

Introduction

Introduction. Estimating. Importance of Estimating. Aims of Estimating. Functions of Estimating. Costing. Importance of Costing. Aims of Costing. Difference between Estimating and Costing. Importance of preparing Realistic Estimates. Estimating Procedure. Divisions of Estimating Procedure. Rate Fixing. Estimating Department Cost Estimators, Types of Estimates, Constituents of a Job Estimate.

1.1. Introduction

In this rapid developing and competitive age, it is necessary for a factory that the advance information about the cost of a job or a manufacturing order to be put through should be available before taking up the actual production. Estimating which is pre-determination of cost is mainly concerned with the factory owner. It helps him to decide about the manufacturing, and selling prices.

1.2. Estimating

Estimating is the calculation of the costs which are expected to be incurred in manufacturing a component in advance before the component is actually manufactured. The expected cost of material, labour and overheads are computed before the actual production work is undertaken. It is a highly technical job and requires knowledge about factory methods and operation times etc.

1.3. Importance of Estimating

Estimating is of great importance to a concern because it enables the factory owner to decide about the manufacturing and selling policies. Estimates are the basis on which any concern fills up tenders or starts production work after ascertaining that the manufacture of any product will be profitable business. Over-estimating and under-estimating both are dangerous for a concern and may put the concern into great trouble. It is obvious that too high estimates will not get jobs to the firm by quoting higher rates according to over-estimate whereas under-estimating will put the owner to a loss and will lead the concern to utter failure. So estimation should be carried out accurately. The persons preparing estimates should be highly qualified and experienced. They should be chosen from shops or should be first trained in all the shop methods and their estimates preparation.

1.4. Aims of Estimating

1. The main aim of estimating is to enable the factory owner to decide about the manufacturing and selling policies. For example, a factory wants to start the manufacturing of bicycles. On studying the market, the concern finds that the market price of a bicycle can be Rs. 525 on the maximum. Now estimates are prepared before starting the actual manufacture work. Suppose estimates show that the particular type of bicycle can be manufactured within the limit of Rs. 525 then it will give an idea to the concern that they should start manufacturing the bicycles and can earn profits. If the estimated value of the bicycle exceeds Rs 525 then it will be clear that by manufacturing the bicycles heavy loss will occur to the concern. Thus estimating gives an indication of the economic soundness of the project.

2. It helps in improving the designs which may reduce the cost of production.

3. It helps in deciding about the expenses in advance so that the actual incurred expenses can be compared and checked in order to establish a standard of work.

4. Estimating helps in deciding whether the particular product or a part of it should be either purchased from outside or should be manufactured in the concern itself so that it may be economical to the concern. Thus estimates help in taking such decisions.

5. Estimates help in providing the basis of price setting. Market price of the article is fixed with the help of estimates when there are no established data.

1.5. Functions of Estimating

The main functions of estimating are :

1. Estimates are required to deal with an enquiry prior to acceptance of a new contract i.e. to submit tenders.

2. Estimates are required for furnishing a basis for the cost control of manufacture.

3. Estimates are required for fixing the selling price of a product.

The value of an estimate lies in accuracy which is the outcome of careful preparation. As far as possible, the items which are used to prepare an estimate should be based on known facts.

To estimate cost of the products, the estimating department follows a set procedure. Starting with material cost, the labour cost and then other charges like overhead charges etc. it sums up all of them finally. After the estimates have been prepared, this department hands over the estimates to the sales department for inviting quotations or tenders.

1.6. Costing

Costing may be defined as a system of accounts which systematically and accurately records every expenditure in order to determine the cost of a product after knowing the different expenses incurred in various departments. The different probable elements of cost to be recorded are material, labour and other charges which jointly complete the cost of the product.

1.7. Importance of Costing

Costing is an essential work for the efficient management of any enterprise and gives most useful information for the preparation of financial accounts. It enables a business not only to find out what various jobs or processes have costed but also what they should have costed. It indicates where losses and wastage are occurring before the work is finished, so that immediate action may be taken to avoid such loss or waste. Also all expenditures are localised and thereby controlled in the light of information provided by the cost records.

