

## Chapter- 1

# Cost Accounting

In management accounting, **cost accounting** establishes budget and actual cost of operations, processes, departments or product and the analysis of variances, profitability or social use of funds. Managers use cost accounting to support decision-making to cut a company's costs and improve profitability. As a form of management accounting, cost accounting need not to follow standards such as GAAP, because its primary use is for internal managers, rather than outside users, and what to compute is instead decided pragmatically.

Costs are measured in units of nominal currency by convention. Cost accounting can be viewed as translating the supply chain (the series of events in the production process that, in concert, result in a product) into financial values.

There are various managerial accounting approaches:

- standardized or standard cost accounting
- lean accounting
- activity-based costing
- resource consumption accounting
- throughput accounting
- marginal costing/cost-volume-profit analysis

Classical cost elements are:

1. raw materials
2. labor
3. indirect expenses/overhead

### ***Origins***

Cost accounting has long been used to help managers understand the costs of running a business. Modern cost accounting originated during the industrial revolution, when the complexities of running a large scale business led to the development of systems for recording and tracking costs to help business owners and managers make decisions.

In the early industrial age, most of the costs incurred by a business were what modern accountants call "variable costs" because they varied directly with the amount of production. Money was spent on labor, raw materials, power to run a factory, etc. in direct proportion to production. Managers could simply total the variable costs for a product and use this as a rough guide for decision-making processes.

Some costs tend to remain the same even during busy periods, unlike variable costs, which rise and fall with volume of work. Over time, the importance of these "fixed costs" has become more important to managers. Examples of fixed costs include the depreciation of plant and equipment, and the cost of departments such as maintenance, tooling, production control, purchasing, quality control, storage and handling, plant supervision and engineering. In the early twentieth century, these costs were of little importance to most businesses. However, in the twenty-first century, these costs are often more important than the variable cost of a product, and allocating them to a broad range of products can lead to bad decision making. Managers must understand fixed costs in order to make decisions about products and pricing.

For example: A company produced railway coaches and had only one product. To make each coach, the company needed to purchase \$60 of raw materials and components, and pay 6 laborers \$40 each. Therefore, total variable cost for each coach was \$300. Knowing that making a coach required spending \$300, managers knew they couldn't sell below that price without losing money on each coach. Any price above \$300 became a contribution to the fixed costs of the company. If the fixed costs were, say, \$1000 per month for rent, insurance and owner's salary, the company could therefore sell 5 coaches per month for a total of \$3000 (priced at \$600 each), or 10 coaches for a total of \$4500 (priced at \$450 each), and make a profit of \$500 in both cases.

### ***Elements of cost***

- 1. Material(Material is a very important part of business)
  - A. Direct material
- 2. Labor
  - A. Direct labor
- 3. Overhead
  - A. Indirect material
  - B. Indirect labor

(In some companies, machine cost is segregated from overhead and reported as a separate element)

They are grouped further based on their functions as,

- 1. Production or works overheads

- 2. Administration overheads
- 3. Selling overheads
- 4. Distribution overheads

## ***Classification of costs***

Classification of cost means, the grouping of costs according to their common characteristics. The important ways of classification of costs are:

- By nature or element: materials, labor, expenses
- By functions: production, selling, distribution, administration, R&D, development,
- As direct and indirect
- By variability: fixed, variable, semi-variable
- By controllability: controllable, uncontrollable
- By normality: normal, abnormal

## ***Standard cost accounting***

In modern cost accounting, the concept of recording historical costs was taken further, by allocating the company's fixed costs over a given period of time to the items produced during that period, and recording the result as the total cost of production. This allowed the *full cost* of products that were not sold in the period they were produced to be recorded in inventory using a variety of complex accounting methods, which was consistent with the principles of GAAP (Generally Accepted Accounting Principles). It also essentially enabled managers to ignore the fixed costs, and look at the results of each period in relation to the "standard cost" for any given product.

