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RESEARCH ARTICLE

**AN ANALYTICAL STUDY ON OVERHEAD COSTING AND ABSORPTION
COSTING IN MANUFACTURING COMPANIES**

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ABSTRACT

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In the world of manufacturing as competition becomes more intense and customers demand more services-it is important that management not only control its overhead but also understand how it is assigned to products and ultimately reported on the company's financial statements. Absorption costing is often contrasted with variable costing or direct costing. Under variable or direct costing, the fixed manufacturing overhead costs are not allocated or assigned to (not absorbed by) the products manufactured. Variable costing is often useful for management's decision-making. However, absorption costing is required for external financial reporting and for income tax reporting. Variable costing uses fixed overhead as a lump sum, rather than a per-unit, expense. Under this method, include all the variable costs such as supplies, raw materials and shipping. And add the full cost of fixed overhead for the period and do not figure these expenses on a per-unit basis. Instead of subtract them from the revenue figure as a lump-sum expense. In managerial accounting, a cost added on to the direct costs of production in order to more accurately assess the profitability of each product. Overhead costs are all costs that are not directly related to the production of the good to be sold. These include administrative salaries, the costs of the building or machinery, commissions to salespeople, and many other items. To allocate these costs, an overhead rate is applied that spreads the overhead costs around depending on how much resources a product or activity used. For example, overhead costs may be applied at a set rate based on the number of machine hours required for the product. In more complicated cases, a combination of several cost drivers may be used to approximate overhead costs.

Introduction

Manufacturing overhead (also referred to as factory overhead, factory burden and manufacturing support costs) refers to indirect factory-related costs that are incurred when a product is manufactured. Along with costs such as direct material and direct labor, the cost of manufacturing overhead must be assigned to each unit produced so that Inventory and Cost of Goods Sold are valued and reported according to generally accepted accounting principles (GAAP). Manufacturing overhead includes such things as the electricity used to operate the factory equipment, depreciation on the factory equipment and building, factory supplies and factory personnel (other than direct labor). How these costs are assigned to products has an impact on the measurement of an individual product's profitability. Nonmanufacturing costs (sometimes referred to as "administrative overhead") represent a manufacturer's expenses that occur apart from the actual manufacturing function. In accounting and financial terminology, the nonmanufacturing costs include Selling, General and Administrative (SG&A) expenses, and Interest Expense. Since accounting principles do not consider these expenses as product costs, they are not assigned to inventory or to the cost of goods sold. Instead, nonmanufacturing costs are simply reported as expenses on the income statement at the time they are incurred. Nonmanufacturing costs include activities associated with the Selling and General Administrative functions. Examples include the compensation of nonmanufacturing personnel; occupancy expenses for nonmanufacturing facilities (rent, light, heat, property taxes, maintenance, etc.); depreciation of nonmanufacturing equipment; expenses for automobiles and trucks used to sell and deliver products; and interest expenses. Although nonmanufacturing costs are not assigned to products for purposes of reporting inventory and the cost of goods sold on a company's financial statements, they should always be considered as part of the total cost of providing a specific product to a specific customer. For a product to be profitable, its selling price must be greater than the sum of the product cost (direct material, direct labor, and manufacturing overhead) plus the nonmanufacturing costs and expenses.

Absorption Costing

Absorption costing means that all of the manufacturing costs are *absorbed* by the units produced. In other words, the cost of a finished unit in inventory will include direct materials, direct labor, and both variable **and** *fixed manufacturing overhead*. As a

result, absorption costing is also referred to as full costing or the full absorption method.

Total Absorption Costing

Total absorption costing (TAC) is a method of Accounting cost which entails the full cost of manufacturing or providing a service. TAC includes not just the costs of materials and labour, but also of all manufacturing overheads (whether 'fixed' or 'variable'). The cost of each cost center can be direct or indirect cost. The direct cost can be easily identified with individual cost centers, whereas the indirect cost can't be easily identified with the cost center. The distribution of overhead among the departments is called apportionment.

