved costs** were the activities used to transport these processed materials within the plant.

5. **Buying, receiving, storing and moving costs** for purchased finished products.

The variable pools in the logistics pools included costs from freight on production material, material cleaning, receiving inspection, material handling labor, and fuel and electricity for operating material handling equipment.

The period pools included costs from purchasing, personnel, specific depreciation and maintenance on material handling equipment, utilities, insurance, property taxes, maintenance and clerical support.
The second activity pool identified by Caterpillar was the manufacturing activity pool. The costs incurred here were associated with operating machines, manufacturing cells, work stations, assembly, tests, painting and shipping areas. The rates for cost in this pool were divided into three categories: variable man rate, variable machine rate and period machine rate. The variable man rate was based on the pay rate and fringe benefits of a direct labor worker.

The variable machine rate included costs related to operating machines. These costs originated from perishable tooling such as drills, taps, cutting tools, tool crib operation and grinding reusable tools; energy consumption or energy used while a machine was in operation; indirect materials and their handling costs; spoilage and rework; quality auditing; supervision salaries of first line employees and other variable labor support.

The period machine rate handled the machine depreciation for equipment within the facility, rental charges, heat and light expenditures, security, building maintenance and repair costs. This rate also accounted for depreciation of durable tooling, machine repairs and planning expenses of salaried industrial engineers.

The activity assembly pool represented the third pool of cost within Caterpillar. In these pools rates of cost were set for each of the assembly areas using average monthly expenses. The assembly areas included testing, painting and shipping. The variable rates in this activity pool included: cost of assemblers, test people, painters, shipping personnel, clerical support, quality assurance, housekeeping, factory accounting, product handling, tooling, indirect material expenses, power, gas, and supervision. The period
cost addressed the depreciation of assets, occupancy costs, training and tool and equipment repair.

The rates for cost of each activity are determined by mini-budgets for each of the cost centers. These rates are based on how the product consumed activities as it was processed. However before the final costs could be determined a system was devised to normalize any extraneous costs or situations and account for asset depreciation.

Normalizing was a step used by Caterpillar to reduce the effects that volume changes and abnormal costs may have on unit period costs. Since period costs are both current and future estimates, short term changes in volume may distort the cost model. However if these costs are spread out over an average value for volume then more accurate business predictions can be made. Normalizing excludes abnormal costs such as start-up, learning curve, major factory rearrangements, and unusual levels of education and training.

After many of the activities in Caterpillar were associated to the major activity pools, the remaining activities were grouped together as a general overhead pool. Although these costs are important, they could not be directly related to the manufacturing of a product, hence they were not grouped into the major activity pools. These costs include expenses such as accounting, employee and labor relations, plant administration, medical services, scheduling and inventory control. A percentage of these costs is assigned to a product based on the total costs of the other activities performed on that product. Products that use a great deal of activities will have a high percentage of overhead assigned to them.
A majority of the data used to set the activity pool cost rates and develop product costs came from several data files that were maintained on a Caterpillar database.

- **The Purchase Order File** provided direct material price based on the latest purchase order.

- **The Station List File** contained descriptive data of the products by part number, such as source of supply, weight, quantity per piece and parent part number.

- **The Production Routing File** (work order) provided man and machine time by operation, machine numbers, set up times, lot size indicator, product assembly, test, paint and ship times.

- **The Requirements File** provided production requirements (quantities) for all products, attachments, replacement parts, and interplant material to be produced.

- **The Product Structure** was a level by level bill of materials.

- The final cost of a product was obtained by assigning the appropriate rate to the amount of an activity an product used as it moved through the factory. The general overhead is appropriated according to the percentage of total activities the product consumed.

### 3.2.2 Results

This cost accounting system devised by Caterpillar was developed into a “computerized consultant” called the Cost Information System, CIS. The CIS was an
active, on-line service used throughout the company by individuals and design teams. It consisted of a database of cost information on specific parts, products and processes. This information was used for product development, component and part design decisions, sourcing decisions, quality and cost improvement analysis, investment justification studies, pricing analysis, competitive cost analysis, manufacturability and manufacturing alternatives. Users obtained this information through printouts or file transfers. The system was equipped with an “estimated cost module” which was used to determine the cost of new products. Since the case study was written Caterpillar was seeking to add a “predictive costing module” to the database, which would provide design and industrial engineers with estimated costs of various design and process alternatives.

3.3 Case III: Hughes Aircraft Company

Today Hughes Aircraft Company is an integrated defense electronics and information systems company. As a world leader in the design, development and production of high technology systems for scientific and military applications, Hughes has approximately 35,000 employees and revenues of about $6 billion annually.¹¹

Hughes has achieved its position by promoting continuous improvement and excellence throughout the company. About ten years ago Hughes faced severe competition from other government contractors because the Department of Defense called for higher quality products at lower costs. To remain competitive, management needed a cost system that could report reliable production costs. This information would

¹⁰ Feil and Haedicke, pgs. 29-33.
be used to control production, make strategic business decisions, price products and report to shareholders. At the time Hughes cost system was based on the quantity of it’s direct labor. However company changes have led to increased outsourcing and automated manufacturing. A direct labor based cost system could not accurately account for these manufacturing changes.

