Chapter 2

Theoretical Background

2.1 Literature surveys

To learn more about the previous practices used in manufacturing cost calculation of mold manufacturing and other manufacturing, some articles of relative costing methods were studied below.

Cooper, R., and Kaplan, R.S. [1988]

This article stated that distorted product cost information, derived by poor costing method, could cause the firm to have an inappropriate and unprofitable schedule. The accuracy of product costing systems was important for the firm. There was still disagreement between measuring product costs by full cost and by variable cost. Even the 2-stage cost allocation system still had problems in the failure of marginal costing and fixed-cost allocations. Complexity costs of a full-line producer included transaction costing and long-term variable cost. A comprehensive product cost system should provide a better support for managerial decisions on pricing, launching, and changing product lines.

Needy, K.L.S. [1993]

This dissertation studied and compared the performance of costing methods between Activity-Based Costing(ABC) and Traditional Cost Accounting(TCA). Simulation models were used to find out the conditions under which ABC gives better results than TCA, considering 3 critical factors namely, the type of manufacturing, the dynamics of the environment, and the product complexity. The outcomes identified that ABC is better than TCA for every manufacturing types, under a stable environment. However, when the environment varied, the performance of ABC became less attractive and depended on the other two critical factors. On the other side, TCA undercosted

low labor products. In high labor products, the accuracy of TCA depended on the manufacturing type and the volume.

Cooper, R., and Kaplan, R.S. [1992]

This paper explained about Activity-Based Cost (ABC) systems, which was used to estimate the cost of resource using in organizational processes to produce outputs. The ABC resource usage cost information was useful for monitoring and predicting of the changes in demands for activities as a function of changes in output volume and mix, process changes and improvements, introduction of new technology, and changes in product and process design. ABC models can help management to reduce resource usage while holding revenues constant, by measuring of short-term contribution margin as price less the cost of resources acquired. More, ABC information was useful in repricing of products so that the revenues received exceed the costs of resources used for individual customers.

Chaneski, W.S. [1996]

This article described the way to properly account for all of the costs that went into running a manufacturing business. A manufacturing company's costs should be divided into 5 main categories: direct material, direct labor, manufacturing overhead, selling and administrative expenses, and profit. Once all operating expenses were properly accounted for, the highest cost areas will rise. This may help explain why a company was experiencing success or failure.

O'Guin, M.C. [1990]

This article expressed the changing of cost allocation method, from the traditional labor and depreciation-based cost allocation system to the ABC system, in a large plumbing fixture manufacturer. The firm faced a large overhead structure that amounted to almost 60% of the cost of goods sold, and tried to improve this weakness. However, the existing cost system gave the wrong picture of actual cost of the firm's manufacturing operations. Then, the firm changed to use the ABC system by

classifying overhead allocation into 2 pools: 1.elements driven by volume, and 2.elements driven by transactions. The cost database and actual data from similar case studies were used to compare with the system implemented. The resulting cost from ABC system was used to support changes in product-line and manufacturing configuration. As a result, the changes were successfully conducted.

Mishra, B.K. [1996]

This dissertation studied the theory of cost-system choices, being traditional and Activity-Based Costing. The paper stated that although many writings in management accounting literature preferred ABC systems than traditional costing systems, these studies assumed that all parties within a firm possessed identical information, and no incentive problems existed. Therefore, the conclusion from these studies were not borne out in practice due to an oversimplification of reality. A more realistic approach was needed.

The dissertation examined the cost system choice of a firm in a more realistic setting. The results contradicted the prevalent notion that the ABC system was unconditionally better than the traditional costing system. Under the scenario when divisional managers had superior information about local phenomena than the firm's top management, the ABC system could perform worse than a traditional system.

Novin, A.M. [1992]

This paper proposed a quantitative technique, which was the regression analysis using the coefficient of determination(R Squared), for determining and analyzing the extent of the relationship between overhead costs and various cost drivers, and for estimating the linear or curvilinear relationship between overhead costs and cost drivers. The value of R Squared is always between 0 and 100%. The closer the value was to 100%, the stronger the relationship between the cost and the cost driver. Besides determining proper allocation bases, the regression analysis was a practical approach for developing single or multiple overhead rates for the allocation of

overhead costs to product and jobs. With the assistance of computers and spreadsheet programs, regression analysis was no more the complicated task.