Costing shows which type of output will yield a profit and which type does not. Thus it makes up the deficiency. A planned system of cost accounting will point out the weak spots and thus enable the administration to have a clear picture and show up immediately the essential facts in such a way that the responsible persons can put forth their efforts to bring improvements and reduce costs.

Costing has proved so beneficial that now-a-days almost every concern has adopted the cost accounting system.

Aims of Costing

The main aims and objects of cost accounting are :

1. **Advance cost determination.** To determine the cost of each article and operation in advance.
2. **Budget preparation.** To help the organisation in preparing the estimates and its budget.
3. **Economy in production.** To achieve more economies in the production system.
4. **Selling price.** To provide information to the management to enable them to ascertain the selling price of the product.
5. **Output targets.** To give information about the increase or decrease of the production of an article so that the concern can earn more profits.
6. **Reduction in wastages.** To help in detecting undesirable wastage and expenditure and thus to incorporate corrective measures to bring it down to a minimum.
7. **Comparison with estimate.** To provide necessary data for comparison between the actual cost and the estimated cost of a component.

8. **Profit and loss.** To locate the cause of increase or decrease in profits of an enterprise.

9. **Selling price change.** To supply information for change in selling price due to change in material cost or labour cost.

10. **Discount provision.** To decide about the discount allowed on catalogue price.

11. **Legal provisions.** To meet certain legal and govt. regulations, cost data is necessary.

12. **Pricing of new product.** To formulate the policies and plans towards the pricing of a new product.

1.9. Comparison between Estimating and Costing

Following table gives a comparison between estimating and costing :

<i>Point of Comparison</i> (1)	<i>Estimating</i> (2)	<i>Costing/Cost Accounting</i> (3)
1. Type of cost	It gives an expected cost of the product based on calculations by means of standard formulae or certain established rules	1. It gives actual cost of the product based on the data collected from the different expenditures actually done for a product.
2. Duration of process	It is generally carried out before actual production of a product. Due to certain unforeseen or unexpected expenses coming to light at a later stage, estimate may be modified or revised.	2. It usually starts with the issue of order for production of a product and ends after the product is dispatched on sale. For after sale commitments like free repair or replacement, the process continues up to the expiry period of guarantee or warranty because the overhead expenses incurred in the above case will be included in the production cost.
3. Nature or quality of the personnel	A qualified technical person or engineer having a thorough	3. It can be done by a person qualified for accounts instead of

(1)	(2)	(3)
4. Main objective:	<p>knowledge of the drawings and manufacturing process is required. Thus it is a technical work instead of clerical one.</p> <p>(i) To set standard for comparison with actual cost. (ii) To help in setting up market price for a proposed product to be manufactured. (iii) To decide whether it is economical to buy or manufacture a product under prevailing market conditions. To facilitate in filling up of tenders or quotations of products for supply. After receipt of supply order from the buyers the production will be started.</p>	<p>a technical person. The cost accountant develops his knowledge of technical terms and processes while working. Thus this work instead of being of technical nature is more of a clerical nature.</p> <p>4. (i) To help in comparison of cost with estimates to know if they are over, under or realistic as well as to know where the actual costs involve unnecessary wastage of men, materials, machines and money. (ii) To facilitate the budget preparation as well as to provide cost data for future estimates of new products of their pricing plans. (iii) To facilitate in deciding output targets from time to time. (iv) To facilitate in meeting certain legal obligations or regulations.</p>

1.10. Importance of Preparing Estimates

In an enterprise it is very important that the estimates prepared should be realistic *i.e.* the estimates arrived at should be as accurate as possible for cost of product. The cost of a product which proves to be almost equal to the actual cost of the product later on is known as realistic estimate. Because it is this estimated cost which is used for filling tenders or decides to start production so that the enterprise can compete in the market and can earn profits. *In over estimating* the chances are that the enterprise

loses the orders to other competitors because over estimating will give a wrong information to the enterprise and on the basis of these over estimates the prices fixed for the product may be high and the rates quoted in the tenders will be high. So in this way the firm will not receive any job orders. When the same product is sold in the market, as the customer would like to purchase the product at the lowest cost, then again the same very product will lose its market. And not only this but in the eyes of customers the enterprise acquire reputation of being expensive and consequently that very firm is not invited to quote tenders in future.