3.3.1 Steps to Implementation

Hughes has been involved with ABC since 1986. The initial ABC project took place at their Ground Systems group, an operation that consisted of approximately 4500 people. Since then Hughes has implemented ABC throughout the company with very positive results. Hughes identifies the four major steps to their implementation of ABC as:

1. The Move to Multiple Burden Centers

2. Central Service Allocations

3. Activity Accounting

4. Activity-Based Costing

The first step to ABC implementation was to move from a model of one burden or activity centers to multiple activity centers. Traditionally, Hughes manufactured many products in a single plant. An ABC analysis of entire plant as one activity center, would lead to many inaccuracies, complications and overlapping costs.

For the purposes of ABC, Hughes decomposed a pilot plant into multiple activity centers based on stages in the various product lines. An ABC analysis was performed on

11 http://www.hac.com
each center with cost rates such as $/minute or $/laborer, assigned to each activity. The sum of all the activities a product consumed would be the cost of the product. This method gave rise to more accurate product costs.

Hughes then performed central service allocations for certain costs. In many manufacturing environments there are costs that are not directly linked to the product. A majority of these costs are support functions that occur throughout the company such as finance, human resources, shipping, receiving, and data processing. Costs are assigned to these activities on the basis of complexity, volume or time taken to perform the service. These resource costs are assigned to a product in proportion to the amount of activities a product consumes. The total resource costs are then added to the previously determined product costs.

The third step to implementation is the activity accounting. Activity accounting analyzes the cost drivers to determine how cost effective they are. Hughes assembled a cross-functional team, MORE (Measurement of Organizational Effectiveness), to accomplish this task. Although the team was headed by industrial engineering, all the participants in an activity along with clients and customers came together to perform the activity accounting and develop methods for increasing efficiency and reducing cost.

The final step, activity based costing, occurs when the costs from the activity centers, resource centers and activity accounting are pulled together to form a costing system. Representatives from operations, management, finance and industrial engineering, work together to determine the most important second stage cost drivers, projected workload and forward pricing rates for application to the system. All this data was modeled with the Cooper/ Kaplan software which was marketed and implemented by
the KPMG Peat Marwick consulting firm. This software was then used to obtain cost impact studies and predict future product costs.

Along with these steps Hughes focused on continuous improvement of all their operations including their methods of cost accounting. The ABC model is updated and verified on a consistent basis.

3.3.2 Results

Managers at Hughes have used ABC to perform a "Shop Mix- Analysis." This analysis justifies their decision to make parts or products internally or buy them from contractors. This analysis can prove that a certain part of the manufacturing process is more expensive than outsourcing. Hughes has also used ABC to compare multiple factories which produce identical or similar products. These comparisons identify "centers for excellence" which are used company wide as examples of efficient manufacturing practices. Design engineers in Hughes have used ABC to assess impact of design changes to a product and design to cost.

3.4 Case IV: Lord Corporation\textsuperscript{12}

The Lord Corporation is a manufacturer of products that control vibration, shock, noise, and motion for industrial and aerospace purposes. In 1991 Lord employed more than 1,700 people worldwide, and annual sales were more than $250 million;\textsuperscript{13} Despite company wide growth Lord's accounting system and view of cost remained stagnant. The

\textsuperscript{12} Rupp pg. 50
\textsuperscript{13} Rupp pg. 50
decision to implement ABC as a new cost accounting system was made. Before Lord engaged in a full scale costing effort, it would use one of its business units as a pilot.

Lord’s first attempt to implement ABC failed for various reasons. A member of a newly established Financial Development Program (FDP) in Lord created an ABC plan for the Chemical Products Division. Since this division was already successful they refused to serve as a pilot for ABC.

The implementation plan was devised by an outsider to the Chemical Products Division. This made the plan appear to be an accounting project, with little value to the division. The Industrial Products Division was next targeted as a possible ABC pilot.

Manufacturing operations in the IPD were complex and there was a great deal of overhead. Management needed a way to control it’s performance. The IPD recently switched from plant cellularization to a multicellular manufacturing processes that could convert raw materials to finished products and then package them for shipment. Yet Lord still used the ASK/MANMAN software system to create manufacturing reports. This software along with a budget-centered method of accounting could not keep pace with the fast paced operations. A process focused system of accounting was needed to maintain Lord’s status.

3.4.1 Steps for Implementation

To implement ABC, first a cross-functional pilot team that represented the departmental diversity of the IPD and the FDP was formed. This team was able to take ownership over the concept of ABC, develop goals and communicate the departmental-
specific problems with the standing accounting system. The team was sent to ABC seminars for training.

The team members met weekly at first to communicate their ideas about ABC, while still attending to their regular company positions. Their first goal for ABC was to achieve better product costs. Over a nine month period an ABC model was constructed that provided marketing with more accurate product pricing data. Lord still had a problem with high numbers of non- certified suppliers. Reducing non-certified suppliers would reduce the need for inspection and decrease manufacturing costs.

To address this need the model would have to be reorganized. The pilot team conducted a series of interviews and created a questionnaire for employees. The interviews and questionnaire were focused on determining how many activities each worker performed and how long it took them to complete each one. It was also important for the workers to describe the activities they performed and what caused these activities. Approximately 30 employees were interviewed. Each interview lasted 15 to 30 minutes. The interviews revealed that workers had between 2 to 4 activities each. The time percentages for these activities were also calculated^{14}

The initial model was set up using Lord’s ASK/MANMAN software. Once the data from the interviews was collected the model was processed with Macintosh’s version of Easy ABC. Eleven basic activities and 2,000 products were identified for the model. The system failed to link so many products to the relatively few activities. The model was then shifted to Microsoft Excel spreadsheets. The spreadsheets allowed Lord to take into

\[^{14}\text{Rupp pg. 52}\]
account overhead, activities and all the products. Lord continues to use spreadsheets for their ABC purposes.

