Activity-based cost management for strategic planning

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ACTIVITY-BASED COST MANAGEMENT

FOR

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VITA 67
The concept of activity-based management (ABM) uses activity-based costing (ABC) to improve a business. It guides efforts to adapt business strategies to meet competitive pressures and improve business operations. Cost information is used by management for operations control and strategic planning. Accuracy of traditional cost reporting for decision making is limited to financial purpose only. Under the umbrella of overhead costs, rides the illusion of lower product cost figures. This leads to the tendency to produce larger lot sizes and continue the unprofitable product lines. A relational database/information system software tool - "Activity-based Cost Manager" was developed through this effort.

Activities are the focal point of this model. The model divides the business process down to the lowest level of operational and functional detail. This task is done through interviewing. Activities are categorized either value-added or non-value-added. These activities consume corporate resources to produce the end product. These resources can be employee, materials, or direct expenses to perform activities. Then all resources are traced to activities. The resource assignment is based on, time consumed on an activity by an employee or portion of expense incurred for an activity.

Higher percentage of overhead costs is an increasing trend in manufacturing. These expenses are related to research and development, product life cycle costs, and customer service. A proper overhead allocation basis is selected. The model then allocates overhead costs to products for true representation of overhead consumption by
a product. All activities related to a product are linked to obtain the product cost. Each activity has a performance measure associated with it to improve productivity.

The model reveals that 30% to 50% of product cost consists of hidden overhead costs. Model focuses on the areas of attack for product cost reduction and improve profitability. Results clearly differentiate value-added and non-value-added portions of product cost for unnecessary activity elimination. The model reflects why an activity is performed and how much does it cost. Thus providing managers an insight into how profits are generated, while providing a financial model for priority-setting in continuous improvement programs.
1. Introduction

1.2 The Goal of Activity-based Costing

1.3 Strategic Decision Making
The ultimate goal of any company must be to provide value to customers at a profit. For customers, value is a function of three interrelated factors that a company ignores at its peril: cost, quality, and time. While manufacturers must be concerned with all three dimensions of customer value, profitability can be achieved only if they know the 'true' costs of their products and services. Hence the special emphasis on knowing and managing costs.

"Modern" cost management is in early stages of development, although its roots are in cost accounting and in management (or managerial) accounting. The primary purpose of cost accounting has focused historically on calculating the inventory values shown on the balance sheet. Thus, the focus of cost accounting is on external financial reporting. By contrast, the primary concern of cost management is on internal decision making.

Although management accounting was always intended to provide information for the internal use of managers, its emphasis and methods have been attacked relentlessly since the mid-1980s, mainly on the ground that traditional management accounting system fail to provide relevant and timely information for managerial decision making. Too often (and particularly if a company produces many diverse products) traditional cost systems provide inaccurate and misleading product costs. Consequently, these inaccurate product costs lead to poor decisions about product lines. Traditional cost systems also cause (at least indirectly) dysfunctional behavior by both individuals and functional
Rather than defining cost management by stating what it is not, we can use a more direct approach by saying that cost management is a set of methods and techniques for planning, measuring, and providing feedback to aid in improving a company's products and processes. Its ultimate purpose is to provide the information that companies need to provide the value (cost, quality, time) that customers demand.

1.2 THE GOAL OF ACTIVITY-BASED COSTING

ABC was developed to understand and control indirect costs. It is a tool that reveals the cause-effect relationship. ABC assigns costs to products or to customers based on the resources they consume. The system identifies the cost of activities such as receiving raw material, reordering stock items and scheduling a job. ABC then traces these activities to a particular product or customer which triggers the activity. Overhead costs are traced to a particular product rather than spread arbitrarily across all products. Management can learn to control the occurrence of activities, and therefore, learn to control the costs. The traditional cost accounting system ignores "below-the-line" expenses like sales, marketing, R&D and administration. ABC assigns these costs to the cost objects creating the need for them. Most executives are acutely aware that it is more expensive, for example to serve some customers than others.
1.3 STRATEGIC DECISION MAKING

Typically overheads and indirect costs are major burden on the profit margin. Usually, indirect costs amount to 40 percent of sales. So, when the overheads are reassigned on an activity cost basis, suddenly many products are found to be losing money. This dramatically changes the way executives look at their products and markets. A company may be tempted to change the strategy.

Capital intensive projects or investments are very hard to justify under the traditional costing systems. ABC encourages a company to implement world class manufacturing techniques. Existing costing systems mislead operating improvements towards direct labor efficiency and away from these truly strategic improvements. Rapid growth in manufacturing automation has presented the United States of America the biggest challenge. These trends have had tremendous impact on product planning at the strategic level, design, manufacturing, finance and marketing. One must realize and acknowledge its impact on management accounting at macro level and cost accounting at micro level.
2. Background and Importance of Costing

2.1 Traditional Manufacturing

2.2 Importance of costing
The Decline in Manufacturing

In recent years, a revolution has started to occur in the Western world in traditional concepts of manufacturing, whose eventual implications are likely to be as profound than those of the first industrial revolution of the early eighteen century. New production technologies, computer-aided design systems, computer systems for automatic process control, robotics, automatic guided vehicles are becoming increasingly available at decreasing cost. The introduction of such technologies into modern manufacturing organizations is already resulting in substantial saving in direct labor costs, but overall costs have not come down dramatically as expected. Overall increase in productivity have so far been disappointing, partially in those companies engaged in small batch production, in which there has been a failure to coordinate effectively the operations of the individual pieces of advanced technology.

On the contrary, the increasing complexity and shorter life cycles of modern consumer products are increasing the strategic significance of small batch manufacturers, who now find themselves competing with high quality foreign products manufactured at a low cost which can not be matched by Western countries with existing levels of productivity and cost structures.

Analysis has shown that the solution to this problem lies in the reduction of direct labor burden by increasing the level of automation. Direct labor typically represent only 5% to 20% of total manufacturing cost. The only way of achieving higher levels of
productivity is to attack what is commonly called the "hidden overhead" present in the excessive quantities of inventories, work-in-process, scrap and rework. The Japanese have had considerable success in achieving this by means of an underlying philosophy and a collection of techniques which have come to known as "Just-in-Time" production. The West has blindly emulated this philosophy in hopes for a better result, forgetting the fact that parameters affecting the end result can differ from market to market.