In case of *under estimating*, the firm will run in loss. Because on the basis of under estimating the concern may fix the price so low that it may be even less than the actual expenses incurred on the product. Consequently orders placed can only be executed at a loss to the enterprise. When there are losses, the firm can not stand in the market and ultimately it comes to an end.

Thus we find that over estimating and under estimating both are dangerous because both will ultimately lead the enterprise to failure. Hence, it is necessary that great care should be taken while preparing estimates. The estimates prepared should be taken into account carefully while preparing costs. The estimates prepared should be realistic one and there arise the need for realistic estimates.

1.11. Estimating Procedure

The estimating department is generally attached with the planning department and is controlled by Production Manager. The total procedure is considered to have three stages :

- (i) Fixing of design, accuracy and finish.
- (ii) Proper working of estimating department.
- (iii) Obtaining a delivery promise from the progress department in view of existing load on the shop.

The planning department sets down the requirements and specifications, types and quantities of materials, makes out the drawings, lays down the methods and sequence of operations, machines to be used, allowed times and rates of labour etc. Main items to be estimated in order of sequence are as follow :

1. **Price list.** To prepare the list of all the components of the product.

2. **Buy or manufacture.** To decide which components should be made in the factory itself and which component should be procured from the market.

3. **Weight of material.** Determination of the weight of the materials with various allowances.

4. **Material cost.** Determination of the material cost either at market price or at a forecast price.

5. **Outside purchases.** Determination of prices of outside purchases.
6. **Machinery or processing data.** Determination of cutting speeds and feeds for the materials selected and machining times for all operations.
7. **Labour cost.** Determination of labour cost of each operation from performance times and wage rates, including manufacturing and assembly and testing.
8. **Cost of tools and equipment.** Determination of cost of necessary special tools or equipment etc.
9. **Prime cost.** Determination of prime cost by adding labour cost into material cost.
10. **Factory overheads.** Determination of factory on cost and general overhead charges.
11. **Package and delivery charges.** Determination of package and delivery charges and also insurance charges if necessary.
12. **Total cost.** To calculate the total cost.
13. **Standard profit and sale price.** To decide standard profit and adding this into total cost so as to fix the sale price.
14. **Discount to be allowed.** To decide discount allowed to the distributors and adding this into sale price to get market price or catalogue price.
15. **Time of delivery.** Determination of time of delivery in collaboration with the progress department.
16. **Approval of management.** When the estimate is complete, it is entered into the 'Estimate Form' and submitted to the directors and sales department for dispatch of the quotation or tender.

An estimate form is shown below :

Estimate Form

Description..... Date.....
 Quantity..... Enquiry No
 Drawing No..... Customer

<i>Item</i>	<i>Total Cost</i>	<i>Cost of each item</i>
1. Material (.....)	No. of comp batch o	

2. Operation	Labour	Overhead		
(a)				
(b)				
(c)				
Total : (Factory cost)				
3. Office and administrative Expenses				
Total : (Induction Cost)				
4. Selling Expenses				
(a) Packing and Carriage				
(b) Advertisement and Publicity				
(c) Other Allied Expenses				
Total : (Ultimate cost)				
5. Profit				
Total : (Selling Price)				

Delivery Date :

Estimated by.....