3.4.2 Results

Lord discovered from ABC that their original cost accounting system was not accurate. They realized that material overhead was not due to a part’s costs but rather to inventory and unnecessary inspections. The pilot team attributes part of their successful implementation to constant communication with management. By making periodic presentations about their progress management was able to understand the ABC approach and support it. Lord was able to develop a certified supplier program that assisted in inspection reduction. The pilot team went on to educate and implement ABC throughout the company. The Lord Corporation demonstrated how an to implement ABC fails. The major barriers to implementation could be identified from this case study. The study also emphasized the importance of forming crossfunctional teams to develop the ABC model.

3.5 Case V: Pennsylvania Blue Shield

Pennsylvania Blue Shield received the 1992-93 Certificate of Merit for their successful implementation of ABC from Management Accounting. Pennsylvania Blue Shield (PBS) is a provider of health insurance to a large market and member of the Blue Cross Blue Shield Association. Since PBS was in constant competition with other insurance companies they were always looking for ways to increase market share, and control overhead costs. To do this efficiently they needed the proper financial
information. As a member of the conservative Blue Cross Blue Shield Association, PBS was accustomed to using the method of financial recording and reporting that the association recommended. These methods generated data that could be used to price products and services but did not equip management with enough information to make proactive decisions. PBS Senior Vice President of Finance felt that PBS needed,” timely accurate and extensive cost data to react to the dynamic health insurance environment.” The decision to implement ABC was made.

3.5.1 Steps for Implementation

The first step that PBS took to implement ABC was to determine what they wanted ABC to do for them. With the help of ABC consultants, the finance group interviewed PBS senior management to find out what they wanted from a cost accounting system. The interviews revealed that PBS faced the same problems that many businesses faced: “market share, integration, overhead cost control, capacity management and legislation.”16 The team was also able to determine management’s most difficult corporate decisions in dealing with these business issues. These decisions required financial and non financial data which the current accounting system did not provide. The interviews also concluded that the overall culture of PBS and Blue Cross Blue Shield was conservative and this attitude carried over into their approach to financial management.

In order to proceed with the implementation of ABC the team at PBS had to overcome the issue of a conservative corporate culture at PBS. Management at PBS was

15 Norkiewicz pg. 28
16 Norkiewicz pg. 28
conservative because they were slow to change their corporate philosophy with the times. They were also reluctant to accept new financial information that did not fit into their old financial models and business view.

PBS consisted of two large business units, several small subsidiaries and one large support unit, each of these groups had their own organization and method of cost accounting. Each of the organizational units insisted on keeping different accounting methods to prevent control by other units as a result of misinterpreted data.

To overcome the problem of corporate culture the PBS team decided to get all the stakeholders involved in the ABC process. To do this a steering committee made up of senior managers from all areas of the company was formed. Their task was to define how they wanted to use the ABC data after the project. Members of the steering committed then chose representatives from their departments to serve in a workgroup. The task of this work group was to identify the data to be used in the ABC model and how it was to be used. The workgroup went on to create a project analysis team to implement the ABC model. This method succeed in involving all the key members of the company. With top level management at the forefront of the implementation process the entire company was able to take ownership over the project.

The next step in implementation, for the PBS team, was to teach the theory and application of ABC to the members of the workgroups and project analysis team. This training was broken up into two parts and much of it was done on the job. The first part consisted of basic definitions, documentation techniques and interviewing techniques. The focus of this phase was on determining a department’s function, obtaining activity
and driver information, and building process flowcharts. The second phase revealed how activities should be examined. This allowed the project analysis team to discern which activities in the model were value adding.

Members of the project team were then responsible for classifying all the activities in PBS. There were five major categories for activities: organization and facility support activities, process activities, process-support activities, customer or market related activities and product or product line related activities. In order to calculate the cost of a single unit of any of these activities an expense analysis was done. In an expense analysis organizational and natural expenses are associated with activity centers through first stage activity drivers. Then this value is divided by the amount of the activity at that particular center, second stage driver, to produce a product cost. A second stage driver is a quantity such as volume or hours. If an annual value of the second stage driver is used, the ABC model can be a budgeting tool, whereas is a monthly value is used the model is better for product costing. PBS obtained most of the information for the expense analysis form their accounting general ledger. The system used to process and store the ABC data was The Walker General Ledger.

The final steps that PBS took to implement ABC were further training efforts. Management had to be instructed on how to use the ABC data to develop business strategy and assess their current operations. Since there was now a universal accounting system all the business units which had separate accounting systems had to be trained to build new ABC models and maintain those already in place.

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17 Norkiewicz pg. 31
3.5.2 Results

At the time this case study was documented results from the new ABC were not reported.

3.6 Case VI: Slade Manufacturing, Inc.: Hudson Automotive Parts Company\textsuperscript{18}

Slade Manufacturing, Inc. is a conglomerate of manufacturing companies whose annual sales range from $30 to $150 million. It is organized into three primary business groups: Automotive, Industrial and Machinery. The Automotive Group contributes to over 40\% of Slade's Corporate Revenue. In 1990 Slade began to demand more short term cash flow from this division to compensate for company wide growth, diversification and previously incurred debt.