The technique of Material Requirements Planning (MRP), introduced to American industry in the 1970s, represented a step forward in terms of an attempt to achieve coordinated production process. MRP-II (Manufacturing Resource Planning), an evolution of MRP, was professed to achieve, in addition, coordination of physical production with other activities such as marketing, distribution, purchasing and accounting. MRP was intended to force an explicit recognition of the key role of information transfer in the manufacturing enterprise. Unfortunately, MRP was basically concerned with integration of material flow, along the "production management" axis of the organization. Despite these noble ideas, the results of MRP have been disappointing. MRP did not address the fundamental problems of rationalization and simplification of the manufacturing process. The information technology employed was not adequate. The entire concept, blinded by the race for technology due to the 'me too' syndrome, failed to recognize and address the concept of COST.
TRADITIONAL MANUFACTURING

Traditionally, companies achieved low cost through economies of scale and high quality through constant inspection along the assembly lines. Direct labor was a major portion of the product cost structure. For decades, resources have been spent on improving the productivity of the Direct Labor. The functional manufacturing was linked to the economic order quantity and other models. These models required the companies to carry a huge amount of inventory to safeguard against the uncertainty. More and more redundancies were introduced into the system.

Competitiveness in the United States of America is on a decline lately. Some of the causes for this trend are found in technological push. New manufacturing technologies, CAD/CAM, CIM, Robotics are available at a lower costs. But, these costs are not low enough for most organizations to afford due to the obsolescence.

The Economic Order Quantity (EOQ) models are the functional aspect of manufacturing. These models tend to offset "carrying cost of the inventories" against the cost of production start-up. The cost of product development, placing orders, order change-over, set-ups, material handling, shipping remain the manufacturing overheads. According to the EOQ models the setup cost per unit decreases as the batch size increases. In this day and age, companies cannot go around producing in larger batches when industry is moving towards smaller lot sizes. EOQ models often require immense amount of Work In Process inventory to safeguard against uncertainty. Multiple change-
overs and set-ups are becoming more common resulting into an expensive cost center.

2.2

IMPORTANCE OF COSTING

The traditional accounting and cost systems are just cost accumulation models. Traditional systems collect costs by cost elements, such as, direct labor, material, supplies, overheads, but do not provide the detailed information necessary to make decisions at operational as well as at strategic level. The following comparison indicates the way different costs are treated by traditional and ABM approach. These fundamental differences cause a major disagreement in cost calculation methods resulting into inaccurate product costs and wrong business status.

DIRECT versus INDIRECT COSTS

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3.1

TRADITIONAL PRODUCT COST

The product cost model implemented in most factories identifies three major elements in the cost of a manufactured product.

- **Direct Material**
  
The acquisition costs of all materials that are identified as a part of the finished goods and can be traced to the finished goods in an economically feasible manner.

- **Direct Labor**
  
The wages of all labor that can be associated with production in an economically feasible manner.

- **Factory Overhead**
  
All costs other than direct labor and direct materials that are associated with the manufacturing process. The factory overhead can be either: (1) variable or (2) fixed.

PRODUCTION COST METHODS

Traditionally production costs are accumulated for two purposes: (1) product costing and (2) planning and control. Cost accumulation for product costing involves
applying production costs to units of production. Cost accumulation for planning and control involves accumulating costs by various responsibility centers (e.g., production department) within the organization for planning and control uses. There are two primary systems of production costing: (1) job-order costing and (2) process costing.

1. Job-order Costing System

Job order costing is used by organizations whose production and service can be identified by individual jobs (batches) or units. Each job generally receives varying amounts of direct materials, direct labor, and factory overhead. An organization using a job-order costing system would accumulate production costs for each job produced. Since units in different jobs generally receive different amounts of direct materials, direct labor, and factory overhead, the cost per units for different jobs will differ. Industries that usually use job-order costing include construction, printing, and custom machinery production.

2. Process Costing System

Process costing is used by organizations whose products or services are mass-produced through a continuous series of production steps (i.e., processes). In general, process costing is used where the units of production contain approximately the same amount of direct materials, direct labor, and factory overhead. In this system, production costs are accumulated for all units produced in a period, and the cost per unit is generally the same for all units. Process costing is commonly used in industries such as oil refining, chemical processing, and steel manufacturing.
3.2

PRODUCT COST DISTORTION

The cumulative effect of decisions on product design, introduction, support, discontinuance, and pricing helps define a firm's strategy. If the product cost information is distorted, the firm can follow an inappropriate and unprofitable strategy.

Despite the importance of cost information, disagreement still exists about whether product costs should be measured by full or by variable costs. In a full-cost system, fixed production costs are allocated to product so that reported product costs measure total manufacturing costs. In a variable-cost system, the fixed costs are not allocated and product cost reflect only the marginal cost of manufacturing.

The definition of variable cost used by academic accountants assumes that product decisions have a short-term horizon, typically a month or a quarter. Costs are variable only if they vary directly with monthly or quarterly changes in production volume.

3.2.1

IMPLICATION OF PRODUCT COST DISTORTION

Product cost distortion leads to cross-subsidization of products. When used to guide marketing strategies, distorted cost information encourages managers to produce many low-volume product lines. The results, in many cases, are declining profit margins and perceived difficulty competing with focused competitors.
Product variety and complexity increase cost distortion. Several factors have contributed to the growth of overhead in recent decades. The traditional cost accounting systems tend to overcost high-volume products - not the ones that cause most growth in overhead - and undercost the low-volume products that are chiefly responsible for the overhead growth.

Many overhead costs are driven by diversity - volume, product, process and customer - which increases the complexity of the production process. Activities such as material movement, scheduling, and set-ups tend to grow with the number of products in the product line and the support required in complexed production environments. The conventional methodology of allocation the cost of overhead activities related to product variety and complexity on a volume-related basis distort product cost.

3.3

Limitation of Traditional Product Costing

The traditional product cost model distorts product cost for several reasons:

1. Factory overhead costs are allocated rather than traced to products.
2. The total overhead component of product cost has historically grown faster than direct costs. As overhead becomes larger percentage of product cost, the distortion inherent in the allocation process causes the total product cost to increase.
3. Generally accepted accounting principles often dictate or influence cost accounting practices. One of these principles - the conservatism principle - is inconsistent with accurate product cost determination in two major ways:
   a. The conservatism principle requires that reported cost be based on precise and easily verifiable data, whereas management often needs costs that are based on forecasts and plans.
   b. The conservatism principle encourages expensing many costs in the current period that should be capitalized. This practice distorts life-cycle costs.

