

# Construction project cost estimation factors



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Construction project estimations are priced using a bill of quantities this is a detailed description of the items needed to finish the product and their costs.

The first and foremost purpose of estimating is basically to set a budget for contract work. This budget is to be kept all the way through the project and is a guess of what the project on a whole will cost it should not be breached or the project is considered a failure and usually results in a loss of money.

Another reason that an estimate is given is so that the contractor can obtain competitive prices from a range of companies to do the work that is needed say for instance if one company gave an estimate way lower than another competing company then obviously the contractor is going to pick the company with the lowest estimate (however the standard of materials and work comes into this also); this is how negotiations work. An estimate is given so that the company or contractor can see weather a profit can be made from the job and in construction profit is everything. If you are not going to make a profit on the job in hand there is no point taking it on.

In order to prepare a detailed estimate the estimator must have with him the following data:

1. Plans, sections and other relevant details of the work.
2. Specifications indicating the exact nature and class of materials to be used.
3. The rates at which the different items of work are carried out.

To enable an estimator to take out the quantities accurately, the drawings must themselves be clear, true to the fact and scale, complete, and fully

dimensioned. The estimator has also to bear in mind certain principles of taking out quantities.

When creating the estimate the estimator must separate the costs into different sections. There are preliminary costs, net costs and gross costs

### **Preliminary Cost**

The preliminary part of a bill of quantities is the section that provides a description of the project, the contractor's general facilities and setup and running costs. If work is disrupted for reasons out of the contractor's control, recurring costs are often used to calculate compensation for the extension on the contract period.

Plant, Tools and Vehicles are included in the preliminary stage of the bill of quantities.

The contractor will include the cost of buying or maintaining machinery, tools and vehicles in the preliminary section of an estimate or a bill of quantities. Also the cost of erecting, inspecting and maintaining scaffolding for a project is included in the preliminaries section. The cost will always depend on the surface area of the structure, the length of time the scaffolding is erect and the type of building that is being built.

Part of the assessment of a contractor's site costs will include the non-productive staff required to administer a site. This generally will include a site manager, an engineer, a store man, a safety officer and a general foreman.

Site Services The preliminaries of a construction project include the costs of installing site toilets, changing rooms, offices, water and electricity, temporary roads and the installation of site security. Within a company gross profit is very important because it shows how efficiently management uses labour and supplies in the production process. More specifically, it can be used to calculate gross profit margin. If we as a company are not making a gross profit then basically we don't have a company.

This magnifies why an estimate is important because we know roughly how much we are going to make when we do a project. Therefore we must know how much we are going to spend so we can look at the correlation of the two figures and see whether the project is worth doing.

### **Net Costs**

The net cost is the cost of all of the basic things you need on site to complete the job in hand. This includes labour; the wages for all of the staff and the facilities they use including food, shelter and first aid. Also all of the equipment they use. The cost of plant material also ties in with the net cost but this will all depend on the type of job you are doing; say you are building a high rise building with several floors then a large crane will be needed this obviously costs a lot of money to hire out by the hour meaning that a large sum will be added onto the estimate in comparison to building a smaller building that will need smaller less expensive plant. Materials also come into the estimation of the net cost. The materials need to be well thought out before the project begins. They must be effective for their cause and their cost. When doing an estimation the estimator must find competitive rates for

materials that are to the buyers specification. The cost of these will all be added to the estimation.

### **Gross Profit**

The definition of gross profit is: Calculated as sales minus all costs directly related to those sales. These costs can include manufacturing expenses, raw materials, labour, selling, marketing and other expenses.

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Overheads are also included into the estimation. These are costs that cannot be controlled such as water gas and electric bills. These are hard to calculate as we never know how much there going to cost. Rent is also a good example.

### **Single rate estimation**

This method of estimation is used usually by national bodies such as schools and hostpitals for measuring and estimating the cost of large floor areas. It is a usefull way of estimation when a quick cost range is needed in the early stages of design. However it is very difficult to change costs to fit different <https://assignbuster.com/construction-project-cost-estimation-factors/>

projects in different locations. So say you know it costs £1000 to floor 1 room of a hotel and you have a budget of £50000 then you know you can build 50 rooms that are all the same. Also when you have a set design for these types of buildings such as Holiday Inns do you know it will always be the same where ever you are

Other types of buildings that this type of estimating is useful for are factory units, hotels, hostels, houses that are all the same design and retail buildings.

The floor area method is given in m<sup>2</sup> the reason why this method is so popular is because of how simple it is. Plus most contractors know the way in which it works and are very used to the idea. It takes previous buildings that have been designed that are similar to give designers and builders a guideline on how to construct other buildings that are the same.

P4

Identify and explain those factors that affect the percentage profit margins, those that affect the output of labour and those that affect the hourly/idle rates for a variety of plant items.

### **Labour Rates**

There are calculations that have to be made when undergoing a project to establish a rate that the estimator can use to price the tender works which recovers all the costs involved in employing labour directly.

The reason this is done is if you had employed a worker on site for £12. 00 an hour is that all you will be paying him, obviously not; there are more

things that need to be included and taken into account when calculating that costs of labour.