Khaisaeng, S. [1998]

This thesis claimed the changing manufacturing environment, and blamed the existing cost system of a manufacturing firm in Thailand, which was traditional cost accounting system, for the deficiency in providing understandable and reasonable information for manufacturing costs. To prevent the management team from the wrong decision using obscured information, this research studied the problems of the existing system and introduced a new cost system, the Activity-Based Costing (ABC) system. The advantages and steps in implementing ABC system were introduced. Applying ABC system exposed 3 main benefits namely, 1) The ABC information demonstrates detailed costs of manufacturing including overhead costs consumed by each activity, 2) the ABC information can be utilized to set the standard price of existing products, and 3) the ABC information can be applied for the future projects.

Shim, E.S. [1993]

This dissertation claimed that the conventional accounting systems could not provide relevant and useful information to the management team of manufacturing firms in the rapidly changing manufacturing environment. Activity-Based accounting systems seemed to be better by providing relevant information on a timely basis. This study conducted an experiment to examine: 1) the demands for new accounting systems, 2) the needs for sophisticated cost allocation methods, and 3) the relevancy of cost allocation in a new manufacturing environment. The results indicated that manufacturing firms needed the new accounting systems and the sophisticated cost allocation methods. The outcomes supported that the shortcoming of the traditional accounting systems needed to be improved by the new methods, to enhance the accuracy of costing estimates and profitability measuring of product.

Mclanahan, J.C. [1992]

Due to the advances in manufacturing industry, cost accounting techniques were improved constantly. This project was conducted to gather comparative data on the performance and operating costs of the three most popular costing systems: full cost, marginal cost, and ABC systems. The computer was used to calculate many variables of cost information, and to simulate manufacturing cost in the experiment, comparing with various candidate accounting systems, to assess the degree of cost distortions and the mix errors inherent in a simulated product mix optimization. The results indicated very close conformance of the ABC systems to the master costing system, while the marginal and full cost systems had more distortion and mix errors.

The risk of experiencing a mix error with these systems was also estimated by means of an incidence of error measurement. The errors found were not as severe as expected from accounts in the literature. On the other aspect, estimated costs of system implementation and operation were derived for the systems under comparison. The results exposed that the full cost system was the cheapest, the marginal system was moderate, and the ABC system was the highest in cost. The suggestion was given at the end, for an optimized cost system.

Bohez, E.L.J. [1998]

This paper stated the methods to calculate the cost for molds and dies. The topic was started by differentiating a cost estimate of the mold for the purpose of a price offer, and a post calculation of the cost after the manufacturing process. After that, the three methods to prepare a price offer namely, Point system developed by Philips, Group Technology based system from CETIM:"Devilmoule", and the Generative system developed by Helmut Schluter, were explained in detail. Advantages and disadvantages of all the three were discussed. Next, the "Mold Manufacturability System" was introduced as being known for the remarkable accuracy and fast applicability to estimate costs. Detailed formula and an example were provided. Last, an alternative way to estimate the cost based on a hypothetical expert system for

detailed process planning of the mold was presented in "More Detailed Cost Calculation".

Fernandes, J.M., *et. al.* [1997]

This thesis claimed to be the first who specifically apply the principle of activity-based costing (ABC) to detailed energy costing and energy management in an actual manufacturing company. The thesis proposed allocating energy costs in a manufacturing environment through the specific cost drivers to the products that really cause those costs (cost centers). Energy costs used to be classed as an overhead cost and be assigned based on a single overhead rate, which was usually directly proportional to the number of labor hours each work consumes during production. Thus, those energy costs were much distorted from the truth. This thesis also provided comparative results between traditional and ABC method. In addition, an idea of moving the cost of energy from overhead cost to a line item in the cost of production, similar to the labor and materials was also proposed.

Navee Chiadamrong [1997]

This thesis also presented an idea of using Activity-Based Costing (ABC) in the process of calculating and estimating the costs for advanced manufacturing systems, in stead of the traditional costing methods. This was specially focussed on the production overhead costs which were formerly based on labor or machine hours. An idea of new manufacturing cost structure for advanced production was proposed. In this model, the role of labor cost content was reduced significantly and is treated as part of overhead. The idea also took account of measuring costs and benefits of non-valued added activities, such as idle time of machines or work-in-process waiting, by applying the concept of Opportunity cost which seems to be a weak point in many other models.