4. Many activities included in SG&A are traceable to specific products.
3.4 ACTIVITY COSTING

COMPARATIVE ADVANTAGES

An activity accounting system better mirrors the manufacturing process and therefore distorts product cost less than the traditional model for the following reasons:

- Activities represent the lowest level of homogeneous cost.
- There are multiple bases of assignment inherent in the selection of activity measures.
- Activities facilitate the linking of related activities, which transcends organizational boundaries. This group of cost can then be assigned en masse to the originating cause.
- Most variances are caused by the process rather than the product.
- Life cycle permits better matching of time periods.
- Today only two major classification of cost exist - Product and SG&A. In activity costing there are many more and better aimed.
- There is minimal dependence for accurate activity costs on a company's existing organizational structure and level of detail captured within the accounting system.
4. Why Activity-Based Management?

4.1 Activity Accounting
WHY ACTIVITY-BASED MANAGEMENT

In the modern manufacturing era proper, accurate and timely information is an integral facet of any business. But gaining good-quality information is only half the battle. The real key to success is putting ABC information to work to identify appropriate strategies, improve product design, and remove waste from operating activities. Using ABC to improve a business is called activity-based management. It guides efforts to adapt business strategies to meet competitive pressures as well as to improve business operations. ABC supplies the information, and ABM uses this information in various analyses designed to yield continuous improvement.

The ABC model shown below consists of two vital parts. The first part is the cost assignment segment. It reveals the need to assign the cost of resources to activities and the cost of activities to cost objects in order to analyze critical corporate decisions.
The second part of the model is the process segment. It unveils the need for a new category of information about activity performance. This information shows what causes work (cost drivers) and how well it is done (performance measure).

Cost drivers are factors that determine the work load and effort required to perform an activity. They tell you why an activity is performed and how much effort must be expended to carry out the work. The performance measures describe the work done and the results achieved in an activity. They tell you how well the activity is performed.

ABM aims at two goals, both common to any company. The first is to improve the value received by customers. The second is to improve profits by providing this value. These goals are reached by focusing on managing activities. The final stop for any business is the customer. Meeting these goals start with a simple realization - customers have very simple wants. Meeting customer wants is one thing and meeting them profitably is quite another. One should also provide an adequate return on stockholder investment. Managing activities is a process of relentless and continuous improvement of all aspects of the business.

4.1

ACTIVITY ACCOUNTING

The activity accounting approach to cost management breaks down an organization into activities. An activity describes what an enterprise does - the way of
doing business and the net end results of the process. The principal function of an activity is to convert resources (material, labor, human and technology) into measurable outputs. Activity accounting defines activities performed in an organizations and determines their cost and performance. A simple and effective activity accounting system uses the following approach:

1. Determine enterprise activities.
2. Determine activity cost and performance. Performance is measured as the cost per output, time to perform the activity, and the quality of the output.
3. Determine the output of the activity. An activity measure (output) is the factor by which the cost of a process varies most directly.
4. Trace activity cost to cost objectives. Activity costs are traced to cost objectives such as products, processes, and services based on the usage of the activity.
5. Determine corporate short-term and long-term goals (critical success factors). This requires an understanding of the current cost structure, which indicates how effectively operating activities deliver value to the customer.
5. ABC for Strategic Management

5.1 Identifying the Problem Cost System

5.2 Role of ABC in Decision making

5.2.1 Overhead Allocation

5.2.2 Identifying a Proper Base
5.1

IDENTIFY THE PROBLEM COST SYSTEM

The section lists ten (10) characteristics of the business organization and its operations that may be used as a guide. IF an organization takes a traditional approach to cost accounting AND has one or more of these characteristics, THEN the probability is high that a review of current practices will reveal potentially damaging deficiencies.

1. Direct labor operations have been replaced with automated or computer-controlled equipment since the system was last revised.

2. Indirect costs are becoming much larger percentage of total costs, or overhead rates have been increasing during recent years. As the bases get smaller and/or indirect expenses get larger, the validity of assumed cause/ effect relationships needs to be investigated and corrected.

3. All overhead is applied to cost objects based on direct labor hours or dollars.

4. Only a few overhead application rates or perhaps only one plantwide rate is used.

5. The organization appears to be competitive on one end of its product line but not on the other end.
6. Operations exist that do not always require the same number of operators.

7. Many operations are set up, started, and can then run with little or no operator intervention.

8. There are both "men using machines" and "machines using men" within the facility.

9. A disproportionate amount of cost charged to "other" categories or general categories such as "other direct costs" or "supplies." Businesses that pay little or no attention to basic categories of costs are unlikely to have a great deal of concern for appropriateness of the overall design of their cost system.

10. Accountants spend a great deal of time doing "special studies" to find answers to basic questions. This implies that the cost system is not providing the day-to-day information that management could get from a well-designed cost system.

Any business organization that any of these ten characteristics would be well advised to take a critical look at how its cost system is designed. Failure to do so could more than offset any advantage it might have in other areas of its operations.
5.2

ABC IN DECISION MAKING

A well-designed ABC system provides managers with better understanding of the way profits are generated at both product and customer level. Managers can take advantage of this understanding and increase profitability by getting rid of unprofitable customers and products or transforming them into profitable ones and focusing more on the profitable ones. The numbers coming from the activity-based cost analysis are being used in conjunction with process improvements. By measuring the costs of business processes such as purchasing, taking sales order, moving materials, inspection and quality control, people in some companies for the first time have seen how costly some of these activities are. By moving towards a JIT environment does not solve the problems. The fundamental underlying problem is the challenge of the continuous improvement. Developing an activity-based cost model first helps managers to set priorities. It lets them see where the most dollars are being spent, what the most fundamental drivers of those processes are, and where can they make changes to improve profitability. So ABC has turned out to be helpful for both focusing managerial attention and setting priorities for continuous improvement efforts.

ABC also promotes improved design for manufacturability programs. The ABC analysis reveals that complex and unique product designs can lead to high manufacturing and support expenses. Several companies, particularly those with relatively short product
life cycle, are using results from the activity-based costing analysis to influence design decisions of their engineers.

When product life cycles are really short, the company does not have enough time to correct a poorly designed product before it is replaced by a new one. ABC gives these firms, which are selling their design skill as much as their products, the ability to fine tune that skill, to become proficient at designing low-cost, high-quality products that meet their customers' needs.

