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Product Costing - as easy as ABC

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Introduction

A major problem for many manufacturers is knowing what products cost to make and what jobs costs to perform. Many manufacturers follow the Pareto rule of making all of their profits on 20% of their jobs and then throwing it all away on the other 80% of jobs. The secret to running a profitable manufacturing operation is to know what jobs cost as they go out the door and then to use this data to accurately estimate the cost of repeat business and other similar jobs.

Many of us learned in Accounting 101 that accounting is an exact science with matching credits and debits. As we become more experienced we learn that you can make the numbers come out any way you want them to come out, depending on the assumptions you make. (Witness the creative accounting by some of the dot com companies before their downfall.) This paper offers some thoughts about how manufacturers can track their costs and use this data to increase their real (money in the pocket) profits.

Many manufacturers use aggregate costing. They add up the cost of their physical plant including rent or mortgage/depreciation, equipment leases, utilities, security, insurance and other plant-related expenses. They add-in the cost of all their people, including taxes, insurance, and fringe benefits. They then add-in the decrease in inventory value for the period being costed. The result is the net cost for operating the factory. Sales revenues minus the costs of sales and marketing and the net operating costs results in the profit or loss for the operation. This is the standard "general ledger" view of a factory, but it is not very helpful from a viewpoint of knowing how to make more money. It is simply a scorecard of how well you are doing.

We recently talked to a manufacturer who had a slow July and made money but had a much busier August and lost money. Aggregate accounting did not help him to understand why or how to fix the problem. Instead, the answer is as easy as ABC, which stands for Activity Based Costing.

Activity Based Costing

With Activity Based Costing (ABC) we assign a cost to every resource in the factory, such as people, machines, and materials. Then we measure how much of each resource each job consumes. If we add all of these up, we get an estimate of how much each job and hence product costs to make. Those jobs that consume more resources will be assigned a greater cost. Those that consume less resources will be assigned a lower cost.

If we compare the actual cost of a job or product with the estimated cost used to cost the job or product, then we can determine whether we made our desired profit or whether we made a loss. If we then make sure that we only take repeat orders that will result in a profit we will avoid throwing away our profits. We will also give the losing jobs to the competition (who may or may not be able to do them at a profit).

This does have an implication that we may price some jobs and products out of the marketplace. This is OK. If you cannot do a job or produce a product at a profit, then you should not be doing this. As my mentor once said "Go lie on a beach instead. Its more fun and much more profitable than working at a loss." There are those people who believe that the most important thing in life is "to keep the factory busy." So they take jobs at a loss. For a full explanation of why this makes no sense at all, please go read "The Goal" and subsequent works by Eli Goldratt.

More importantly, ABC tells you the components of the cost of each product. It tells you what each operation costs both in terms of labor and machine time. It tells you the cost materials consumed and how much scrap and wastage occurred. It tells you the cost of rework and unscheduled operations and machine down time. It is often possible, if these cost elements are examined in detail, to see how to cut the cost of producing a product so that it can be sold at a profit.

Allocating Costs

An important concept of ABC is that all costs of manufacturing must be allocated to resources that are consumed in manufacturing. Then by measuring the resources consumed, we can allocate the costs to the products of jobs that consume them.To make ABC work, we need to allocate the costs of running the manufacturing plant across the jobs and products it makes in such a way that the cost allocation is in proportion to the resources consumed. Jobs and products that consume more resources carry a greater proportion of the cost burden.

A useful concept for costing people is their burdened hourly labor rate. In deriving this we take an employees basic hourly wage rate and multiply it by an overhead rate. This gives us the loaded cost per hour for the person. If we multiply the loaded labor rate by the number of hours that a person works on a job, we get the loaded cost burden for that job for labor. The higher the number of hours or the higher the loaded cost, the higher the cost of the job.

So what goes into the overhead rate for people? Here are some suggestions:

- Cost of employer paid taxes on employees.
- Cost of fringe benefits such as company paid health insurance.
- Cost of holidays and vacations.
- Cost of non-productive time for meetings and the like.
- Cost of supervisors and managers.

Note that employees only work part of the time on direct labor on jobs. The rest is assigned to overhead. We can computer the cost of direct labor as the sum of all direct labor hours worked during a given time period multiplied by the employee compensation rates at which that labor was performed. Then the overhead rate is the cost of overhead divided by the cost of direct labor.