1.12. Division of Estimating Procedure

The above said procedure for simplicity can be divided into following major groups :

1. Material Cost.
2. Direct Labour Cost.
3. Direct Expenses.
4. Various Overhead Expenses.

1. Material cost. Material estimation is the most important factor in cost estimation of a component. In calculating material cost both direct and indirect materials should be taken into account. The estimation of materials for a job or product includes the calculation of quantities to be provided including allowances for scrap and wastage in cutting, punching, turning etc. and for spoilage in processing. After calculating weights or volumes of materials required, the cost of material is estimated from rate of material. The estimator should have full information about the availability

of the material and knowledge of the future market prices of the materials to be used.

2. Labour cost. Next step is the estimation of labour cost. For this purpose the estimator must have the knowledge of the operations which will be performed, tools to be used, machine that will be employed and the departments in which the product is to be manufactured. He must also know the wage rate paid to the worker for different operations. The labour cost is calculated by multiplying hourly rate of the worker by total time spent in processing the job. The total time spent includes the set up time, tear down time, operation time and other miscellaneous allowances such as personal, fatigue, tool sharpening and changing, checking etc. All these details have been discussed in Chapter 2.

3. Direct expenses. It includes any expenditure other than direct material and direct labour directly incurred on a specific cost unit such as :

(i) Hire charges of special tools or equipment for a particular production order or product.

(ii) Cost of special layout, designs or drawing.

(iii) Cost of jigs and fixtures/pattern specially meant for the particular job only.

4. Various overhead expenses. All expenses other than direct material, direct labour and other direct expenses are called overhead expenses. These include the expenses such as :

(i) *Indirect material cost.* These expenses include the cost of oils, greases, coolants, cotton waste etc.

(ii) *Industrial labour cost.* These expenses include the salaries of supervisors, foremen, draftsmen, designers, chowkidars, store-keepers etc.

(iii) Repairs and maintenance expenses of machines and tools.

(iv) Insurance premium on building and plants.

(v) Expenses of power such as steam, gas, electricity etc.

(vi) Depreciation on building, furniture and equipment.

(vii) *Administrative overhead or expenses.* These expenses include the salaries of high officials, persons working in general office, telephone, telegraph, stationery etc.

(viii) *Selling expenses.* These expenses include the salaries of salesman, commission to salesman, advertising, publicity expenditure

(ix) Light and power expenses.

(x) Packing expenses.

(xi) Supervisory staff expenses

Rate Fixing. It is the process of carefully ascertaining the wages of workers for a definite work. For this purpose the various allowances like Unavoidable Delays, Personal, Fatigue, Tool sharpen-

ing, Cutter changes and Checking allowances are taken into consideration. It is an essential work in the modern changing set-up where numerous systems of wage payments are prevalent. This process is mainly based on a careful time study of a particular operation in a particular working environment. For this purpose systematic rate fixing tables or diagrams are prepared by the time study department after careful survey and time study of each operation. The tables help to determine the handling time and machining time quickly. Finally we can find out the piece time of each operation and fix up the rates to be given to the worker.

Costing and rate fixing. Costing is the technique and process of ascertaining costs of the products. It is defined as a system of accounts to determine the cost of manufacturing a product by systematically and accurately recording the expenditure.

It enables a concern not only to ascertain what various products or processes have costs but also what they would have costed. It helps to find out the stage of manufacturing and position of the work where losses and wastages are occurring before the work is finished. This would avoid greater losses and wastages of the material and products by taking immediate action.

It is a necessity for efficient management and performance of an enterprise to secure business stability. It gives most useful information for making the financial accounts to examine the financial position of the enterprise. By comparison of various. Cost accounts of various products are can ascertain which type of output will yield a profit or a loss.

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Objects of costing. The various aims and objects of costing or cost accounting are as under :

- (a) It helps to determine the expenses incurred in manufacturing of a product in order to fix up its selling price.
- differ (b) It helps to ascertain departmental efficiency. job must be

(c) It helps to find out the weak spots in the production line so that losses and wastages could be checked up before final product finished.

(d) It helps to ascertain whether it is more economical to manufacture a part than to procure it from outside.