Lowe, P.H. and Walshe, K.B.A. [1985]

A British tool-making company worked with a university department to turn to a computer-based tool cost estimating system for injection molds. The concentration was

on the labor content of mold manufacture, using component shape and tool structure analyses which based on conventional coding principles. The outcome data base was, then, classified and subdivided into groups by cluster analysis. Ultimately, estimates in fabrication labor hours were derived by multiple linear regressions which used cost variables and data bank from the relevant cost characteristic tool group.

To facilitate those three concept stages above, the computing system that combines group technology-based classification systems and statistical analysis together was also developed. The operating system consisted of three part: component shape analysis, tool structure analysis, and tool cost correlation which transcribes mold characteristics into fabrication hours. The system was designed to run on low cost business computers, easy to use by moderate experience computer users, and able to be integrated with a total manufacturing information system.

Chaneski, W.S. [1997]

This article presented benefits from computer-aided cost estimating systems, which are increasing in sophistication, but remains easy to use. The systems beneficially tied together all costs of manufacturing, and provided a history of comparable quotes at the touch of a button. Importantly, the systems provided accuracy of cost estimates, consistency between cost estimators, and records that everyone can access and utilize, which make the pricing procedures consistent.

In order to take advance advantages from the systems, users should learn the basis of personal computer together with estimating software. More, the users should opt for types of computer-aided cost estimating system by considering some contingence such as, type of computer being used, numbers of estimates completed in each month, types of quantities being quoted, and the system's ability to reflect their shop practices. The article insists that computer-aided cost estimating can serve the need for accurate manufacturing times, resulting in the extension of efficiency to run the business profitably.

Coates, J.B. [1976]

This article studied information obtained from a sample of at least 40 firms of varying sizes in different industries surrounding tool manufacture. The studies contain three major aspects of tool economics: the process of estimating tool costs, the training of tool cost estimators, and the costing of toolroom operations. For the cost estimating process, the problem of data records availability enabled the author to study only press tooling and injection mold. However, after comparing three conventional, and two non-conventional estimating methods, a new tool estimating system requiring good company past records was proposed. For *form reproduction* and *benchwork*, six variables of each tool's characteristics: box volume, face area, perimeter, depth, number of shapes, and a dimension code; were related and computed by a multiple linear regression computer program to establish the equation for estimating. For the *remaining parts*, a classification system was proposed so that the 'near-neighbor' technique (or Group Technology) may be applied.

Gentsch, E.L., *et al.* [1994]

This report provided an occupation-based cost profile of the manufacturing activities that contribute to defense production. The analysis was based on direct and indirect industry shipments to the number of workers in each manufacturing occupation, and the median pay by occupation. Ninety-one industries were covered as defined by the 3-digit Standard Industrial Classification system and 287 Bureau of Labor Standards-defined Occupations. The results reflected the activities of all related manufacturing industries in the domestic economy, including prime contractors, subtier suppliers, and development and production activities ranging from major systems to spare parts. The occupation cost profiles for all industries combined, were reported for industries grouped on the basis of degree of defense involvement, and for selected individual industries and industrial sectors.

Moore, L.T., and Creese, R.C. [1990]

This article indicated that the failure of absorption accounting to provide useful product costs came from the changing manufacturing environment, as well as the systematic limitations. Direct labor has declined to be a minor cost of less than 15% of total manufacturing costs. Overhead, which is not responsible for any one product, is becoming more significant in modern industry. To assign the costs to the proper activities, these 4 points must be realized: 1.A product cost should depend on neither capacity utilization nor product mix. 2.End activity costs should account for almost 100% of total costs by directly relating overhead with products and associated activities. 3.A product should not be assigned costs for which it is not directly responsible. And, 4.A product costing system should be as simple as possible.