For example: if the railway coach company normally produced 40 coaches per month, and the fixed costs were still \$1000/month, then each coach could be said to incur an overhead of \$25 ( $\$1000 / 40$ ). Adding this to the variable costs of \$300 per coach produced a full cost of \$325 per coach.

This method tended to slightly distort the resulting unit cost, but in mass-production industries that made one product line, and where the fixed costs were relatively low, the distortion was very minor.

For example: if the railway coach company made 100 coaches one month, then the unit cost would become \$310 per coach ( $\$300 + (\$1000 / 100)$ ). If the next month the company made 50 coaches, then the unit cost = \$320 per coach ( $\$300 + (\$1000 / 50)$ ), a relatively minor difference.

An important part of standard cost accounting is a variance analysis, which breaks down the variation between actual cost and standard costs into various components (volume variation, material cost variation, labor cost variation, etc.) so managers can understand

why costs were different from what was planned and take appropriate action to correct the situation.

## The development of throughput accounting

As business became more complex and began producing a greater variety of products, the use of cost accounting to make decisions to maximize profitability came under question. Management circles became increasingly aware of the Theory of Constraints in the 1980s, and began to understand that "every production process has a limiting factor" somewhere in the chain of production. As business management learned to identify the constraints, they increasingly adopted throughput accounting to manage them and "maximize the *throughput dollars*" (or other currency) from each unit of constrained resource.

For example: The railway coach company was offered a contract to make 15 open-topped streetcars each month, using a design that included ornate brass foundry work, but very little of the metalwork needed to produce a covered rail coach. The buyer offered to pay \$280 per streetcar. The company had a firm order for 40 rail coaches each month for \$350 per unit.

The company accountant determined that the cost of operating the foundry vs. the metalwork shop each month was as follows:

Overhead Cost by Department	Total Cost	Hours Available per month	Cost per hour
Foundry	\$ 7,300.00	160	\$45.63
Metal shop	\$ 3,300.00	160	\$20.63
Total	\$10,600.00	320	\$33.13

The company was at full capacity making 40 rail coaches each month. And since the foundry was expensive to operate, and purchasing brass as a raw material for the streetcars was expensive, the accountant determined that the company would lose money on any streetcars it built. He showed an analysis of the estimated product costs based on **standard cost accounting** and recommended that the company decline to build any streetcars.

### Standard Cost Accounting Analysis Streetcars Rail coach

Monthly Demand	15	40
Price	\$280	\$350
Foundry Time (hrs)	3.0	2.0
Metalwork Time (hrs)	1.5	4.0
Total Time	4.5	6.0
Foundry Cost	\$136.88	\$ 91.25
Metalwork Cost	\$ 30.94	\$ 82.50
Raw Material Cost	\$120.00	\$ 60.00

Total Cost	\$287.81	\$233.75
Profit per Unit	\$ (7.81)	\$116.25

However, the company's operations manager knew that recent investment in automated foundry equipment had created idle time for workers in that department. The constraint on production of the railcoaches was the metalwork shop. She made an analysis of profit and loss if the company took the contract using throughput accounting to determine the profitability of products by calculating "throughput" (revenue less variable cost) in the metal shop.

#### **Throughput Cost Accounting Analysis**

	Decline Contract	Take Contract
Coaches Produced	40	34
Streetcars Produced	0	15
Foundry Hours	80	113
Metal shop Hours	160	159
Coach Revenue	\$14,000	\$11,900
Streetcar Revenue	\$ 0	\$ 4,200
Coach Raw Material Cost	\$(2,400)	\$(2,040)
Streetcar Raw Material Cost	\$ 0	\$(1,800)
Throughput Value	\$11,600	\$12,260
Overhead Expense	\$(10,600)	\$(10,600)
Profit	\$1,000	\$1,660

After the presentations from the company accountant and the operations manager, the president understood that the metal shop capacity was limiting the company's profitability. The company could make only 40 rail coaches per month. But by taking the contract for the streetcars, the company could make nearly all the railway coaches ordered, and also meet all the demand for streetcars. The result would increase **throughput** in the metal shop from \$6.25 to \$10.38 per hour of available time, and increase profitability by 66 percent.