Overhead Allocation

The allocation of certain overhead costs to produced goods is required under the rules of various accounting frameworks. In many businesses, the amount of overhead to be allocated is substantially greater than the direct cost of goods, so the overhead allocation method can be of some importance. There are two types of overhead, which are administrative overhead and manufacturing overhead. Administrative overhead includes those costs not involved in the development or production of goods or services, such as the costs of front office administration and sales; this is essentially all overhead that is not included in manufacturing overhead. Manufacturing overhead is all of the costs that a factory incurs, other than direct costs.

To allocate the costs of manufacturing overhead to any inventory items that is classified as work-in-process or finished goods. Overhead is not allocated to raw materials inventory, since the operations giving rise to overhead costs only impact work-in-process and finished goods inventory.

Overhead Calculation

The typical procedure for allocating overhead is to accumulate all manufacturing overhead costs into one or more cost pools, and to then use an activity measure to apportion the overhead costs in the cost pools to inventory. Thus, the overhead allocation formula is:

$$\text{Cost pool} / \text{Total activity measure} = \text{Overhead allocation per unit}$$

You can allocate overhead costs by any reasonable measure, as long as it is consistently applied across reporting periods. Common bases of allocation are direct labor hours charged against a product, or the amount of machine hours used during the production of a product.

The following items are usually included in manufacturing overhead:

Depreciation of factory equipment	Quality control and inspection
Factory administration expenses	Rent, facility and equipment
Indirect labor and production supervisory wages	Repair expenses
Indirect materials and supplies	Rework labor, scrap and spoilage
Maintenance, factory and production equipment	Taxes related to production assets
Officer salaries related to production	Un-capitalized tools and equipment
Production employees' benefits	Utilities

allocation charged per unit is known as the overhead rate.

The overhead rate can be expressed as a proportion, if both the numerator and denominator are in dollars.

For example, ABC Company has total indirect costs of \$100,000 and it decides to use the cost of its direct labor as the allocation measure. ABC incurs \$50,000 of direct labor costs, so the overhead rate is calculated as:

\$100,000 indirect costs and \$50,000 direct labor

The result is an overhead rate of 2.0.

Alternatively, if the denominator is not in dollars, then the overhead rate is expressed as a cost per allocation unit.

For example, ABC Company decides to change its allocation measure to hours of machine time used. ABC has 10,000 hours of machine time usage, so the overhead rate is now calculated as:

\$100,000 indirect costs

10,000 Machine hours

The result is an overhead rate of \$10.00 per machine hour.

If the basis of allocation does not appear correct for certain types of overhead costs, it may make more sense to split the overhead into two or more overhead cost pools, and allocate each cost pool using a different basis of allocation. For example, if warehouse costs are more appropriately allocated based on the square footage consumed by various products, then store warehouse costs in a warehouse overhead cost pool, and allocate these costs based on square footage used.

Thus, far we have assumed that only actual overhead costs incurred are allocated. However, it is also possible to set up a standard overhead rate that you continue to use

for multiple reporting periods, based on long-term expectations regarding how much overhead will be incurred and how many units will be produced. If the difference between actual overhead costs incurred and overhead allocated is small, you can charge the difference to the cost of goods sold. If the amount is material, then allocate the difference to both the cost of goods sold and inventory.

Overhead Allocation Examples

Mulligan Imports has a small golf shaft production line, which manufactures a titanium shaft and an aluminum shaft. Considerable machining is required for both shafts, so Mulligan concludes that it should allocate overhead to these products based on the total hours of machine time used. In May, production of the titanium shaft requires 5,400 hours of machine time, while the aluminum shaft needs 2,600 hours. Thus, 67.5% of the overhead cost pool is allocated to the titanium shafts and 32.5% to the aluminum shafts.

As another example, Mulligan Imports incurs overhead of \$93,000, which it stores in an overhead cost pool. Mulligan uses a standard overhead rate of \$20 per unit, which approximates its long-term experience with the relationship between overhead costs and production volumes. In September, it produces 4,500 golf club shafts, to which it allocates \$90,000 (allocate rate of \$20 x 4,500 units). This leaves a difference between overhead incurred and overhead absorbed of \$3,000. Given the small size of the variance, Mulligan charges the \$3,000 difference to the cost of goods sold, thereby clearing out the overhead cost pool.