The Automotive Group had annual sales of approximately $410 million with the Big 3 US automotive manufacturers as their major customers. Due to customer demand, the automakers needed more sophisticated features and safety products such as motorized seat belts. The automotive manufacturers decided that costs would decrease if they began to source parts from fewer suppliers that were more technologically advanced. The Automotive Group competed with other companies to supply automotive parts to these manufacturers. Product lines included: stampings, fuel systems, electrical assemblies, engine components, transmission components and assemblies and rubber products.

The Automotive Group was a conglomerate of highly autonomous, completely decentralized manufacturing companies. Strategic business decisions were made by local management teams and few company wide policies or standards existed. The independent
culture of these companies led to organizational complexity. Each company had their own form of labor contracting and negotiating, purchasing, research, application engineering, accounting practices, performance report systems and cost systems. The controller of Slade Manufacturing, Inc., saw that this problem had to be addressed in order to for the Automotive Group to remain competitive and provide Slade with sufficient cashflow.

The initial motivation to implement an ABC system came from a need for an improved cost system across all the automotive companies. A former accounting consultant was hired as Controller of the Slade Automotive Group to accomplish this task and establish a better relationship between corporate and the many local companies.

3.6.1 Steps to Implementation

After familiarizing himself with the corporate environment of the Automotive Group, the new Automotive controller reported to the Slade controller that the implementation of a new cost accounting system over the entire company would be too costly. This cost would come from the need for a new mainframe computer system, and the full time commitment of many workers. However, he also determined that an ABC system that existed at an independent plant level would serve as a good pilot for an ABC analysis. The two chose Slade’s Hudson Automotive Parts Company as a pilot for an ABC project.

The Hudson Automotive Parts Company (HAP) was a producer of machine parts for automotive applications that require a high degree of skill and efficiency. Products included gears, flanges, pinions and metal housings. The company was split into five

18 Cooper et al., pgs. 209-236.
manufacturing facilities in Northeastern Ohio with a total of 1,400 employees. The process technology ranged from state of the art to fully depreciated, high maintenance technology. This old equipment remained in service as long as it performed adequately.

The next step was to develop management buy-in to the concept of ABC. The Automotive controller made presentations to the HAP management about the theory and benefits of ABC. However his plan was rejected because HAP management was skeptical about ABC and a corporate outsider interfering with their operations. The controller then sought the help of an experienced ABC consultant.

The consultant was able to prove to HAP management that ABC works with examples of successful implementations that he had been involved in. The consultant also negotiated with HAP so that Slade manufacturing would share 50% of the consulting fee and the Automotive controller would commit his full time to implement ABC.

After the management buy in, a pilot site for ABC implementation had to be selected. This decision was made by the consultant, the controller and HAP management. Together they chose the Youngstown plant which, represented about 25% of HAP's revenue. This site was chosen because its revenue had began to decrease and ABC along with other performance improvements could remedy this situation. Also the plant was in the midst of negotiations with a major customer, while another important customer was threatening to discontinue business with Youngstown.

The Youngstown plant was a producer of nine product families of machined parts. These product families resulted in 63 different types of gears, armatures, pinions, covers, flanges, valves, supports, housings, and filters. The steps for processing consisted of: receiving raw materials (primarily steel); inspection of raw materials; delivery to
manufacturing departments; and manufacturing operations in which up to eight distinct operations were performed in one cell to produce a finished product. Youngstown had approximately 300 direct labor employees and 125 factory support employees.

Once the pilot site had been selected another ABC presentation was made to the plant staff. Then a project steering team consisting of two outside consultants, and top level HAP management was selected to guide the ABC effort, provide input to the ABC project team and analyze their final recommendations.

The project team consisted of the Automotive Group controller, the Youngstown plant accountant and manager and the consultants from the steering team and an additional staff consultant. The controller was the sole team member who was dedicated on a full-time basis to the project. He was in charge of coordinating meetings, conducting cost-driver interviews, and administration of all ABC resources for the project team. The plant accountant dedicated 60% of his time to the project, to process data in the ABC model, create an ABC product file, and develop a download file system for activity cost drivers. This system was based on the plant’s existing information system. The plant manager served on the team for approximately 8 hours per week to conduct interviews, and develop project team ideas. The consultants served as trainers and facilitators during the interviews and model development sessions.

The project team was able to identify 140 activities performed by the Youngstown plant. These were complied into an activity dictionary and used to develop interview questions, questionnaires and surveys. Employees produced information such as total time required to complete an activity and percentage of total time that activity takes up,
also factors that influenced or altered this time commitment. The project team conducted approximately thirty 45 minute interviews.

The next step was to identify the activity centers. A total of nine activity centers were chosen to parallel the nine major product lines. Then 11 additional activity centers were identified for non-process related support activities.

The subsequent cost drivers at these centers were: number of released finished products, number of machine hours, number of operations. The sum of the receipts and shipping for a finished product to serve as the materials handling cost driver.

The Youngstown plant produced products that were specific to their different customers. In order to keep track of products and how they are linked to customers, the project team developed a customer-specific product coding system. This system linked information about the customer, product line, volume (high, medium or low) and production state (launch or development products, production products, and after-market service products) to each of the 63 products.