## **Throughput Accounting**

**Throughput Accounting** (TA) is a dynamic, integrated, principle-based, and comprehensive management accounting approach that provides managers with decision support information for enterprise optimization. TA is a relatively new management accounting approach based largely on the identification of factors that limit an organization from reaching its goal and is proposed by Eliyahu M. Goldratt as an alternative to cost accounting. As such, Throughput Accounting is neither cost accounting nor costing because it is cash focused and does not allocate all costs (variable and fixed expenses, including overheads) to products and services sold or provided by an enterprise. Considering the laws of variation, only costs that vary totally with units of output e.g. raw materials, are allocated to products and services which are deducted from

sales to determine Throughput. Throughput Accounting is a management accounting technique used as the performance measures in the Theory of Constraints (TOC). It is the business intelligence used for maximizing profits, however, unlike cost accounting that primarily focuses on 'cutting costs' and reducing expenses to make a profit, Throughput Accounting primarily focuses on generating more throughput. Conceptually, Throughput Accounting seeks to increase the velocity or speed at which throughput is generated by products and services with respect to an organization's constraint, whether the constraint is internal or external to the organization. Throughput Accounting is the only management accounting methodology that considers constraints as factors limiting the performance of organizations.

Management accounting is an organization's internal set of techniques and methods used to maximize shareholder wealth. Throughput Accounting is thus part of the management accountants' toolkit, ensuring efficiency where it matters as well as the overall effectiveness of the whole organization. It is an internal reporting tool. Outside or external parties to a business depend on accounting reports prepared by financial (public) accountants who apply Generally Accepted Accounting Principles (GAAP) issued by the Financial Accounting Standards Board (FASB) and enforced by the U.S. Securities and Exchange Commission (SEC) and other local and international regulatory agencies and bodies.

Throughput Accounting improves profit performance with better management decisions by using measurements that more closely reflect the effect of decisions on three critical monetary variables (throughput, investment (AKA inventory), and operating expense — defined below).

## ***History***

When cost accounting was developed in the 1890's, labor was the largest fraction of product cost. Workers often did not know how many hours they would work in a week when they reported on Monday morning because time-keeping systems were rudimentary. Cost accountants, therefore, concentrated on how efficiently managers used labor since it was their most important variable resource. Now, however, workers who come to work on Monday morning almost always work 40 hours or more; their cost is fixed rather than variable. However, today, many managers are still evaluated on their labor efficiencies, and many "downsizing," "rightsizing," and other labor reduction campaigns are based on them.

Goldratt argues that, under current conditions, labor efficiencies lead to decisions that harm rather than help organizations. Throughput Accounting, therefore, removes standard cost accounting's reliance on efficiencies in general, and labor efficiency in particular, from management practice. Many cost and financial accountants agree with Goldratt's critique, but they have not agreed on a replacement of their own and there is enormous inertia in the installed base of people trained to work with existing practices.