Wichein Pacayamai [1987]

This thesis related directly to an application of Group Technology to injection mold. The study proposed an original classification and coding system (C&C) for injection mold components, aimed to facilitate many design and manufacturing activities in the industry of injection mold components, especially for Thailand. The system consists of nine schemes; namely 1.Part Family Scheme, 2.Material Scheme, 3.Fabrication Process Scheme, 4.Fabrication Tool Scheme, 5.Equipment Scheme, 6.Supplier Scheme, 7.Injection Mold Assembly Scheme, 8.Plastic Raw Material Scheme, 9.Injection Mold Product Family Scheme. Beside a creation of C&C system, a software package was also developed on a PC under MS-DOS, written in C language for interactive coding of mold components to demonstrate applications of the C&C system for promoting the use of standard components of injection molds. And a sample data base was written with Prime Oracle PC data base management system to be expandable and cover the whole range of injection molds.

Zenger, D.C. [1989]

Existing component manufacturing cost estimating techniques require detailed part information and the existence of a developed process plan. This dissertation was

aimed to provide an early manufacturing cost estimating methodology that the designer can use before process plans and detailed part drawing are developed. So, early cost estimating techniques were developed to require only basic part geometry and production data. This dissertation also developed manufacturing cost estimating techniques for many processes including machining an injection mold. The procedures were developed using the concept of a manufacturing point system. The algorithms for all these processes had been incorporated into a computer program that compares numerous attributions and calculates final manufacturing costs.

Held, K.C. [1995]

This technical report accounted for the consideration of disposal costs in life-cycle cost estimates, executed by The Office of Secretary of Defense(OSD). The Component Material Estimating Methodology provided a working alternative for estimating weapon system disposal costs. The Component Material Methodology (CMM) estimated disposal costs based on the type of materials used in a weapon system. The methodology considered a system's individual component, determined the type and quantity of material used in each component, and estimated the cost of disposing of those materials. The CMM can be done with little environmental experience or knowledge. Using the CMM disposal estimates can be performed either by a simple or sophisticated cost model. The methodology was flexible and available for any phase of the acquisition life-cycle.

Wibule Surasakhon [1994]

The study used Monte Carlo simulation technique to evaluate the probability of cost overrun in building construction projects. The price data for buildings in Bangkok was collected. The studies concentrated on 20-30 storeys buildings, divided into two categories; office buildings, and condominiums. Cost components for each project could be presented by a suitable statistical distribution. The total cost of a project would be a random variable which is the sum of several random numbers. The result

model can be used to estimate the budget for construction projects, and can also be used to check with the detailed estimate.

Mlakar, P. F. and Bryant, L.M. [1990]

This article concerns Range cost estimation which is becoming an accepted procedure in the cost engineering profession. Range cost estimates' concept mostly treated the unit prices as the random variables and applied Monte Carlo simulation technique to prepare cost estimates from the distribution of total cost, with a known level of confidence. However, there are some weak points that the technique is time consuming and gives no indication of the dominant contributors. So, this article proposed a direct method for range estimation that involved only a single evaluation of the cost equations, in stead of the large number of estimates needed in a Monte Carlo simulation.

2.2 Background of Activity-Based Costing

Activity-Based Costing (ABC)

ABC is an accounting concept which is developed to serve the changes in costs structure of advance business. The concept breaks through the traditional accounting methods which usually allocate indirect cost, mainly overhead cost (FOH), based on the proportion of direct resources, such as direct labor (DL), utilized by the function or the department, regardless of considering the actual matters which induce those costs. Allocating overhead on direct labor implies that by reducing direct labor, subsequent reductions in overhead mystically follow, which is not true.