Management at Youngstown wanted their ABC system to help them make decisions about the development of new products. They decided to include another activity center in the model meet this requirement. The costs incurred in new product development came from engineering and quality control man hours, airfare, outside consultant fees and testing.

3.6.2 Results

HAP's ABC implementation succeeded because senior management was willing to commit the proper resources to the project. The duration of the project was sixteen
weeks. The final results were presented to the HAP President. Then the project team and client customers were able to renegotiate certain offers.

The information from the 20 activity centers was used to find out what expenses each product line incurs and investigate the factors that led to an activity centers use of resources such as indirect labor, utilities, shop supplies, or maintenance

ABC provided insight to the cost and profitability of products and customers. Using the customer-specific product codes, HAP discovered that some products and customers could be eliminated from the mix to reduce complexity and increase profitability. They also were able to make price increases that resulted in a $1.2 million increase in revenue. ABC proved that 30% of their products represented 80% of their sales and 150% of their total profits.

Through ABC analysis, HAP was willing to lose a customer who had been using their services for three years. ABC showed that the products that the customer needed were highly unprofitable. Losing the bid to a competitor allowed HAP to obtain a bid for a new product that would become the next generation of that product type. The competitor was stuck with a bid lower than what HAP previously held and a product that was only current generation soon to be phased out.

HAP operations was able to track maintenance cost and tooling cost. Quality improvement measures were taken by reallocating resources to prevent poor quality. As a result, quality failure dropped 13%. Management developed a quote system that used ABC to estimate product costs. This system revealed the flaws in their traditional cost system, which overpriced certain products.
3.7 Case VII: Southwestern Ohio Steel$^{19}$

Southwestern Ohio Steel (SOS), a steel service center in Hamilton, Ohio, used ABC in accord with the Theory of Constraints, TOC, to reduce the cycle time of their manufacturing operations. TOC considers any system as a chain. To improve the strength of the chain, one must identify the weakest link and then concentrate efforts on strengthening that weakest link. The Theory Of Constraints (TOC) is a way to solve constraints and problems in a logical way by building a logical chart of the problem, finding its roots and developing steps to remove the root of the problem, thus solving it.$^{20}$

SOS provides steel sheets which may vary in width and dimension according to a customers needs. A major step in the production of these sheets is the blanking line operation. This is where the sheets are cut according to demand. The blanking line is a major operational constraint because a majority of the steel sheets must be processed there. Sheets processed there must be uncoiled and set up, then sample cuts are taken. When the sheet has been processed the job is recorded in a log then the excess steel is packaged and stored. Finally the blanking area is cleaned. This entire process takes up a significant amount of time, an estimated 24 hours for 500 units and 17.5 hours for 250.$^{21}$

The only time during the blanking line that value was being added to the product was during the processing. ABC was needed to deal with this "bottleneck: activity."

3.7.1 Combining ABC and the Theory of Constraints

$^{19}$ Campbell pg. 31
$^{20}$ http://www.saigon.com/%7Enguyen/toc_02.html
$^{21}$ Campbell pg. 32
SOS applied TOC to the bottleneck in their blanking line to conduct an activity analysis. It was determined that a reduction of blanking line cycle time was the best way to deal with this problem. SOS was assessed for cost in three different areas. The total operating cost of the blanking system was referred to as historical cost. Using ABC, the annual blanking line activity cost was determined. The drivers for this cost were payroll for direct workers, blanking line supplies and utilities, support and supervision, equipment depreciation and percentage of rent allocation. This resulted in a total annual cost of $504,000.

To compensate for high cycle time it was customary for SOS to have workers process orders during overtime and on weekends. These temporary costs included overtime payroll and operational expense such as utilities. The average cost to run the blanking line overtime or on weekends was $84/hour. For an estimated 800 hours per year of overtime the temporary cost totaled $67,200.

SOS was not always able to meet the customers needs. Since the cycle time was high some orders could not be taken. Customers who were turned away had their needs met by one of SOS’s competitors. These lost sales represented an opportunity cost of $5400 for every 24 hours of production time. ($225 per cycle time hour).

Of all the non-value adding activities in the cutting process, setup time was the largest. To reduce setup time SOS considered purchasing a new machine that could reduce setup time by 60%. This represented a savings of 720 blanking line hours per year. Set on reducing cycle time, management next had to determine whether they wanted to reduce overtime or decrease the number of orders they turn away. Since the opportunity
cost was higher per hour than the overtime cost, $225 and $84 respectively, the decision was made to handle more orders.

Next it was necessary to justify the purchase of a new setup time saving device. This device would cost an estimated $36, 000 per year to operate based on depreciation, maintenance, training and utilities. If the blanking line operated 720 hours per year then the machine would cost $50 per cycle time hour. This meant that if the new machine was purchased, working overtime would result in a savings of $34 per hour and processing more orders would result in a gain of $175 per hour. However the gain of $175 per hour would only benefit SOS if they were able to obtain new orders from customers.\(^{22}\)

3.7.2 Results

Combining ABC with other cost analysis methods allowed SOS to improve manufacturing cycle time and justify the purchase of new equipment. It also provided them with a way to adjust operational procedures with market demand. SOS was soon able to process larger orders and increase throughput.

4.0 COMMON ENABLERS OF IMPLEMENTATION

ABC can be used by a variety of companies as a management tool for strategic business practices. Regardless of the nature of a company and its products or services common steps can be taken to implement ABC. The three companies analyzed performed six common steps to implement ABC.