Primary apportionment or distribution of overheads

The selection of the base on which overheads are or should be apportioned depends on the following principles:

Service or use basis: If the benefit obtained by various departments from the overheads can be measured, overheads can be apportioned on that basis.

Survey basis: If amount of overhead can't be measured survey basis can be applied. For example, if it can be noted that a supervisor is giving 60% of his time to one department and 40% to another his wages can be apportioned on that basis.

Ability to pay basis: In this case the apportionment may depend on the factors like total sale/profitability. This may not be a fair case always as some departments may have to take most of the burden.

Secondary Apportionment

With the process of primary apportionment or distribution, the loading of overheads for all the departments i.e. production as well as service departments can be obtained. The next step is to transfer the overheads of non-production departments to the production departments, as the various cost centers move through the production departments only.

Each job while moving through the production department should get its share of overhead. This process of distribution of overheads is called absorption. There can be a number of methods of absorption of overheads, consideration should be given to the type of industry, manufacturing process, nature of industry etc. The various methods of absorption are

Direct material cost percentage rate

Direct labour cost percentage rate

Prime cost percentage rate

Labour hour rate

Machine hour rate

Direct Material Cost Percentage Rate

In this method overhead is calculated as a percentage of the material cost. This is used where the material cost is high and of prime importance. Here other costs are negligible or are dependent on the material cost. This is calculated as $(\text{Amount of overhead}/\text{Material cost}) \times 100$ If the production overhead is 3,000 and the material cost is 10,000 then the absorption rate will be

$$(3000/10000) \times 100 = 30\%$$

Now for a product if the material cost is 1000 then the overhead cost is 300. so the total cost would be 1300. The classic example of an industry using this type of

absorption are gold jewelers the typical absorption rate varies from 2-5% of the cost of the gold. If the cost of the material fluctuates this method cannot be used. For this type of absorption the material cost should be stable. If in the same industry material of different cost is used the calculation becomes unjustified, especially when the cost of the material differ too much.

Direct Labour Cost Percentage Rate

In this method cost is absorbed as a percent of the labour cost or the wages. $(\text{Overhead cost}/\text{Labour cost}) \times 100$ If the Labour cost is 5000 and the overhead cost is 1000 then the absorption cost is 20%. If the labour cost of one job is 500 it will have to absorb 20% i.e. 100 as the overhead cost making the total cost to be 600. This method can be used in service industry where the major input is the skilled or unskilled labour. For the proper calculation labour rates need to be constant and the skill and efficiency of the labourer need to be identical.

Prime Cost Percentage Rate

In this method both material cost as well as labour cost is the base for calculating the overhead absorption. It is calculated as $(\text{Overhead Cost}/\text{Prime cost}) \times 100$. Prime cost is nothing but the sum of direct material cost and direct labour cost.

Labour Hour Rate

This method is mostly used if the industry is labour-intensive and the labour is mostly unskilled or semiskilled. It is calculated as $(\text{overhead cost}/\text{Labour hours required for production})$ if the labour hour required is 1000 and the overhead to be absorbed is 250 then the rate is .25 per labour hour. if 20 labour hours are required to complete a job then the overhead will be 5.

Machine Hour Rate

If the industry considered is having high degree of automation and mechanization then this method can be used. Here the major chunk of the cost comes from the utilization of the machines. it is calculated as $(\text{overhead cost}/\text{number of machine hours})$ This is very useful if the running cost of the machines including rent are the dominant part of the cost of the product.

One of the main reasons for absorbing overheads into the cost of is for inventory valuation purposes. Absorption costing is permissible under GAAP. Traditional TAC was developed in the age of manufacturing and mostly used to arrive at the full manufacturing cost of producing goods; an alternative method of arriving at full cost known

as activity-based costing (ABC) is often thought to be more appropriate for services. Absorption costing is a means of incorporating a fair share of indirect cost or overheads into the cost of a unit of product or service provided.

Absorption Costing

A costing method that includes all manufacturing costs direct materials, direct labour, and both overhead in unit product costs. According to the ICMA London "Absorption costing is a principle whereby fixed as well as variable costs are allocated to cost unit the term may be applied where production costs only or costs of all function are so allocated".