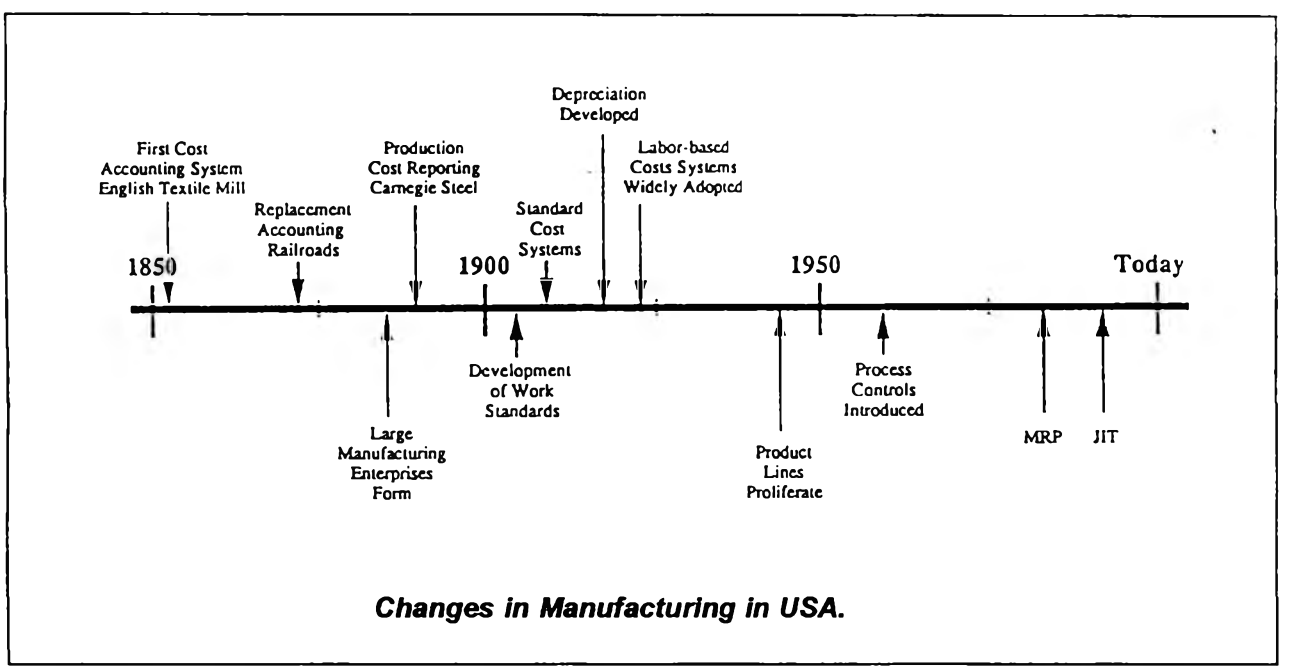

Figure 2-1 The Evolution of Cost Accounting Systems.

Source : O'Guin,Michael C.(1991), p.16

From chart above, manufacturing environments have changed radically in the past century. Accordingly, cost accounting systems also have been adjusted to suit those changes. Direct labor used to be major contribution (≈40%) of product value in the early of 1900's, the age of labor intense industry in US. which emphasized on mass

production and working standard. But when the labor wages increased, the products from US. could not competed with those from the countries of lower labor cost, such as Korea, Hongkong,and Taiwan. Accompanied with traditional cost accounting systems at that time which reflected wrong picture of costs structure, there were industrial wide attempts to reduce labor cost by the replacement of mechanization and automation. Robotics were introduced everywhere as tools to reduce costs.

In 1970's, direct labor costs continued to shrink and industries turned from labor intensive to be more capital intensive. This made a big change in manufacturing cost structure. Overhead costs, such as engineering, tooling, programming, and maintenance support, became very significant, while direct labor turned to be merely a fraction of overhead costs. The traditional cost accounting systems, while still allocated costs based on labor contents, obscured the sources of overhead and gave distorted cost information to management.

"As early as 1971, George J. Staubus proposed management systems built on activities. In that year, he published *Activity Costing and Input-Output Accounting*. Unfortunately, at that time there was little interest in new forms of costing." (O'Guin, 1991 : 23)

"In 1984, two respected accounting professors, Dr. Robert Kaplan of Carnegie-Mellon University, and Dr. Tom Johnson of Portland State University, began to expound the shortcomings of traditional cost accounting systems. Then, Dr. Robin Cooper of Harvard Business School developed a new type of cost system while consulting for Schrader Bellows. This new cost system allocated costs on overhead transactions or activity, called "Activity-Based Costing" ABC." (O'Guin, 1991 : 24)

"Shortly thereafter, Kaplan reported on a new cost estimating system which John Deere's Component Works had developed. It, too, assigned costs on measures of activity. From these beginning, ABC gained attention and spread." (O'Guin, 1991 :24)

ABC was developed to understand and control indirect costs. ABC assigns costs to products or customers based on the resources consumed. Overhead costs are traced to a particular product rather than spread arbitrarily across all products, thus, the

management can learn to control costs by controlling the occurrence of relating activities. Unlike traditional methods, ABC does not assume that, direct labor or direct material causes overhead. Instead, ABC presumes products incur indirect costs by requiring resource-consuming activities such as warehousing, scheduling, set-up, inspection, etc. These activities cause overhead spending by triggering the consumption of resources such as labor and machine time.