\(^{22}\) Campbell pgs. 31-33.
1. Management buy-in

2. ABC Education

3. Selection of a pilot site for ABC implementation

4. Activity analysis

5. Driver analysis

6. Activity based costing

Management must be convinced that ABC can bring success to their company before other implementation efforts are made. Support from management for an ABC project will ensure the commitment of the proper resources such as capital and manpower to the project. Managers must be shown the success that other competitive companies have achieved using ABC.

The second step to implementation involves teaching the principles of ABC to all involved in the project. Companies must be prepared to educate not only senior management but also the lower level employees. Many companies hold information sessions throughout the company to educate employees.

Implementing ABC company wide may pose many complications. To avoid these problems it is important to conduct a small scale ABC experiment within the company. An ABC pilot program allows management to identify key barriers to implementation within their company. Information from the pilot program could be used to model a strategy for company wide ABC implementation. The pilot program should be conducted
with a business or functional group that is having difficulties making business decisions and dealing with waste.  

All the companies that were analyzed performed their initial ABC projects on a pilot company or business unit. Conducting a pilot implementation gave the project team flexibility to create a customized ABC system that addressed the needs and desires of the plant. The costs for resources, consultants and employee hours were kept at a minimal since the project was done on a small scale. All the pilot programs were able to process their ABC data on PC’s instead of large mainframe computers. A steering committee, made up of senior management was selected to guide the ABC efforts. This allowed the entire company to develop ownership over the project and commit adequate resources to its development. Each of the ABC project teams was a multifunctional or crossfunctional group. In addition to creating company wide ownership of the project, this team structure allowed every aspect of the manufacturing and non-process related activities to be addressed in activity and driver analysis.

There are two main stages in the development of an ABC model. The first stage is the activity analysis which involves the identification and description of all the activities and activity centers in a company or operation. To successfully identify all the activities a great deal of information must be gathered. A majority of this information can be obtained from accounting ledgers and budgets. Other vital information can be obtained by interviewing various members in the different levels of an organization or distributing questionnaires. This information can be processed by ABC software, or an information system designed by the company. In the activity analysis phase, several companies

23 Compton pg. 34
succeeded in grouping common activities to construct a model. Too many activities
would lead to a complex ABC model that the computer system may not be able to handle.
By using a system of products families and similar activity centers both AMD and Slade
Manufacturing were able to construct useful models.

A system of cost rates is the most efficient way to perform a driver analysis. All
the companies were able to use data from their old cost systems, ledgers, budgets and
databases to create effective costing rates. The benefit of these cost rates came in the final
stage of activity based costing.

Finally, in activity based costing the rates were applied to the products demand
on activities and the sum of all the activities was the price of the product. To account for
overhead a percentage of the general overhead costs from a separate activity pool was
assigned to each product based on volume and activity consumption.

5.0 MAJOR BARRIERS TO IMPLEMENTING ABC

Implementing ABC can be difficult and certain barriers may arise. Companies
should be aware of the various barriers to implementation before starting the
implementation process. From the three companies analyzed the following major barriers
to implementing ABC were determined:25

1. Lack of top management “buy in”

2. Failure to understand the three views of cost

3. Lack of clear objectives

24 Benke pg. 61
25 Keys and Player pg. 27
4. Lack of employee involvement

5. Lack of monetary support

6. Lack of training

7. Lack of cost management expertise

A lack of support from top level management is the primary barrier to implementing ABC. Top level management must be committed to the success of the ABC project in order for the proper resources to be assigned to the ABC project. The resources necessary for an ABC project to succeed are people, time and funding. Management must see the ABC project as a critical and feasible way for the company to operate more strategically. Management must use its judgment to determine the purpose and scope of the ABC project.

ABC users must understand that there are three distinct views of cost: financial, operational and strategic. Financial costs are related to budgets and a company’s income. Operational costs are any costs incurred during manufacturing such as labor, factory floor space or machinery. Strategic costs include any action or resources that result in the selling or dissemination of a product. Most companies costing systems are designed to report financial costs. ABC is used primarily to track operational and strategic costs. Many companies abandon ABC projects because the models they created could not address these three views at once. With an understanding of how each of these costs work in their companies managers will be able to use ABC as a tool for internal improvements.

Clear objectives for ABC must be set by management to ensure a proper analysis. This entails understanding ABC and its varied uses. The second phase to the implementation of ABC is centered around a companies purpose for implementing ABC.
In assigning cost to the value added activities, long term and short term goals for ABC come into play. If the cost of an activity is viewed over a short term basis (weekly/monthly) then product costs can be derived. However, if an activity is costed over a long period of time, annually, then strategic marketing or operational decisions and budget estimates could be developed. If clear objectives are not set then the second phase of implementation can not be completed.

Lack of employee involvement is another hindrance to successfully implementing ABC. It is essential for all kinds employees to be involved in the process. Since ABC is best used for continuous improvement, many employees must be involved in the initial stages of it's development. Once many employees create ownership of ABC then they will seek to continuously improve the model. If most employees are left out of the implementation of ABC, then when it is in place very few will understand how to use it.