Note that the labor overhead rate, such as measured over successive monthly time periods, will vary over time. In most cases, the variation is small and an average number can be used in estimating the cost of a job.

What about costing machines? Like people, machines are usually costed on an hourly use basis. Some of the factors that go into determining the hourly cost rate include:

- Replacement cost.
- Maintenance cost.
- Energy cost when running

Machines wear out physically or by technological obsolescence and must be replaced. A simple way of arriving at the replacement cost per hour, if the machine is purchased, is to take the depreciation per year divided by the expected number of operating hours per year. If the machine is leased then the monthly lease cost can be divided by the number of operating hours per month. Alternately, we can use the manufacturers predicted operating life in hours and divide this into the cost of the machine. Which method is best, will depend on the characteristic of the equipment. For example a computer may be capable of continue to function for a decade or more but need to be replaced because of technological obsolescence after 3 years. An engine may be capable of operating for 5,000 hours and then need to be replaced as it will be worn out.

Machines need to be maintained, usually on a preventive maintenance basis. The cost of parts and labor should be included in the hourly cost of the machine. Machines use energy when running. The cost of electricity or other energy sources must be included in the hourly cost.

Raw materials used in manufacturing can be costed based on the actual price paid for each item or on a standard average cost. In many cases it is simpler to track the cost of each item as it comes in the door and then to allocate that cost to a job as it is used. Sometimes, however, materials are used on a continuous basis but the spot market prices vary from delivery to delivery. In this case, it is better to use a standard cost so that product-cost comparisons are not influenced by short term market fluctuations in the supply price. If lots are co-mingled, such as in bulk gas or chemical deliveries, then a standard cost must be used.

When raw materials are turned into intermediate materials, we can accumulate the cost of the labor and machines needed to convert raw materials into intermediate goods and derive a cost basis for the intermediate inventory. We can then apply this same process to derive a cost for finished goods inventory.

An important cost element of any job or product is material scrap or wastage. It is important to capture this as part of the cost of a job, product, or intermediate manufactured inventory.

A problem with ABC can be how to allocate costs such as:

- Cost of the building, including heat, light, utilities, phones, and other services.
- Cost of general management
- Cost of legal and accounting services
- Cost of business insurance
- Cost of sales, marketing, and customer support.

To make ABC work, we need to allocate all the costs of manufacturing to resources that are used to make products or perform jobs for customers.

Generally, the cost of sales, marketing, and customer support (including their share of the overhead) is subtracted from sales revenues to arrive at net revenues, which can then be meaningfully compared in an ABC method with product costs to derive the profit or loss. Sometimes the cost of sales commissions are directly subtracted from the income for specific products or jobs, as these commissions are specific to the product or job.

The other costs, listed above, are then general overhead costs. These costs can be allocated to the other labor, machine, and material costs as a G&A burden. The easiest way is to take the overall General and Administrative cost and divide it by the total running cost of the manufacturing operation (excluding G&A and sales, marketing, and customer support) and add one to this number to get the G&A overhead multiplier. Then we multiply the cost of any resource used by this G&A multiplier to include the G&A in its true cost.

Note that we are allocating a G&A multiplier on material costs to include the cost of storage and warehousing. We can obviously be more precise about this allocation but there comes a point of diminishing returns.

An issue with machines, is whether to allocate an hourly cost to the time when a machine is being setup or is down during a production run or is being torn down or cleaned at the end of a job. There are two ways of allocating machine cost:

- Allocation of cost based on run hours
- Allocation of cost based on setup, run, and tear down hours.

In the latter case a differential rate may be needed when the machine is running to account for the energy used in running the machine.

Conclusions

Activity Based Costing is not an exact science. The results achieved depend on how costs are allocated to different resources. With judicious allocation choices, however, you can get close estimates as to the cost of each job or product. If you capture the labor and machine time and materials consumed or scrapped as the job or product is being manufactured then you can get an accurate real-time measure of actual costs versus the cost point you need to achieve to make a profit. You can see where the costs really accumulate, in detail, and can use this data to produce better estimates for future job or product costs. This will enable you to make money on all your jobs and products and, hopefully, substantially increase your bottom-line profits.