What is Overhead

Overhead is an accounting term that refers to all ongoing business expenses not including or related to direct labor, direct materials or third-party expenses that are billed directly to customers. Overhead must be paid for on an ongoing basis, regardless of whether a company is doing a high or low volume of business. It is important not just for budgeting purposes, but for determining how much a company must charge for its products or services to make a profit.

Fixed Overhead Costs

You must understand fixed overhead expenses in order to understand absorption costing and variable costing. Fixed overhead consists of expenses that do not change with your level of production. Examples of fixed overhead include rent, insurance, wages for permanent full-time employees, and lease payments on equipment. These expenses continue no matter what your level of sales or how much you manufacture.

Manufacturing Overhead Costs

On financial statements, each product must include the costs of the following:

1. Direct material
2. Direct labor
3. Manufacturing (or factory) overhead

According to generally accepted accounting principles (GAAP), manufacturing overhead must be included in the cost of Work in Process Inventory and Finished Goods Inventory on a manufacturer's balance sheet, as well as in the Cost of Goods Sold on its income statement.

As their names indicate, direct material and direct labor costs are *directly* traceable to the products being manufactured. Manufacturing overhead, however, consists of *indirect* factory-related costs and as such must be divided up and allocated to each unit produced. For example, the property tax on a factory building is part of manufacturing overhead. Although the property tax covers an entire year and appears as one large amount on just one tax bill, GAAP requires that a portion of this amount be allocated or assigned to each product manufactured during that year.

Some of the costs that would typically be included in manufacturing overhead include:

Material handlers (forklift operators who move materials and units). People who set up the manufacturing equipment to the required specifications,

1. People who inspect products as they are being produced.
2. People who perform maintenance on the equipment.
3. People who clean the manufacturing area.
4. People who perform record keeping for the manufacturing processes.
5. Factory management team.
6. Electricity, natural gas, water, and sewer for operating the manufacturing facilities and equipment.
7. Computer and communication systems for the manufacturing function.
8. Repair parts for the manufacturing equipment and facilities.
9. Supplies for operating the manufacturing process.
10. Depreciation on the manufacturing equipment and facilities.
11. Insurance and property taxes on the manufacturing equipment and facilities.
12. Safety and environmental costs.

Financial Reporting vs. Individual Products and Customers

As mentioned above, in order for a manufacturer's financial statements to be in compliance with GAAP, a portion of the manufacturing overhead must be allocated to each item produced. Even when allocations are arbitrary and inaccurate, the totals of the amounts reported

as inventory and cost of goods sold on the financial statements can still be reasonably correct. For example, if a manufacturer's inventory is minimal or if the beginning and ending inventories are similar in amount, this indicates that the company is selling nearly all of the units it produced in a given year. If that is the case, then as long as most of the manufacturing overhead appears on the income statement as part of the cost of goods sold, the financial statements will be correct—even if the amounts allocated to the individual products are inaccurate. The message here is this: Even if each product's costs are wrong due to inaccurate allocations of manufacturing overhead, it is still possible that the financial statements will be accurate and receive a clean audit report.

However, if management wants to know the *true* cost of manufacturing an *individual* item, it is essential that the manufacturing overhead be allocated in a precise and logical manner. In addition to knowing the true cost of *manufacturing* each item, management needs to know the true expense of all of the other business functions involved with an individual item. In this way, management will know if each product and each customer is generating enough sales revenue to cover not only *manufacturing costs* but also selling, general and administrative, interest expense, and some profit. This means that management will need to allocate or assign nonmanufacturing costs to individual products and customers (even though this type of allocation is not allowed for financial reporting).

Traditional Methods of Allocating Manufacturing Overhead

Let's look at several methods used to allocate manufacturing overhead. Keep in mind that if the method does not allocate the true amount of factory overhead, the cost per unit of product will be wrong and could result in management making a flawed decision. As you review these methods, ask yourself for each given product, *will the allocated amount of overhead reflect the actual amount of overhead used in that item's production?* If a cause-and-effect relationship is not evident, is there at least an obvious correlation between manufacturing overhead and the basis for the allocation (such as machine hours)? If there is no correlation, the allocation method is suspect and could result in the improper amount of overhead being assigned to individual products.