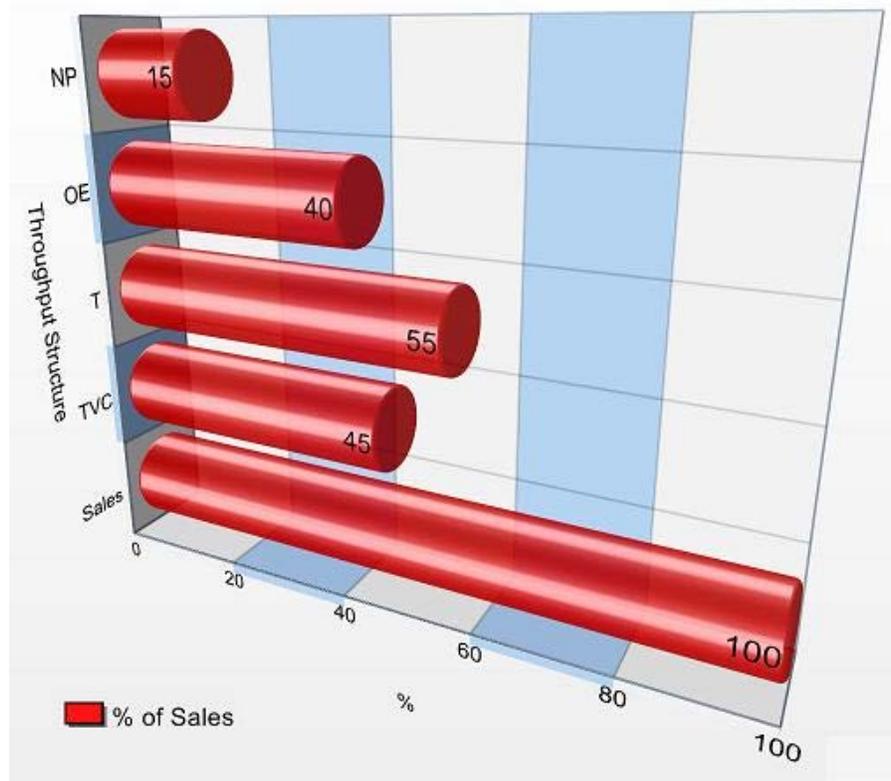
Constraints accounting, which is a development in the Throughput Accounting field, emphasizes the role of the constraint, (referred to as the Archimedian constraint) in decision making.

### ***The concepts of Throughput Accounting***

Goldratt's alternative begins with the idea that each organization has a goal and that better decisions increase its value. The goal for a profit maximizing firm is easily stated, to increase profit now and in the future. Throughput Accounting applies to not-for-profit organizations too, but they have to develop a goal that makes sense in their individual cases.

Throughput Accounting also pays particular attention to the concept of 'bottleneck' (referred to as *constraint* in the Theory of Constraints) in the manufacturing or servicing processes.

Throughput Accounting uses three measures of income and expense:



The chart illustrates a typical throughput structure of income (sales) and expenses (TVC and OE).

$T = \text{Sales} - \text{TVC}$  and  $NP = T - \text{OE}$ .

- **Throughput** (T) is the rate at which the system produces "goal units." When the goal units are money (in for-profit businesses), throughput is net sales (S) less totally variable cost (TVC), generally the cost of the raw materials ( $T = S - TVC$ ). Note that T only exists when there is a sale of the product or service. Producing materials that sit in a warehouse does not form part of throughput but rather investment. ("Throughput" is sometimes referred to as "throughput contribution" and has similarities to the concept of "contribution" in marginal costing which is sales revenues less "variable" costs - "variable" being defined according to the marginal costing philosophy.)

In the business management Theory of Constraints, **throughput** is the rate at which a system achieves its goal. Often this is monetary revenue and is in contrast to **output**, which is inventory that may be sold or stored in a warehouse. In this case **throughput** is measured by revenue received (or not) at the point of sale—exactly the right time. Output that becomes part of the inventory in a warehouse may mislead investors or others about the organizations condition by inflating the apparent value of its assets. The Theory of Constraints and throughput accounting explicitly avoid that trap.

Throughput can be best described as the rate at which a system generates its products / services per unit of time. The ultimate goal of a business is to keep their customer satisfied. Businesses often measure their throughput using a mathematical equation known as Little's Law, which is related to inventories and process time: time to fully process a single product.