Sufficient funding is needed to implement an ABC program. The cost for an ABC program lies in initialization and support. Initialization includes the resources and time that employees spend learning ABC and developing the model. ABC consultants are needed for the initial implementation process. Before a full scale ABC project is undertaken, a small pilot program should be conducted to minimize implementation costs. A pilot program also allows the company to see what barriers they may encounter with a larger project, and gives management proof that ABC can be used to operate more efficiently. A pilot program should be conducted in a timely manner. It is better to have several employees serving as an ABC project team fully committed to the project than to have several workers handling the task with other responsibilities. The latter tends to prolong the process and increase the cost of implementation. Support refers to the person-
nel and resources needed to maintain the system once it is place. ABC works best over time, so properly trained employees are needed to keep the system in place and encourage its use by management. Although a wide array of ABC software on the market, it is not essential to purchase this software to complete a project. Some companies have successfully implemented ABC using simple spreadsheet programs. Research should be done to find out which software package is suitable for a company.

ABC must represent the views of the individual company. Thus it requires input from all levels of the company. If a majority of the ABC project is undertaken by outside consultants then vital company information may be overlooked or misinterpreted. Outside consultants can not alone fabricate ABC models for one company based on the models used by another. Further, inside employees must be properly trained in ABC to provide support and maintenance for the model once the initial project has been completed. Internal expertise can aid management in adapting the ABC model to changing markets and product lines.

6.0 RECOMMENDATIONS FOR FUTURE RESEARCH

Aerospace companies interested in ABC should develop a framework for understanding their company and the ABC implementation process. This framework should allow management to identify the variables that drive the cost and effort to implement ABC within their company.
6.1 Variables of Implementation

ABC systems track various types of cost with more accuracy than traditional cost systems. In most operations cost comes from products, processes, customer demands and supplier performance. The information necessary to accurately assess these activities is both financial and non-financial in nature. Since ABC systems are based on various types of data they require more effort and resources to implement than a traditional accounting systems.

Figure 3\textsuperscript{26} shows the relationship between cost and accuracy of cost accounting systems. Figure 6.1 demonstrates how traditional systems have a low cost to implement and low degree of accuracy. The figure also shows that although traditional systems have a low cost of measurement the cost of errors is high.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure61.png}
\caption{Figure 6.1 Cost vs. Accuracy of Cost Accounting Systems}
\end{figure}

\textsuperscript{26} Cooper and Kaplan pg. 103.
Cost of measurement relates to the effort and resources necessary to implement and maintain an accounting system. These costs may be in the form of manpower, time, and equipment. Traditional systems use only accounting information to account for cost. Since they are based on a limited amount of information their accuracy is limited.

Traditional systems generally produce inaccurate activity, product, process, customer and supplier costs. Consequently, managers use distorted data and cost models to make business decisions. Traditional systems are set up to report data on a quarterly or annual basis, giving managers delayed feedback. This prevents them from making timely business decisions. The cost of errors relates to the resources a company spends to account for bad decisions which were based on inaccurate an costing system.

ABC systems are optimal mix between cost of accuracy and cost of errors. They can be highly specialized to reflect the behavior of a product line in the market. These systems reflect the demands of various customers on and the performance of suppliers. They can be used by management as a performance measurement device.

Managers should understand the variables that drive the cost of measurement and implementation of ABC within their company. This understanding allows management to identify key areas for their implementation efforts and resources. The variables that drive the cost of measurement and implementation of ABC are product mix, process complexity, organizational complexity, customer relations, and supplier relations.

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27 Cooper, Kaplan 102-103.
6.1.1 Product Mix

Product mix refers to the number of different products and product lines, volume, and product life. Companies that produce many different products and product lines will require more effort to track using ABC. These companies require a detailed activity and driver analysis to characterize their many operations. Operations that have complex products such as jet engines will take more effort to cost than simple products such as gears because of the detail needed to complete a thorough activity and driver analysis.

Volume does not directly drive the cost to implement ABC because cost rates are set for individual products. Volume is a factor which affects other variables of implementation such as customer relations. Product life relates to the costs incurred from the activities that support the production and distribution of new products and the activities which support mature products.

Figure 6.2 shows the relationship between Product Mix and Effort and Resources to Implement ABC. As the number of different product lines and products at different stages of market maturity increase within a company the effort and resources to track all the activities that support these products will increase.

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28 Cooper, Kaplan pg. 160
Several of the companies analyzed tailored their approach and use of ABC to account for product mix issues. AMD faced product mix issues in dealing with high volume standard products and low volume specialized products. An ABC analysis was conducted to compare the two product lines. The analysis revealed that the standard products supported the custom products.

The ABC analysis at Hughes aircraft was driven by the company’s large number of products and product lines. The analysis obtained different costs for identical products manufactured at different locations. The cost distortion was largely due to the various activities that went into producing these products at the different locations. Hughes had to conduct separate activity studies to understand how product mix affected product cost.

Slade Manufacturing Inc. produced a total of different 63 products in a single plant. In order to conduct an activity analysis they had to create an activity dictionary.
which defined each of the activities within their plant. This dictionary was used to link multiple activities to various products. If Slade did not devise a scheme for organizing their activities and products their analysis would have been too complicated to produce in an ABC model.

6.1.2 Process Complexity

Process complexity relates to the distribution and number of activity centers within a company. Since an activity analysis must be performed on each activity center, processes with many activity centers require many as many activity and diver analysis. Building an ABC model with too many activities leads to complications. A process that is distributed between several locations within a plant or series of plants requires more effort to identify the logistic-related activities that occur in-between activity centers.