5.2.1

OVERHEAD ALLOCATION

Direct labor is no longer the most effective base for applying factory overhead costs to various jobs and products. With today's highly automated systems, labor-related costs constitute only a small portion of total manufacturing costs, and overhead costs now correlate more with factors such as machine hours and material quantities. Accordingly, many companies are beginning to identify application bases that better reflect the causes of overhead costs in their unique manufacturing environments.

Selection of proper application bases also has received a boost from the recent growth in activity-based costing (ABC). ABC applies accumulated costs for each activity to products and jobs using a separate base for each activity. It is crucial to select the right bases (cost drivers) for applying the costs of various activities to products and jobs.
5.2.2

IDENTIFYING A PROPER BASE

Theoretically, the factory overhead cost application base should be a principal cost driver - an activity(s) that causes factory overhead costs to be incurred. There should be a well defined cause-and-effect relationship between factory overhead costs incurred and the base chosen for their application. Selecting the proper base requires knowledge of the relationships between the overhead costs and various cost drivers such as machine hours, direct labor hours, direct labor costs, space requirements, invoices processed, number of setups, units produced and material usage.

Using an objective technique, regression analysis, rather than experience or observation of activities can be helpful in ascertaining the relationship between the overhead costs and various cost drivers. Regression analysis has not been explored fully in practice, possibly due to its computational complexities coupled with a lack of easily accessible computer software. With the widespread use of microcomputers and spreadsheet programs, however, regression analysis now can be performed rather easily.

The regression analysis is one of the few quantitative techniques available for:

(1) determining and analyzing the extent of the relationship between overhead costs and various cost drivers, and;

(2) estimating the linear or curvilinear relationship between overhead costs and cost drivers.
One of the values provided by regression analysis, the coefficient of determination or R Squared, measures the extent of the relationship between the two variables. More specifically, the value of R Squared indicates the percentage of variation in the dependent variable (overhead cost in this case) that is explained by variation in the independent variable (the cost driver). The value of R Squared is always between 0 and 100%. The closer its value to 100%, the stronger the relationship between the two variables.
6. The ABM Model

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6.

Methodology for ABC system Implementation

The following project methodology enable us to understand the client company’s cost behavior and to position lasting improvements:

6.1

Process Definition

- Document the process flow,
- Identify the customer’s internal and external requirements,
- Define the outputs of each process steps,
- Determine process input requirements,
- Compare customer requirements with outputs/inputs, and
- Define the staffing levels for each process.

6.2

Activity Analysis

- Define activities within each process,
• Identify activities as value-added and non-value-added, using customer requirements,

• Determine cycle time for each activity,

• Calculate the cycle efficiency for each process, and

\[
Efficiency = \frac{Value\ Added\ Time}{Total\ Time}
\]

• Cumulate cycle efficiency along business value chain.

6.3

Driver Analysis

• Develop cause and effect - driver identification, and

• Perform an analysis on the drivers and the activities they control.

6.4

Opportunity Improvement Planning

• Develop perspective charts on value-added / non-value-added,

• Develop an opportunity improvement plan to eliminate / minimize non-value-added and optimize value added, and

• Develop performance measures and improvement indicators to track opportunities.
6.5

CALCULATION OF ACTIVITY COST

The following steps should be performed in order to derive the activity cost.

6.5.1. SELECT COST BASIS

6.5.1.a. Determine cost type

The first step is to determine the type of cost. The choice of cost types is influenced by the type of cost in the existing accounting system. The typical cost bases include the following:

ACTUAL COST

An actual cost is the exact cost paid for a factor of production based on a financial transaction. The advantage of using an actual cost is that costs are always current and reflect changes in the business environment. The disadvantage is that actual costs are very sensitive to short-term fluctuation in the operating environment. In activity accounting an activity cost varies based on changes to both the cost of the factors of production and the volume of the activity measure.

BUDGETED COST

A budgeted cost reflects management’s options, generally a most likely scenario, regarding future financial status. A budget is the outcome of a periodic, structured planning. Often it is used to measure the performance. It is not recommended to use the budgeted costs because they represent what management wants to happen rather than
what DOES happen.

STANDARD COST

A standard cost is a predetermined cost based on normal conditions of efficiency and volume production. The costs are predetermined by some sort of management study. The results are heavily dependent on the variance analysis, which often incite inappropriate behavior. Standard cost dependent systems control costs at an elementary level. Standards do not portray life-cycle or business process related decisions. Standards are usually set according to the current business and operating conditions, not the philosophy of continuous improvement; thus incorporating inefficiencies and non-value-added activities into the standards.

PLANNED COST

A planned cost is derived from the strategic and operational planning systems. The output from the planned system is a set of planning assumptions reflecting future activities. Planned cost provides a dynamic cost system providing feedback. Budgeted or standard costs are typically derived on a yearly or semiannual basis.

Once a cost basis for an activity-based system is chosen, several changes must occur the way costs are handled in traditional systems.

1. Costs must be set at an activity level.

2. A clear distinction between value-added and non-value-added costs must be made.
6.5.1.b. Determine cost time-horizon

It is advisable to use quarterly or yearly data but continually adjust them for changes in the operating environment - modification to activities. The monitoring of monthly variance between actual cost and planned cost at an aggregate department - not at an activity level. Time-frame should be considered as part of continuous improvement process. In order to obtain higher accuracy as many adjustments should be made as needed.

6.5.2. Trace Resources

6.5.2.a. Determine source of data

The primary source of cost data is a general ledger. The cost data can also be obtained from a detailed industrial engineering analysis. The general ledger is recommended because the costs reported under the activity accounting system would reconcile to the financial reporting system. This ensures the consistency between financial accounting data and management system.

6.5.2.b. Establish casual relationship

A casual relationship exists when a factor of production can be shown to be directly consumed by an activity. The key to establishing a casual relationship is defining an activity measure that is common to both the factor of production and the activity. Because people are paid on the basis of time, it is an excellent basis for costing people. Similarly, measure for facility could be square footage.
6.5.2.c. Trace people-related costs

To trace people-related costs to activities require the following information:

1. An Employee-Activity Relationship
2. Departmentalized Pay-roll Information
3. A Casual Tracing Basis

Employee costs are traced to activities on the basis of either time or the physical output of the activity. The use of physical outputs as a basis for tracing employee cost is valid only if the effort to complete each individual output is homogenous. When both the options are available, the time spent on an activity is preferred.