Using Little's Law, one can calculate throughput with the equation:  
 $I = R * T$ ,

where  $I$  is the number of units contained within the system, Inventory;  $T$  is the time it takes for a unit to go through the process, Flow Time; and  $R$  is the rate at which the process is delivering throughput, Flow Rate or Throughput. If you solve for  $R$ , you will get:

$$R = I / T$$

- **Investment** (I) is the money tied up in the system. This is money associated with inventory, machinery, buildings, and other assets and liabilities. In earlier Theory of Constraints (TOC) documentation, the "I" was interchanged between "inventory" and "investment." The preferred term is now only "investment." Note that TOC recommends inventory be valued strictly on totally variable cost associated with creating the inventory, not with additional cost allocations from overhead.
- **Operating expense** (OE) is the money the system spends in generating "goal units." For physical products, OE is all expenses except the cost of the raw materials. OE includes maintenance, utilities, rent, taxes and payroll.

An **operating expense, operating expenditure, operational expense, operational expenditure** or **OPEX** is an ongoing cost for running a product, business, or system. Its counterpart, a capital expenditure (CAPEX), is the cost of developing or providing non-consumable parts for the product or system. For example, the purchase of a photocopier involves CAPEX, and the annual paper, toner, power and maintenance cost represents OPEX. For larger systems like businesses, OPEX may also include the cost of workers and facility expenses such as rent and utilities.

In business, an operating expense is a day-to-day expense such as sales and administration, or research & development, as opposed to production, costs, and pricing. In short, this is the money the business spends in order to turn inventory into throughput. Operating expenses also include depreciation of plants and machinery which are used in the production process.

On an income statement, "operating expenses" is the sum of a business's operating expenses for a period of time, such as a month or year.

In throughput accounting, the cost accounting aspect of the theory of constraints (TOC), operating expense is the money spent turning inventory into throughput. In TOC, operating expense is limited to costs that vary strictly with the quantity produced, like raw materials and purchased components. Everything else is a fixed cost, including labour (unless there is a regular and significant chance that workers will not work a full-time week when they report on its first day).

In a real estate context, operating expenses include costs associated with the operation and maintenance of an income-producing property. Operating expenses include:

- accounting expenses
- license fees
- maintenance and repairs, such as snow removal, trash removal, janitorial service, pest control, and lawn care
- advertising
- office expenses
- supplies
- attorney fees and legal fees
- utilities, such as telephone
- insurance
- property management, including a resident manager
- property taxes
- travel and vehicle expenses

**Travel expenses** are defined as those incurred in the event of travel required for professional purposes.

For this purpose, “travel” is defined as the simultaneous absence from the residence and from the regular place of employment. It is prompted by professional or company purposes and likely does not concern the traveller’s private life, or concerns it only to a small degree. Travel expenses include travel costs and fares, accommodation expenses, and so-called additional expenses for meals. For the self-employed (contractors and freelancers), the expenses constitute business expenses.

- leasing commissions
- salary and wages
- raw materials

Organizations that wish to increase their attainment of *The Goal* should therefore require managers to test proposed decisions against three questions. Will the proposed change:

1. Increase throughput? How?
2. Reduce investment (inventory) (money that cannot be used)? How?
3. Reduce operating expense? How?

The answers to these questions determine the effect of proposed changes on system wide measurements:

1. Net profit (NP) = throughput - operating expense = T-OE
2. Return on investment (ROI) = net profit / investment = NP/I
3. TA Productivity = throughput / operating expense = T/OE
4. Investment turns (IT) = throughput / investment = T/I

These relationships between financial ratios as illustrated by Goldratt are very similar to a set of relationships defined by DuPont and General Motors financial executive Donaldson Brown about 1920. Brown did not advocate changes in management accounting methods, but instead used the ratios to evaluate traditional financial accounting data.

Throughput Accounting is an important development in modern accounting that allows managers to understand the contribution of constrained resources to the overall profitability of the enterprise.