ABC assigns costs to products based on the number of activities the product consumes. The more activities a product requires, the more cost the product creates. To develop a cost per activity, divide the total overhead cost of the activity by the number of activities performed. This creates a cost per activity and a productivity measure for each overhead function.

ABC principles and techniques can be applied equally well to almost all kind of business from discrete manufacturing to continuous process industries like a chemical plant, or job shops and service businesses. In each of these cases, ABC's application and implementation may have different requirements and problems.

O'Guin (1991) wrote, "Process industries tend to have little routing diversity, as such, fewer cost drivers and simpler bills of activity are usually required. Product lines usually have dedicated process lines, allowing easy, accurate product costing. The challenge is to understand how products drive support costs, and how to increase throughput."

For example, process industries are usually capital intensive. Capital costs (or fixed costs) and changeover costs (from batch to batch) are very high. However, since the costs, such as direct labor and depreciation, can not be charged directly to a product, these costs are charged to a process. Then, the time is used to represent capacity utilization of process by assigning process's costs to products based on machine hours, which is a volume measure. The danger here is aggregating costs that are not time driven with period costs, such as batch costs, set-up, tank cleaning and lost capacity, which should not be assigned on volume base. These costs should be separately assigned by the consideration on batch.

"For job shop environment, ABC is important for cost estimating and profit reporting. Many of the orders a job shop produces are unique, so, profits depend on how well the shop estimates costs." (O'Guin, 1991: 49)

Either the shop intends to make profit on these unparalleled jobs or, at least, want to understand how much the job will cost. Since, the jobs are low volume, the transaction costs of order entry, planning, design, inspect, supervise, etc., are important. ABC concept will estimate how much each type of transaction costs, and will indicate the important parameters. Management can use this information to decide in the future case what work they wish to receive, and what price to charge.

However, according to O'Guin,(1991), one weak point of general job shops is the poor cost systems and lack of MRP (Material Requirement Plan) systems, similar to the process industries. Forecasts are error prone. Therefore, the information needed for effective allocating of cost might be limited.

ABC categorizes costs into two groups – one is product driven and another one is customer driven. Product driven costs are the costs of designing and manufacturing products, which include procurement, warehousing, production planning, quality control, engineering, etc. Customer driven costs are the costs of delivering, servicing, and supporting customers and markets, which include order entry, distribution, sales and marketing, advertising, R&D, etc.

In some cases, a cost can be both directly charged to the products, and assigned to the products based on activities. For example, an engineering design work can be charged directly from the time that the designers work on it. Alternatively, ABC can also assign this engineering cost to the product based on activities, which in this case are number of drawings created and bills of materials developed.

According to the generally accepted accounting principles (GAAP), ABC separates manufacturing costs from customer driven costs and engineering costs. Only the costs of supporting the production of a product can be inventoried, which include direct labor, direct material, and indirect manufacturing costs. Indirect manufacturing costs consist of indirect labor (IDL), utilities, supplies, rent, depreciation, taxes, and

supervisor salaries. These costs become expenses only when inventory is sold. On the contrary, customer driven costs such as, sales, distribution, engineering, R&D (research & development), or other general and administrative costs, are not allowed to be inventoried. These costs must be expensed over the current accounting period.

The fundamental assumption of ABC is that activity consumes resources and product consumes activities. Thus, a cost is incurred at the point where the activity takes place. The cost would be assigned to products or services by the drivers in two stages.