To trace the departmental cost, the salaried supervisor are to be interviewed. The activities performed by them is them identified and the amount of time spent associated with the employee salary is attached to the activity. The organization chart and its job description would be an excellent starting point for tracing employee costs to activities.

\[ \textit{Employee Cost} = \textit{People Related Cost} \times \textit{Percentages} \]

There are three methods for charging labor to activities:

1. Tracing total department employee cost to activities by using the percentage of time spent on each activity departmentwide.

\[ \textit{Total Activity Cost} = \sum \% \textit{Time On Activity} \times \textit{Employee Salary/Hourly Rate} \]
2. Tracing employee cost to activities by using the percentage of time spent on each activity by a specific class of employees.

3. Tracing employee labor cost by using the percentage of time spent on each activity by each individual employee.

The choice of method depends on the desired accuracy. In the departments where wages are relatively standard, the first approach is preferred for its simplicity. When wages vary significantly within a department, the second and third methods are used.

This model uses the first method for the following reasons:

i. Relative ease to understand, and

ii. The model assumes that wages are relatively standard.

6.5.2.d. Trace all other costs to activities

Employee-related costs are not the only costs that a department would incur. Some nontraceable costs represent general department support costs. Not all of the 100% costs can be associated with the departmental activities. The facility rental, utility and other similar costs may not be traced to activity with expected precision. In such cases, these costs have to carefully allocated to departments.
6.5.3. Determine activity performance measurement

The relationship among performance measure is tightly bonded, so that a change to an activity impacts all aspects of performance measures. A reduced lead time will impact cost, flexibility and other functions. Performance measures address questions about an activity such as:

a. What does it cost? - *True Product Cost*

b. How much does it take to complete (time)? - *Productivity Measures*

c. How well the activity is performed? - *Efficiency Measurement*

d. How are we using corporate resources? - *Resource Utilization*

Performance measures traditionally have been financially oriented with an emphasis on short-term results. Traditional measures have become invalid measures of performance and often send misleading signals to management. Performance measures assist the cost reduction effort by focusing on the significant activity levels and measuring the drivers of activities. The targeting of measures provides the necessary visibility to the status of non-value-added elimination and value-added optimization progress. Performance measurements provide an important building block in the process of value analysis. They set the baseline and measure the impact of changes in pursuit of continuous improvement. Unlike other open-ended systems, performance measurements close the loop on activity-based process costing by relating the process cost to a measure of output producing "cost per" information.
6.5.4. SELECTION OF ACTIVITY MEASURE

6.5.4.a Measure Identification

Usually activity measures are inputs, outputs or physical attributes of an activity. It is a common phenomenon that the greater the desired accuracy, the more difficult it is to obtain activity data to achieve it. Determining the total number of orders processed is an example of a measure for the activity 'Process Orders'. A careful review of an activity is required to identify the measure for that activity.

6.5.4.b Frequency of Occurrence

After an activity measure has been selected, the frequency of its occurrence is determined. It is required that the period of time used for the activity volume determination correspond to the same time period used in determining the cost basis. The output must have consistent cost behavior patterns and require similar amounts of the factors of production.

6.5.5. Allocate secondary activities

Primary activities contribute directly to the task being performed. It is usually easier to associate resource consumption to these activities. Secondary activities are support to the primary activities. They include training, meeting of generic nature, and administration. These activities have to be linked to the primary activities in order to associate them with cost. A common method is to allocate secondary activities to the primary activities using the primary factors of production.
6.5.6. Calculate cost per activity

This is the final step in our exercise. The following steps will derive the desired result:

1. Calculate total cost for the activity from the general ledger.

2. Obtain the volume of activity measures.

\[
\text{Activity Cost} = \frac{\text{Resource Tracking} + \text{Secondary Activity Cost}}{\text{Activity Measure Quantity}}
\]

6.5.7 CALCULATION OF MATERIAL COST

Material Costs are derived from the bill of material (BOM). A BOM is an engineering document that defines the product from the design point of view by listing components of each assembly and subassembly. The BOM structure permits to the way product is structured, and the material flow in and out of each state of completion. Thus the BOM specifies not only the composition of a product but also the process stages in that product’s manufacturing process. It defines product structure in terms of levels of manufacture, each of which represents a step in the manufacture of the product.

The BOM is the key source of material cost used to compute a product cost. Several activity product cost systems incorporate the BOM into the product cost roll-up, while the others interface with the BOM and extract material cost in total. The following features of the BOM are important in determining a product cost:

1. A given component either can be purchased or internally manufactured. The cost
of purchased material consists of the purchase price and all traceable costs of bringing the material to the activity that consumes it.

2. A given component can exist in its own right as a uniquely identified physical unit (raw material, component part, subassembly) or as a ready assembled component of another inventory item. In either case, the activities to build the component are identical. However, if the part is stored, the component cost will be higher due to the storage cost.

3. The BOM establishes the items lead times and timing of requirements. This information can be used for performance measurement.
Like any other management changes, Activity-based Management is a management philosophy. For an ABM program to be successful, organizations have to get their people to buy into the actions, and it takes time. The transition from an ABM analysis to the bottom line profit improvement requires a whole set of linked steps. It is also important for the management to understand that ABM triggers actions but by itself does not cause savings to occur. The ABM system helps management come to a common platform for better communication and understanding. It also provides a universal language for the corporation.

ABM is a significant management tool, not an accounting or financial system. The following conclusions can be drawn:

- Results of existing business analysis can be used in the ABM methodology.
- ABM / ABC can be taught easily and quickly to any level of management.
- ABM model is efficient and produces results that management at varying levels can use.
REFERENCES


Plossl Keith R., Engineering for the Control of Manufacturing, Prentice Hall.


1. Material Cost Assignment to Activities

There are two database files containing these information:

1. ITEM.DBF

   Contains Item Master Information. Details included are: Raw Material Number, Description, Unit of Measure, and Material Cost.

2. BOM.DBF

   Contains the Bill of material information. The product building structure is defined in this file.

The calculation of the material cost is done separately from the activity costing. A clear distinction of Product(s) or Service(s) is required upfront to associate the material cost to a proper product(s) or service(s). This model is designed to calculate the "Direct Material Costs" separately. Future researcher should link direct material related costs to the activity costs.
2. Cost of Quality

A provision has been made in the code to add the module with relative ease to incorporate the cost of quality aspect. The cost of quality can be classified into the following categories:

1. Prevention
2. Appraisal
3. Internal Failure
4. External Failure

This segment of the software completely depends on the end user. In my opinion all organizations should focus on the cost of quality heavily. Often, cost of quality or 'cost of customer service is dumped into the corporate overhead. One must know how much do they have to pay for bad quality.