(e) It helps to control the expenses by proper comparison of the actual and estimated costs.

(f) It helps to quote the most reasonable price for availing contracts from the market.

1.13. Estimating Department. The estimating department is one of the important departments of a production concern. In small concerns, it is generally attached with the planning department. It works under the control and supervision of the Production Manager. Due to its varied types of functions and immense importance, this department should be a independent unit. Its independent existence provide an opportunity to work independently. It can make comparative study of the various aspects of the estimate cost and actual cost of the product without influence of other department.

The information required for making various estimates is provided by planning department and the design office.

The estimating department is generally divides into various sections each dealing with one product of the firm's manufacturing unit.

The various functions of the estimating department can be enumerated as under :—

(a) To estimate the material cost with due consideration to the various allowances provided for the manufacturing as well as finishing processes.

(b) To estimate the outside (market) purchases.

(c) To estimate the man-hours required for a job.

(d) To estimate the labour cost from (c).

(e) To estimate the cost of tools and auxiliary equipment required in the manufacture of the various products.

(f) To estimate the factory on-cost.

(g) To estimate the various overheads and other indirect expenses.

(h) To estimate the total time required for delivery of a product.

(i) To estimate the total cost and the selling price after adding the selling cost and the profit to the factory cost of a product.

(j) To estimate packing, forwarding and transportation charges.

(k) To help the sales department for filling up the tenders and quotations required by the customers.

1.14. Cost Estimators and their Qualifications

The various types of estimates dealing with material cost, process times and tools are carried out by trained personnels known as estimators. The main duty of an estimator is to make estimates for the manufacture of a product at the lowest possible cost. The estimators should be highly trained and experienced persons. The various qualities which an estimator should possess can be enumerated as under :

1. The estimator must have complete knowledge of the plant and the capacity of the various machines in the factory.
2. He must have thorough knowledge of various properties and the quantities of the materials required for manufacturing a product. He must be well conversant with the labour, types of operations, tools and machine requirements.
3. He must have good knowledge of cost accounting in order to read cost analysis sheets and cost statements. This would also help him to estimate the various over head charges.
4. He must have proper experience and practical training of the production work being carried out in the factory.
5. He must be well versed with various types of tools, jigs and fixtures, lubricant. He must also know the latest investigation and research being carried out in the field of product design and manufacture. This would help him to forecast the various factors of the cost intelligently and reasonably.
6. He must have full information about the market price of the various types of materials and machine tools used for the manufacture of a particular product.
7. He must be upto date with the information about the availability and the rates of the skilled and un-skilled labour.
8. He must be systematic in his work. His method of maintaining records should be systematic and rapid in order to make the informations readily available.

1.15. Types of Estimates

The various type of estimates are ultimately concerned with the cost of the product. The various estimates can be classified under the following groups :—

- (1) Estimates required to determine whether or not to accept a contract for a new work.
- (2) Estimates for fixing the sale price of a product.
- (3) Estimates for setting various standards for the purpose of comparison.
- (4) Estimates to forecast the progress of production and cost of the order to keep control of any variation of the material costs.

1.16. Constituents of a Job Estimate

The various constituents of estimating the cost of a product may be sub-divided as under :—

- (a) Design time
- (b) Drafting time
- (c) Method studies, time studies, planning and production time
- (d) Design, procurement and manufacture of special patterns, cores, core boxes, flasks, tools, dies, jigs and fixtures etc.
- (e) Experimental work
- (f) Materials
- (g) Labour
- (h) Overheads.

Design Time

The time required for designing a product is estimated either on the basis of similar products previously manufactured or on the judgement of the designer. This time is generally considerable in quantity. It should be taken as the important factor in estimating the cost of the product. The standard man hour rate should be used for calculating the cost of the designing time.

Drafting time

The next step after the design of the component is the preparation of its drawing to be used by the worker during production. An experienced draughtsman is required to prepare them. He also estimates the time and cost of drafting for a new product. The probable time for drafting and the cost of drafting are estimated on the basis of drawings of similar previous components, and the standard man hour rate.