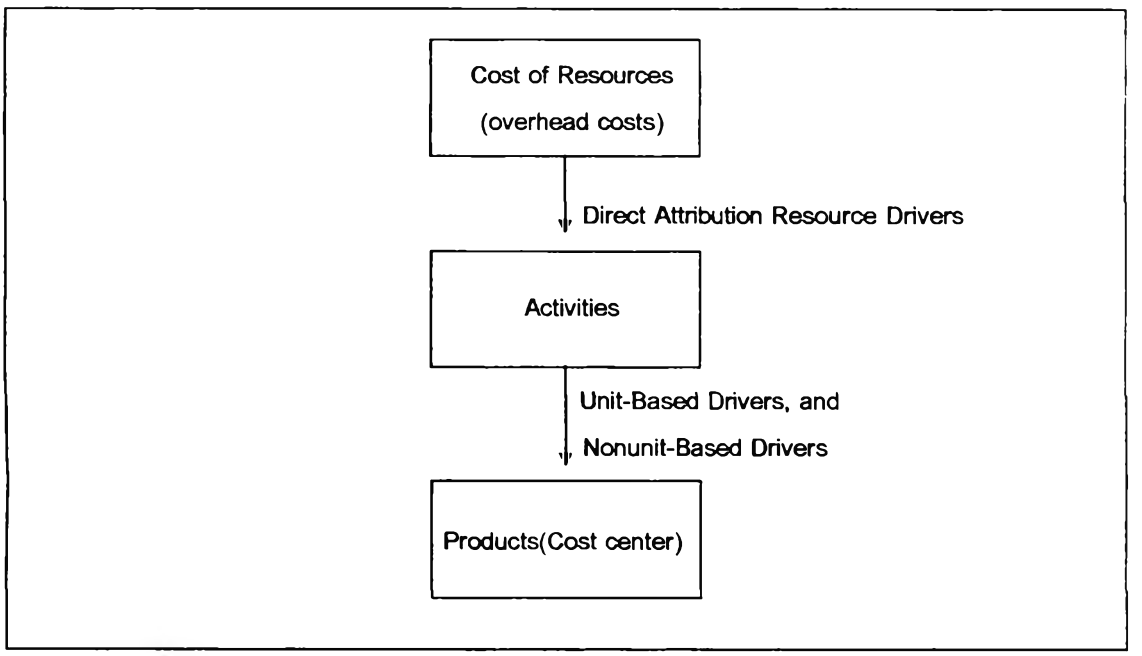

Figure 2-2 Activity-Based Costing: Two-Stage Cost Assignment

Source: (Hansen, D.R. (1997), p.301)

Similar to traditional systems those assign costs in two stages, ABC assigns all resources such as direct labor, depreciation, supplies, and utilities to either products or customers to reflect the company's operation. The difference is that ABC uses more cost pools and assigns costs using a diversity of more appropriate bases. ABC also allows greater variety in determining second stage drivers over the conventional

concepts, thus, enables the system to model substantially more complex cost behavior. Consequently, ABC is more accurate than traditional cost systems.

Firstly, ABC assigns all costs to the major manufacturing or business processes called activity centers, similar to the first-stage cost assignment of traditional systems. The slightly difference is that ABC's first-stage driver are more rigorous and depend more on activity measures than traditional systems. The activity centers are either homogeneous processes like machining, or assembly, or a business process like procurement, distribution, or accounting. Each kind of costs assigned to activity centers is called a cost pool. Therefore, there might be many cost pools in an activity center, as shown in figure 2-3.