Suggested Methodology:

1. Identified all quality / inspection stations along the process flow.
2. Isolate product quality related activities from concept to customer service.

   (A life cycle approach)

3. Trace all the resources to quality related activities.
4. Assign resource costs to product(s) or service(s).
ADDITIONAL REPORTS

1. A Combined Activity Report

This report will reflect the employee and expense account information associated with each activity. The net result will be an activity cost other than the direct material costs.

2. Direct Material Cost Report

Two database files have been structured and created, (1) ITEM.DBF and (2) BOM.DBF; to contain the information related to the product structure

Why Material Roll-up not included?

For some service industries there might not be any Direct Material Costs involved in their offerings to their customers. On the other hand organizations in manufacturing business can not be ignored from their need to trace the "Direct Material Related Costs". This model has been carefully crafted considering the needs of all types of industries. So, This model can be applied to any organization regardless of its mission; (1) to manufacture products or (2) to provide services.

PASSWORD IMPLEMENTATION

At some point in time the password system has to be implemented. Data Entry personnel will have access to "Data Entry Module" and a few reports in "Report Generation Module". This implementation helps prevent the data integrity.
OVERHEAD CLASSIFICATION

Overhead costs are the most difficult product cost to be identified. All of the overhead expenditure can be classified into one of the following categories:

1. Unit level
2. Batch level
3. Product level
4. Factory level

There are several approaches available to incorporate this change into the model. Facility Utility Expenses, e.g. can be assigned to product in the following way:

\[
\frac{\text{Utility}}{\text{Sq.Ft.}} = \frac{\text{Total Utility Cost}}{\text{Total Factory Area}}
\]

Calculate portion of total factory space dedicated in sq.ft. towards the production of product under consideration. Determine a common time period for Production Time and Utility Costs. Calculate for the time period and number of units produced, allocated per unit cost of facility utility expense.

\[
\frac{(\text{Facility Cost / Unit})}{\text{Total Dedicated Production Area}} = \frac{\text{Sq.Ft. Area Consumed by Unit} \times (\text{Utility Cost / Sq.Ft.})}{\text{Total Units Produced}}
\]

Therefore, by substitution of values gives:

\[
\frac{\text{Facility Cost / Unit}}{\text{Total Units Produced}} = \frac{\text{Total Dedicated Production Area}}{\text{Total Factory Area}} \times \frac{\text{Total Utility Cost}}{\text{Total Factory Area}}
\]
APPENDIX

ABM MODEL

DOCUMENTATION
HOW TO USE THIS MODEL

DATA REQUIREMENTS

To derive the full benefits of this package, please perform the following steps before data entry. The checklist of required data:

1. Employee Related Cost Information - Payroll Information
2. Activity Listing
3. Employee to Activity Assignment
4. Expense Account Information
5. Expense to Activity Assignment
6. Activity Measure Information

The format of information will be explained by the instructor.

SYSTEM REQUIREMENTS

- Any PC (386 or higher) with dbase III+ installed.
- A 5 1/4" or 3 1/2" disk.

IMPORTANT

The disk containing ABC Model is located in Department of Industrial Engineering. Please contact Prof. John C. Wiginton, Professor of Industrial Engineering and Director of Information Systems, to make arrangements.
HOW TO ACTIVATE ABC?

Step 1.

Turn your PC on.

Step 2.

At C:\> prompt, type 'cd\dbase' and hit <RET>.

Step 3.

At C:\DBASE> prompt type 'dbase' and hit <RET>.

Step 4.

At dbase opening menu hit <RET>.

If you are at a DOT (•) prompt go to step 7.

Step 5.

Hit the <Esc> key.

Step 6.

Now you are at DOT prompt.

A small DOT (•) will appear at lower left corner (with a blinking cursor next to it) of your screen.

Step 7.

Type "set defa to [disk drive initial - A or B]:" at DOT prompt.

Depending on your data disk you may have typed A or B to be the default drive.
Step 8.

Insert your data disk into appropriate drive and Hit <RET>.

Step 9.

At DOT prompt, now type "DO ABC" and hit <RET>.

Step 10.

Now you are at opening menu of "ABC Manager".

See Exhibit 1.

At this point you are required to hit any key to proceed to the main menu of the model. Message: Press any key to continue ...

Step 11.

The next screen will provide some information about the Copyright on this Model. See Exhibit 2.

System Prompt : Press any key to continue ...

User Action : Press any key once.

The next screen will provide the opening menu and will have the following format: See Exhibit 3.

1. Data Entry Module,

2. Calculation Module, and

After having made a selection either a number or a letter <RET> must be hit to process the request. Every time, either a selection is made or entire database field is consumed, there will be a sound of beep.

Step 12.

For data entry, type "number 1" and hit <RET>.

Step 13.

The following menu options will appear on the screen: See Exhibit 4.

Step 14.

Make an appropriate selection for data entry.

Tip: (Refer to Exhibits 5 through 9 for sample data entry)

User will be provided with 'input data package'. This will include Tables 1, 2, 3, 4, 5, 7, and 8. Following pages are included in this documentation for your understanding of the system. It should help you enter data correctly.

The Data Entry Module contains the following menu options:

- Press '1' to enter: Employee Detail or Payroll Information (Table # 1)
- Press '2' to enter: Activity Information (Table # 2)
- Press '3' to enter: Activity Measure Details (Table # 3)
- Press '4' to enter: Employee - Activity Assignment (Table # 4)
- Press '5' to enter: Item Master - Inventory Information (Table # 5)
- Press '6' to enter: Bill of materials (Table # 6)
- Press '7' to enter: Expense Account - Activity Assignment (Table # 7)
- Press '8' to enter: Expense - Activity Assignment (Table # 8)
Step 15.

Calculation and Report Generation Tips

Once given set of data is entered, user should calculate the results and print desired reports. The system will display the following message if the chosen menu option is not available:

"Option is not available at this time."

The systems architecture is predetermined in this model. The database structure is defined in a way that most organizations would not require any change. However, the design provides flexibility to modify the database structure with relative ease.

Menu options five and six are loosely defined to provide better adaptability to any desired industry. More work should be done on these two options before implementation, since they are industry specific.

User can go back to the previous screen or menu option from any place in the model. There are a few built-in validity checks in the model. They provide better data integrity.

Once the data entry is done, perform the following steps to generate desired reports:
Step 16.

Go back to the Main Menu.