Method studies, time studies, planning and production time

Before the component is actually put into production, the material situation and purchase requisition are investigated for different materials required for the product. Now the job must be planned as regards the various processes and time to be taken by each. In case of routine or repetitive jobs, the planning would be available in the records. This may be checked up and the necessary modifications required may be made. In case of new jobs its method studies and time studies should be carried out. The jobs should be broken down into its elements. For each part, sub-assembly and complete assembly, the type and sequence of operation should be studied and planned. Times for various operation and the schedules for doing the work should also be set. This time setting effect both the delivery date as well as the cost. In case of a special order requiring considerable time, a special calculation should be made by making some allowance.

Design, procurement and manufacture of special patterns, core boxes etc.

The cost of special patterns, core boxes, tools, jigs, fixtures, gauges, consumable cutting tools etc. required for manufacturing a product should be considered for estimation. This cost should be added to the estimated cost. This cost is generally estimated in close coordination with Tool Department.

Experimental Work

Certain types of experimental work has to be carried out in case of new type of products or inventions. The main purpose of experimental work is to find the quickest, easiest and cheapest way of manufacture of the product. When estimating the cost of the new or undeveloped type of products the estimator should be very careful to make proper allowances to the experimental work.

The main points to be considered for this purpose are cost of the equipment, labour, material, depreciation, overheads, repair and maintenance, special buildings if required, supervision and the time required to conduct the experimental work.

Materials

It is the most important factor in cost estimation of any component. While computing the cost of material both the direct and indirect material should be taken into account. For this purpose the calculations of the quantities of raw materials, allowances for scrap, spoilage and wastage during cutting, punching, turning etc. should be made. Now the cost of the material is estimated from the rate of the material.

Labour

For estimating the labour cost, the estimator is to go into greater details. He must be in knowledge of the various operations to be performed, tool to be used, machines employed and the departments in which the product is to be manufactured. He must also be conversant with the wage rate for different operations. For times calculation he must consider "The set up time; the operation time including the handling and machining time; the tear down time and various allowance likes personal, fatigue, tool sharpening or changing, checking, etc.

The set up time consists of the time required to prepare for operation. This time includes the time required to get the tools, gauges etc. issued from the stores, time to study the blue print, to install the necessary tools in the machine, time to make adjustment in the machine as well as the cutter.

The operation time includes the time required to perform the various elements of an operation. It is also known as "floor to floor

time³ Its two main elements are the handling element and the machining element. The handling element includes the various movements which the operator is to make for preparing the jobs for machining and its disposition after machining. The machining element time includes all the times which the tool takes when it touches the job to the time when it leaves the job after the operation.

The "Tear down time" is the time taken to unload the machine i.e. to remove the job, tools and other equipment from the machine after the completion of the operation. In other words, it is the time required to bring the machine to such a position so that no further removal of tools is necessary for a new operation. This time is generally 10 to 15 minutes of most of the average machines.

In order to estimate the labour cost to a greater degree of accuracy certain types of allowances are added to the above time calculations. These allowances are the personal allowance, fatigue allowance, tool sharpening and cutter change allowance, checking allowance and certain other allowances. The other allowances are required for activities like periodic cleaning and oiling of machines, getting material, delivering the parts, filling coolant reservoirs, disposing off scraps and surplus materials etc.

Exercises

1. Define and differentiate between Estimating and Costing.
2. Why costing is essential to industrial control ?
3. What do you understand by a realistic estimate ? Explain its importance in production.

(Haryana Board 1975 N, 1977 M, May 1982)

4. What shall be the effects of the following on an enterprise,
 - (i) Over-estimate.
 - (ii) Under-estimate.
5. Give the objectives of costing.
6. Differentiate between estimating and costing.
7. Describe the estimating procedure. What are the qualities of good estimator ?

(B.S.T. May 1982)