Figure 6.3 represents the relationship between process complexity and effort and resources to implement ABC. As the complexity of a process increases the effort necessary to accurately map the activities will increase. More information must be collected to ensure that the model is correct.

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29 Cooper and Kaplan pg. 160-161.
Companies with complex operations altered their ABC approach in order to develop simple activity models. The Caterpillar Corporation devised a set of activity pools to account for the various activities that went on within their operations. These activity pools identified all the logistic, manufacturing and assembly related activities. Grouping the activities into pools created a manageable model of Caterpillar’s process. Although the model was simple, much effort was required to classify each activity and account for all the activities for the different products.

The technical complexity of AMD’s manufacturing process created complications in the ABC process. AMD separated the activities that go into producing one product between several location. The separation of activity centers gave rise to many activities that were used to handle and transport unfinished products between operations. AMD had to conduct a detailed analysis to map the activities that occurred in between plants.
Southwestern Ohio Steel, SOS, used ABC to deal with process complications. SOS had identified a bottleneck in their operations. An ABC analysis would have given them the cost of products moving through that bottleneck. SOS wanted a way to justify acquiring new equipment to eliminate the bottleneck and predict the cost of their products. SOS had to hire outside consultants to develop such a model. The model used both the theory of constraints and ABC to predict product costs and justify the purchase of new equipment.

6.1.3 Organizational Complexity

Organizational complexity relates to the levels of management and departmental structure within a company. Since management must be convinced that ABC is right for their company, companies with several levels of management will require several attempts to convince management about the benefits of ABC. Companies with several divisions, each having their own from of accounting, will require more effort to implement ABC than companies with a unified accounting system.

Organizational complexities drove the cost to implement ABC at Pennsylvania Blue Shield. PBS used the accounting system of their parent organization, Blue Cross Blue Shield. Although middle level management saw ABC as a means for organizing PBS’s business practices top level management maintained their conservative view of accounting. Several educational efforts were made to convince management that ABC could work.

After management was convinced, PBS had to overcome the individual views towards accounting for all of it’s subdivisions. Each subdivision had an independent
accounting system. Much work was needed to unify all these systems in an activity based model.

Slade Manufacturing also experienced several organizational complexity issues when dealing with ABC. Although the parent company, Slade Manufacturing, was committed to ABC, various levels of management had to be convinced that an ABC analysis would be worthwhile. Figure 6.4 shows the various levels of Management within Slade that had to be bought into the principles of ABC.

The Lord Corporation also encountered implementation difficulties related to the organizational complexity. Although top level management was committed to conducting an ABC pilot program, plant level management did not see the need for such an undertaking. After a failed attempt to convince plant level management another site for a pilot program had to be identified.
6.1.4 Customer Relations

Customer relations refer to the demands that customers place on an enterprise. Customers develop various costs that must be tracked by ABC systems. Some of these costs arise from the various distribution and delivery channels necessary to convey a product to a customer.

Companies must also take into account the demands that customers place on various products. Companies must understand the difference between an low to serve cost and a high cost to serve customer and how each of these customers affect their operations. High cost to serve customers demand low volume, specialized products. Low cost to serve customers order high volume generic products. Companies can use ABC to compare the profitability of these types of customers.

Slade Manufacturing faced customer related problems during the ABC implementation process. Slade produced many customer specific products. A regular activity analysis could account for these products only up to a particular point in production. After that point the number of customer specific activities increased greatly. An attempt to model these variations would be complicated. To overcome this barrier, Slade conducted their activity analysis based on customer requirements using information links between customer demands, product line, volume, and product life. This system allowed Slade to determine the cost of each customer, justify product lines, reduce product line complexity by eliminating low profit products and selecting low cost to serve customers.
6.1.5 Supplier Relations

In the past companies purchased supplies from vendors who gave them the lowest possible quotes. At times this forced companies to purchase excess volume, maintain large inventories, and receive poor delivery services and quality. As companies move towards leaner manufacturing practices supplier relations becomes a critical issue. Supplier relations involves how suppliers meet the demands of an enterprise. This requires companies to develop a cost for each supplier which is driven by the quality of products and service, reliability, and cost of delivery. Enterprises must be able to distinguish between high cost and low cost suppliers. High cost suppliers provide goods and services that required excess resources and activities to handle. Low cost suppliers provide quality products and services that are in accord with the lean manufacturing principles of an enterprise. Suppliers who delivery materials on a Just In Time basis are examples of low cost suppliers.

Hughes used ABC to compare the cost of producing supplies internally and outsourcing. To construct an accurate model for this comparison they had to develop an understanding of internal processes as well as supplier performance.

Caterpillar Inc.’s products consisted of many purchased components. To manage the complexity of conducting business with multiple suppliers Caterpillar incorporated Just In Time principles into their operations. This allowed them to develop better supplier relations and set performance standards for these suppliers. An ABC analysis was used to justify the move to JIT. In the analysis activity files were developed to classify all the supplier related activities.
Lord Corp. conducted business with many high cost suppliers. Traditionally Lord allocated many resources to inspect and rework products from these suppliers. An ABC analysis revealed that these additional inspections were highly unprofitable because they added excess activities and cost to the process. As a result Lord eliminated several non-certified suppliers to improve operations.

7.0 CONCLUSION

ABC is a means for achieving leaner manufacturing practices. US Department of Defense contractors can also be successful with ABC. These companies should design implementation strategies based on the enablers and barriers to implementation that similar enterprises have experienced.
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