You may have to type 'R' to select option "R. Return to previous menu" a couple of times depending on where you are.

Step 17.

Select menu option "2. Calculation Screen" by typing number '2'.

Step 18.

Hit <RET> to select activate menu option # 2.

Step 19.

At the Calculation Menu type '7' and hit <RET>.

Step 20.

This option will calculate the "Value-Added Costs".

Step 21.

Type 'R' and hit <RET> to go back to Main Menu.

Step 22.

Now, you should be at the Main Menu for Report Generation.

Step 23.

Type '3' and hit <RET> to select Report Generation Menu.
Step 24.

The following reports will be generated, if the selection is:

1 - Payroll Cost Report
2 - Activity Master Listing
    Activity Employee Detail
3 - Activity Expense Assignment Report
5 - Value Added Activity Detail

To end the session perform the following steps:

Step 25.

Upon completion of the exercise, at the main menu, type 'Q' to exit.

This should take you back to the operating system, DOS prompt - "C:\>".

Step 26.

If you are at DOT prompt, do steps 27 and 28.

Step 27.

Now you are DOT prompt.

Step 28.

Type 'QUIT' at DOT prompt to go back to DOS prompt.
1. Employee Master

All employee specific details are handled by this module. The module also allows user to add, delete, and edit employee related details, such as:

- Employee Number
- Last Name
- First Name
- Annual Salary
- Department Number

There are a few validity checks installed in the code. To eliminate most silly errors most data entered should be checked. The module will interact with user a couple of times before updating records. All the details are stored in EMPLOYEE.DBF.

2. Activity Information

Information pertaining to an activity is processed through this module. Activity information is either added, edited or deleted here. The system prompts the user if an activity number keyed-in exists. All the activities must have a unique number even though they may not be from the same location, plant or department.

Activities should be carefully identified and reviewed at the planning stage in order to minimize the tampering of this database file. A clear distinction between "value-added" and "non-value-added" activities has to be made. This determination has to be made at the planning stage. This module is equipped to handle this distinction. "Value Added Report" is one the benefits derived from this essential information. This information is stored in ACTIVITY.PRG.

The following information is collected at this stage:
3. Activity Measure Information

This module deals with the information related to the activity measure. It measures the performance of the undertaken activity. The information is handled by **MEASURE.DBF**.

4. Employee - Activity Assignment

This module assigns the 'employee resource' to an activity. The following details are considered:

- Employee Number
- Activity Number
- Fixed or Variable
- % of Employee Time for the Activity

This assignment is vital in cost calculation. It also reveals some of the employee time (resource or money) under-utilized or un-utilized. The information for "Activity-Employee Detail" is extracted from this file, **Emp2Act.DBF**.

5. Item Master - Inventory Information

This file simply keeps all relevant information of an inventory item. The file containing this data is **ITEM.DBF**. Each inventory item must have an unique identifier.
The following details are captured in this module:

- Item Number
- Description
- Unit of Measure
- Material Cost / Unit
- % Loss in Assembly

This format's adaptability allows user to do followings:

1. Link-up the inventory module with Company's accounting department for value.

2. Use the structure as BOM, if the material requirement is limited to only one level (mostly service industries).

6. Bill of Material (BOM) Information

The BOM.DBF file contains fundamental product structure information. The BOM provides details about integral components of a product. The direct material information is derived from this module. For individual part, component or sub-assembly cost information; one has to link BOM.DBF with ITEM.DBF. A combined information of these two files will furnish complete 'Direct Material Information'.

7. Expense Account Assignment

Apart from direct material and people related costs there are several other resources add to the product cost, such as; depreciation, supplies, and utilities.

<table>
<thead>
<tr>
<th>Type of data required</th>
<th>Department Number</th>
<th>Account Number</th>
<th>Description of Expenditure</th>
<th>Expenditure to Activity</th>
<th>Percentage of Expense to Activity</th>
<th>Fixed or Variable Expenditure</th>
</tr>
</thead>
</table>

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MECHANICS OF THE MODEL

The model heavily relies on activities of a firm. All the costs (related to employees, material or of any nature) have to be associated with some activity. In order to implement the model the following steps have to be taken:

1. Know the business.
2. Collect the information about the product line(s).
3. Develop a product flow chart for each of these products.
4. Fragment the steps involved along the process into the lowest level of operation.
5. Review these levels of operation with previously identified activities.
6. The cost for each of these activity will be calculated as follows:
   a. For individual product the calculation of activity cost is as follows:
   b. For batch process the cost can be calculated as follows:

\[
\text{Unit Cost} = \frac{\text{Total Cost for Activity}}{\text{Number of Units ∈ Batch}}
\]
2. If the total output of the batch activity is a batch of products;

\[ \text{Unit Cost} = \frac{\text{Total Cost of Batch}}{\text{Quantity of Batch}} \]

For the batch related activities use the following formula:

\[ \text{Cost Per Activity} = \frac{\text{Time Spent} \times \text{Salary/Hourly Rate}}{\text{Number Of Batches} \times \text{Units Per Batch}} \]

A provision has to be made to accept either the 'Hourly Rate of the Operator' or the 'Salary of the Employee' performing such an activity. Typical activities of this nature could be:

1. Set-up a batch operation
2. Number of Purchase Orders Processed
3. Run a batch

6.1 A provision has to be made for the Activity Measure Volume by Item for these activities.

7. All the activities leading to the final product or on the process flow will be linked. The collected cost to perform these will be the product cost.
8. After having completed this process for all the products or services, one might find the following not accounted for.
   a. some functions currently being performed
   b. A certain portion of Payroll or expenditure

---

This is the PORK you have been looking for.

---

THE BOTTOM LINE

ASSUMPTIONS

1. Each of the activities in this model are assumed to be unitary in occurrence.

2. The level of operational complexity of a firm is considered trivial in this model. With further modification model can be applicable to companies with more functional intricacy.

3. Model will consider all types of expenditures incurred by the firm or the department. An association of these expenditures with the products or services will be identified. The amount that can not be identified with any product or service related activity will be carefully reviewed in light of its existence and necessity.
INSTRUCTOR’S NOTES

The model is fully functional to handle data regarding the followings:

1. Employee Information
2. Activity Information
3. Expense Information
4. Employee - Activity Assignment
5. Expense - Activity Assignment

Please refer to the database structure files for formation of data for above information. There are displayed in Exhibits 4 to 8 respectively.