The basic rate of pay has to be agreed with both company and worker; this includes any holiday pay or sick pay that will be taken due to entitlement. Workers will still be paid for these days. Weather can restrict when workers can do the work meaning they may not get paid for some hours of the day or even the whole day. Also the employer's national insurance contribution needs to be made as well as payments to the CITB (construction Industry Training Board). And, finally any bonuses that are given to the worker as extra incentives.

To calculate the cost of labour per hour we must take all of the above into consideration however, one more piece of information is required, this is the output rates for labour. How fast can a brick layer lay bricks? If your paying a man by the hour, how long will it take for him to finish the job. The idea behind this calculation is to really see if it's worth hiring in to do the job because obviously some workers are better than others. If you can establish the the output rate of labour, then you can calculate the cost of labour per unit of brickwork(for example). This can be applied to the tender prices. Output rates can be estimated in one of two ways. Carrying out work studies where bricklayers are timed to see how many bricks they can lay in an hour. Or using output tables from work done in the past can provide information on how long work took or on unit output rates.

## **Plant Expenses**

Plant in construction can be very expensive to hire and own and even operate. It is the estimator's job to be able to give a guide on how much it will cost for plant on any specific job. There are two ways of providing plant for construction sites. These are if the company decide to purchase the plant (this means they must operate and service it) or hire in the plant externally or internally.

Operating costs are those that are time related. If the plant was owned by a company the calculation and estimation of how much the operating costs would be would include the amount of fuel used. This would have to be done using a consumption rate of the plant. Also any repairs on punctures etc. These will occur rarely and at random and are added in to recover costs. Also operating costs must be considered. The umber of hours that it is operating will obviously cost more in energy and make for more breakages.

When hiring plant there more aspects required to take a note of there are deliver costs to think about. If your site is in the city it may be hard to get it to your site so alternative methods of transport are used but usually low loaders and tractors are used nevertheless all of these methods cost money. Erection costs are also something to think about, if it is a crane that you need then this is going to take time to erect, and time equals money not to mention the labour involved. Also when everything is finished removal costs come into place and these need to be noted and change the percentage profit in the long run



The worst thing that can happen to a site manager is when he has expensive plant lying around and not doing anything; this wastes a lot of money, mainly through rental costs. The rate of rental costs per hour is very expensive as we know. The unit rate of calculation for an item of plant will depend on a number of things. The ground conditions are important, whether there are trained operators. If not then hiring someone new or investing in training is needed (training would be needed for at least 2 people to account for the absent). The dimensions of the height and reach of the plant material is also accounted for. The higher and longer the plant is the more it costs for example a crane costs more than a small digger. Finally the reliability plays an important role in how much plant costs. If you are hiring or buying brand new plant machinery then its obviously going to cost more. All of these things take off and put on percentage to the overall percentage profit.

### **M3**

#### **Overheads and On Costs**

Overhead is business term that refers to fixed costs that a business incurs so that production is continued. Overheads can be cut if limits to production are made, or if production is halted completely, although some overheads are incurred whether there is and production or not. Overhead expenses are all costs on the income statement except for direct labor, direct materials & direct expenses. Overhead expenses include accounting fees, advertising, depreciation, insurance, interest, legal fees, rent, repairs, supplies, taxes, telephone bills, travel and utilities costs.

In construction the overheads of a company are the costs that must be met in order to be able to run the head office. These are things such as;

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departmental costs (buying the department) and insurances, also paying for company cars and basic IT equipment. They are basically costs you can't control such as wages, electricity, gas or office rent, usually you will have to recover them because they include admin. Most medium sized construction organisations recover the cost of these each year spread over the turnover of the project; this can be added as a percentage addition but may vary according to your turnover.

Just the same as any other aspect of construction work this has to be added into the estimation at the start of a job and must be met from somewhere. So a percentage is used to signify the cost of these necessities. The calculation involved takes the total value of the company's overheads per year and then the turnover and divide them two totals and finally times the number by 100%. This will give us the percentage to add to tender. This percentage will always be applied to future estimates unless the turnover drops.

There are a few other ways that the overheads can be set up so that the value is always known. By not including them, but using an increased profit margin to cover their costs will reconcile the overheads. But, for larger and more well-known companies working on larger projects we can move the head office into small cabins that are positioned on the site this allows us to recover the costs of overheads through the preliminaries.

The turnover that comes from a company will rise and fall from year to year. It goes without saying that the risks you take and the work efficiency of your company will change all the time. No year will ever be the same as the last

one; it can be similar in terms of jobs and projects and contract pricing but will usually never be the same. Risks that we take are a massive factor to the turnover. Some risks are worth it and some go wrong, that's the risk we take to get more money. As a leader of a company we have to make the right decisions when risking and always be level headed and think everything through so that in the end we make money. Work efficiency also plays a massive part in annual turnovers. Being efficient can save money and make more of a difference to your profit margins than you may think. Lastly when pricing is competitive with in the industry this takes affect. As a company you may need to lower your prices to be able to sign a deal. If you don't then you won't get a deal and you wont get work done, meaning you wont make money. When the turnover of a company drops, you loose not only profit but you loose money on overheads as well this is because the turnover will drop with proportion with the percentage. However, on the other hand if the turnover rises this can create money to compensate for overheads as mentioned earlier.

In the preliminaries there are fixed and time related changes that must be considered. In SMM7 we see that these two types of charges are identified separately. A fixed charge is the cost of the work that is independent on duration and a time related charge is the cost that is dependant on others over duration.