## **Relevance**

One of the most important aspects of Throughput Accounting is the relevance of the information it produces. Throughput Accounting reports what currently happens in business functions such as operations, distribution and marketing. It does not rely solely on GAAP's financial accounting reports that still need to be verified by external auditors and is thus relevant to current decisions made by management that affect the business now and in the future. Throughput Accounting is used in critical chain project management (CCPM), Drum Buffer Rope (DBR) - in businesses that are internally

constrained, Simplified Drum Buffer Rope (S-DBR) - in businesses that are externally constrained particularly where the lack of customer orders denotes a market constraint, in strategy, planning and tactics, etc.

### ***Activity-based costing***

Activity-based costing (ABC) is a system for assigning costs to products based on the activities they require. In this case, activities are those regular actions performed inside a company. "Talking with customer regarding invoice questions" is an example of an activity inside most companies.

Accountants assign 100% of each employee's time to the different activities performed inside a company (many will use surveys to have the workers themselves assign their time to the different activities). The accountant then can determine the total cost spent on each activity by summing up the percentage of each worker's salary spent on that activity.

A company can use the resulting activity cost data to determine where to focus their operational improvements. For example, a job-based manufacturer may find that a high percentage of its workers are spending their time trying to figure out a hastily written customer order. Via ABC, the accountants now have a currency amount pegged to the activity of "Researching Customer Work Order Specifications". Senior management can now decide how much focus or money to budget for resolving this process deficiency. Activity-based management includes (but is not restricted to) the use of activity-based costing to manage a business.

While ABC may be able to pinpoint the cost of each activity and resources into the ultimate product, the process could be tedious, costly and subject to errors.

As it is a tool for a more accurate way of allocating fixed costs into product, these fixed costs do not vary according to each month's production volume. For example, an elimination of one product would not eliminate the overhead or even direct labor cost assigned to it. ABC better identifies product costing in the long run, but may not be too helpful in day-to-day decision-making.

### ***Lean accounting***

Lean accounting has developed in recent years to provide the accounting, control, and measurement methods supporting lean manufacturing and other applications of lean thinking such as healthcare, construction, insurance, banking, education, government, and other industries.

There are two main thrusts for Lean Accounting. The first is the application of lean methods to the company's accounting, control, and measurement processes. This is not different from applying lean methods to any other processes. The objective is to eliminate waste, free up capacity, speed up the process, eliminate errors & defects, and make the process clear and understandable. The second (and more important) thrust of Lean

Accounting is to fundamentally change the accounting, control, and measurement processes so they motivate lean change & improvement, provide information that is suitable for control and decision-making, provide an understanding of customer value, correctly assess the financial impact of lean improvement, and are themselves simple, visual, and low-waste. Lean Accounting does not require the traditional management accounting methods like standard costing, activity-based costing, variance reporting, cost-plus pricing, complex transactional control systems, and untimely & confusing financial reports. These are replaced by:

- lean-focused performance measurements
- simple summary direct costing of the value streams
- decision-making and reporting using a *box score*
- financial reports that are timely and presented in "plain English" that everyone can understand
- radical simplification and elimination of transactional control systems by eliminating the need for them
- driving lean changes from a deep understanding of the value created for the customers
- eliminating traditional budgeting through monthly sales, operations, and financial planning processes (SOFP)
- value-based pricing
- correct understanding of the financial impact of lean change

As an organization becomes more mature with lean thinking and methods, they recognize that the combined methods of lean accounting in fact creates a lean management system (LMS) designed to provide the planning, the operational and financial reporting, and the motivation for change required to prosper the company's on-going lean transformation.

### ***Marginal costing***

This method is used particularly for short-term decision-making. Its principal tenets are:

- Revenue (per product) – variable costs (per product) = contribution (per product)
- Total contribution – total fixed costs = (total profit or total loss)

Thus, it does not attempt to allocate fixed costs in an arbitrary manner to different products. The short-term objective is to maximize contribution per unit. If constraints exist on resources, then Managerial Accounting dictates that marginal cost analysis be employed to maximize contribution per unit of the constrained resource.