EXPECTED OUTCOME

Perform the following steps at the Report Generation Menu. The following reports are expected:

<table>
<thead>
<tr>
<th>Menu Selection</th>
<th>Expected Report</th>
<th>Report Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Payroll Cost Report</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Activity Master Listing</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Employee - Activity Detail</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Activity Expense Assignment</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>For future development ...</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Value Added Activity Report</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>For future development; and</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Custom made for specific industry.</td>
<td></td>
</tr>
</tbody>
</table>

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Bill of Material and direct material related data cannot be handled without further development of the model. Model can accept the Item Master Information.

LEGEND

CR = Database File has been Created
ND = Needs Development to Incorporate into the Model
FN = Functional
DT = Data Entry can be done through ABC Model

Database Files

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>File Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Activity Master File</td>
<td>CR / FN / DT</td>
</tr>
<tr>
<td>Emp2Act</td>
<td>Employee - Activity Assignment</td>
<td>CR / FN / DT</td>
</tr>
<tr>
<td>Employee</td>
<td>Employee / Payroll Information</td>
<td>CR / FN / DT</td>
</tr>
<tr>
<td>ExpAct</td>
<td>Expense - Activity Assignment</td>
<td>CR / FN / DT</td>
</tr>
<tr>
<td>Expense</td>
<td>Expense Account File</td>
<td>CR / FN / DT</td>
</tr>
<tr>
<td>Item</td>
<td>Inventory Item Master File</td>
<td>CR / FN / DT</td>
</tr>
<tr>
<td>RValuAdd</td>
<td>Value-Added Cost Report File</td>
<td>CR / FN</td>
</tr>
</tbody>
</table>
### PROGRAM FILES

<table>
<thead>
<tr>
<th>Program File</th>
<th>Description</th>
<th>PRG called</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>Main Program</td>
<td>D_Entry</td>
<td>FN/DT/CR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calcs</td>
<td>FN/DT/CR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Report</td>
<td>FN/DT/CR</td>
</tr>
<tr>
<td>Activity</td>
<td>Activity Master File</td>
<td></td>
<td>FN/DT/CR</td>
</tr>
<tr>
<td>ActPrint</td>
<td>Prints Activity Master</td>
<td></td>
<td>FN</td>
</tr>
<tr>
<td>Calcs</td>
<td>Calculation Master Menu</td>
<td></td>
<td>FN/DT</td>
</tr>
<tr>
<td></td>
<td>Only option #7 installed, all other calculation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>should be performed under this menu to generate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>reports without hassle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D_Entry</td>
<td>Data Entry Master Menu</td>
<td>Employee</td>
<td>FN/DT/CR</td>
</tr>
<tr>
<td></td>
<td>Activity</td>
<td>Activity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Measure</td>
<td>Measure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emp2Act</td>
<td>Emp2Act</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Item</td>
<td>Item</td>
<td></td>
</tr>
<tr>
<td>Del-Emp</td>
<td>Delete an Employee Info.</td>
<td></td>
<td>FN</td>
</tr>
<tr>
<td>Emp2Act</td>
<td>Employee-Activity Assignment</td>
<td></td>
<td>FN/DT/CR</td>
</tr>
<tr>
<td>EmpCheck</td>
<td>Checks for Duplicate Employee Num.</td>
<td></td>
<td>FN</td>
</tr>
<tr>
<td>Employee</td>
<td>Employee Master Transaction</td>
<td>Del-Emp</td>
<td>FN/DT/CR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EmpCheck</td>
<td></td>
</tr>
<tr>
<td>ExpAct</td>
<td>Expense-Activity Assignment</td>
<td></td>
<td>FN/DT/CR</td>
</tr>
<tr>
<td>Expense</td>
<td>Expense Account Master</td>
<td></td>
<td>FN/DT/CR</td>
</tr>
<tr>
<td>Item</td>
<td>Item Master Information</td>
<td></td>
<td>FN/DT/CR/ND</td>
</tr>
<tr>
<td>ItemChk</td>
<td>Duplicate Item Check</td>
<td></td>
<td>FN</td>
</tr>
<tr>
<td>ListInfo</td>
<td>Displays Employee Detail</td>
<td></td>
<td>FN</td>
</tr>
<tr>
<td>Payroll</td>
<td>Employee Related Cost Information</td>
<td></td>
<td>FN</td>
</tr>
<tr>
<td>Program File</td>
<td>Description</td>
<td>.PRG called</td>
<td>Status</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
<td>-------------</td>
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<tr>
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<tr>
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<tr>
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<td>Clears Report File Before Report Generation To Avoid Duplication</td>
<td>FN</td>
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<tr>
<td>Rpt3_Cls</td>
<td>Clears Report File Before Report Generation To Avoid Duplication</td>
<td>FN</td>
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<tr>
<td>RValuAdd</td>
<td>Creates Value-Added Report</td>
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<tr>
<td>Tmp_Rpt2</td>
<td>Updates Temp. File to Generate Report by Activity</td>
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<td>Tmp_Rpt3</td>
<td>Updates Temp. File to Generate Activity-Expense Assignment</td>
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<tr>
<td>Tr2_Prn</td>
<td>Prints the Prepared Report Employee-Activity Assignment</td>
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<tr>
<td>Tr3_Prn</td>
<td>Prints the Prepared Report Expense-Activity Assignment</td>
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The following files are created but need development to incorporate into the Model.

### Database Files

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<tr>
<td>LaboRate</td>
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<tr>
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### PROGRAM FILES

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<th>Status</th>
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<td>Inventory Item, Master</td>
<td>ItemChk</td>
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<tr>
<td>Measure</td>
<td>Activity Measure Master</td>
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<td>DT/CR</td>
</tr>
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</table>
Mr. Uday Desai was born to Mr. Surendra N. Desai and Mrs. Gunvanti S. Desai on October 5, 1963. After graduating from Kalyani School, Atul, India, he joined the Faculty of Technology and Engineering at the M. S. University, Baroda, India and received a Bachelor of Engineering degree in Mechanical Engineering in December 1985. He then joined the South Gujarat University for his Master of Business Administration in Marketing in August 1985. He received his M.B.A. in June 1987. He joined Lehigh University to pursue Master of Science in Industrial Engineering in 1988.

He worked at the CIM Laboratory at Lehigh University, during his stay at Lehigh. After completing the coursework he joined Frazier Industrial Company as Production Manager in May 1990. He rendered his services to Frazier for two years.

His professional interests are Activity-based Management in Manufacturing environment and Business Process Re-engineering.
END
OF
TITLE