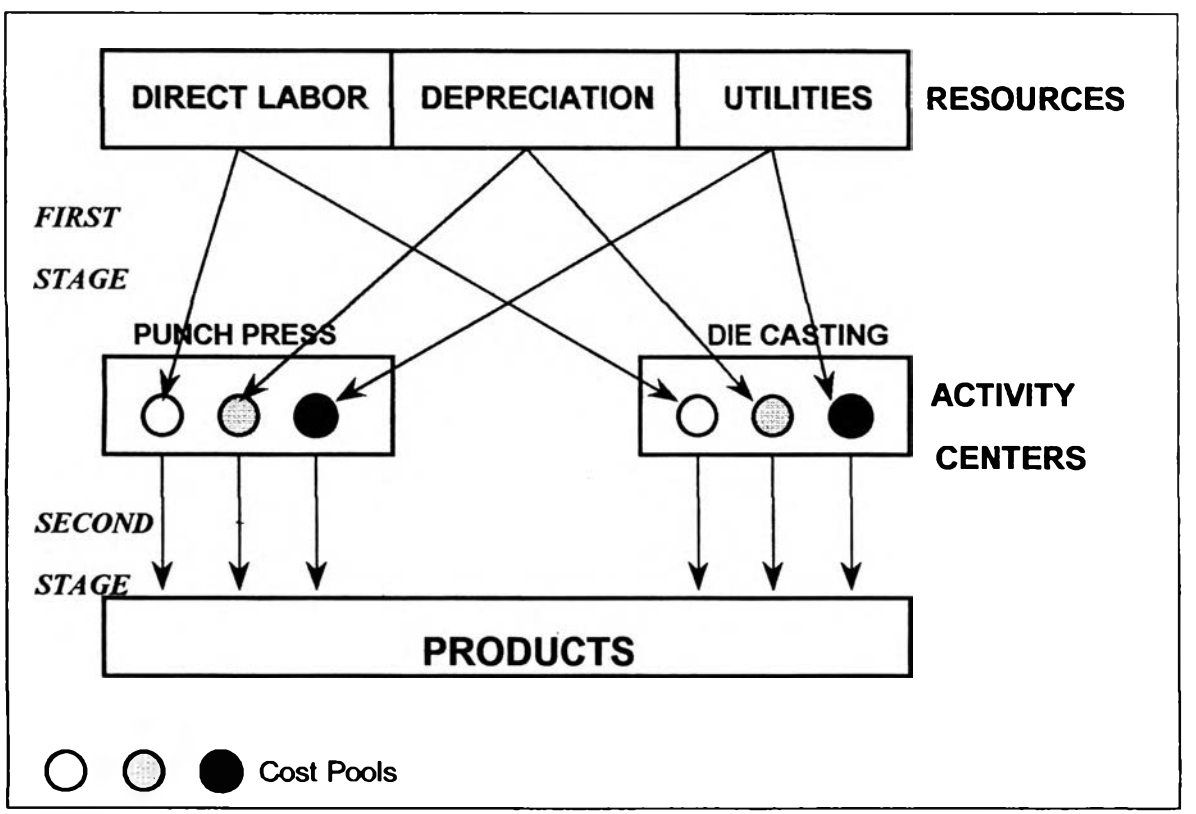

Figure 2-3 ABC Structure with Cost Pools Illustration

Source: O'Guin,Michael C. (1991), p.83)

The truly distinguishing feature of ABC concept is the second-stage drivers, which are the measures of activity used to assign costs from activity centers to products or customers. The ABC recognizes that many costs are not directly proportional to the number of units produced, but the number of batches processed, or even the type of product itself. Therefore, ABC separates activity centers in two groups, namely, product-driven activity centers (where costs are assigned to products), and customer-driven activity centers (where costs are assigned to customers). In either case, a product or customer directly consumes the activity center's costs. For instance, a machining part consumes an operator and his machine time.

In traditional cost system, second-stage drivers are usually direct labor hours, material dollars, machine hours (m/c hrs), or some other measure of volume. In ABC, second-stage drivers can be direct labor hours, machine hours (m/c hrs), number of set-ups, set-up time, inspections, customer orders, sales calls, warehouse moves, or purchasing order (P.O.). These drivers reflect how an activity center's costs are consumed by products or customers.

For example, a machining department has two cost pools. One cost pool consists of production costs like direct labor, power, tools, supplies, and machine depreciation (m/c deprec.). These costs are consumed by products based on the production volume each product possesses. These volume costs are assigned from machining activity center to a product based on machine hours consumed. Another cost pool consists of the costs of changing over from one product to another one, namely, moving material, setting up the machine, creating work orders, and inspecting the work piece. These costs are irrelevant to the number of machine hours, but are triggered by number of production changeover. These two cost pools are driven by different measures. Here, the machining activity center has two second-stage cost drivers: machine hours and number of set-ups.

By this principle of two stage drivers, the actual cost of a product or service (acting as a cost center) can be calculated relative to the amount of resources it really consumes via the cost drivers. From the benefits stated, ABC is now popularly used in costing of various fields.

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 orders based on the usage of the activity.

5. Determine corporate short-range 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 customer.

6. Evaluate activity effectiveness and efficiency. Knowing the critical success factors (step 5) enables a company to examine what it is now doing (step4) and the relationship of that action to achieving those goals. Everything a company does—or avoids doing—is measured against the short-and long-term goals. This provides a useful formula on which to base a decision of whether to continue performing or to restructure an activity. Also, cost control is improved by ascertaining if there are superior methods of performing an activity, identifying wasteful activities, and determining the cause of the cost.