Allocating Manufacturing Overhead Via Direct Labor

In the early 1900s it was logical to allocate manufacturing overhead on the basis of direct labor hours (or direct labor cost). The manufacturing process was not automated, there were hardly any variations in the products made (think Model T cars), and customers did not demand such things as just-in-time (JIT) deliveries or bar coding. In those days, when manufacturers increased the amount of direct labor, there was likely to be a related increase in such things as the number of factory supervisors, the factory space to be maintained, and factory supplies and utilities consumed. In other words, there was a high degree of correlation between the quantity of direct labor used and the amount of manufacturing overhead used. By allocating manufacturing overhead on the basis of direct labor hours, a product requiring 30 direct labor hours would be allocated twice as much manufacturing overhead as a product requiring 15 direct labor hours.

Let's illustrate an overhead rate based on direct labor hours for a company that manufactures just two products, X and Y. (An annual rate is developed in order to have a constant overhead rate even when production volumes fluctuate from month to month.) For the upcoming year the company expects the following:

	Product X	Product Y	Total
Units of product to be manufactured	8,000	20,000	28,000
Direct labor hours (DLH) per unit	15 DLH	30 DLH	
Total DLH expected	120,000 DLH	600,000 DLH	720,000 DLH
Total annual expected mfg O/H Costs			\$1,440,000
Mfg O/H cost per DLH			\$2
Mfg O/H allocated per unit of product	\$30	\$60	
Mfg O/H allocated to all products	\$240,000	\$1,200,000	\$1,440,000

As shown in the above table, each unit of Product X will be assigned \$30 of overhead, and each unit of Product Y will be assigned \$60 of overhead. This is reasonable so long as there is a correlation between the quantity of direct labor hours and the cost of manufacturing overhead.

Allocating Manufacturing Overhead Via Departmental Machine Hours

As the 20th century moved on, manufacturers studied and controlled direct labor's time and motion (think of Frederick Taylor's work) and began replacing direct labor with machines. The increased use of machines resulted in an increase in factory overhead due to such things as additional depreciation of the machinery, maintenance of the machinery, and machine setups. With direct labor being reduced and manufacturing overhead increasing, the correlation between direct labor and manufacturing overhead began to wane. A logical response was to begin allocating manufacturing overhead on the basis of *machine hours* instead of *direct labor* hours.

Companies also began to create new departments to help manage the changing character of the factories. Production departments such as machining, finishing, and assembling were established. Other departments such as quality control, maintenance, and factory administration were designated as service departments (or production service departments), since these departments served the production departments. The company's costs were contained in the accountant's general ledger, which was organized by departments so as to mirror the organization chart and to provide for budgeting and control. Because some of the production departments used more of some service departments' efforts/costs than others, accountants responded by first allocating the service department costs to the production departments, and then developing manufacturing overhead rates for each of the production departments. These rates were computed by dividing each production department's costs (its own direct costs plus the service departments' costs allocated to it) by its machine hours.

Basing the manufacturing overhead rates on a company's production departments was an improvement over using just one rate for the entire plant—particularly when companies began manufacturing a greater variety of products. Some products being manufactured may have required many machine hours in one department but very few hours in another department, while other products may have used a much different combination of machine hours.

Let's illustrate this method by assuming just two products (X and Y) are being manufactured in a factory that has one service department (Factory Administration,

S1) and two production departments (Machining, P1; Finishing, P2).

	Machining (P1)	Finishing (P2)	Factory Admin (S1)	Total
Dept's direct O/H Costs	\$330,000	\$90,000	\$80,000	\$500,000
Allocation of service dept	70,000	10,000	(80,000)	-0-
Total production dept O/H Costs	\$400,000	\$100,000	-0-	\$500,000
Machine hours	10,000 MH	5,000 MH		15,000 MH
Production dept O/H cost per MH	\$40	\$20		
MHs required for Product X	4	1		5
Mfg O/H costs for Product X	\$160	\$20		\$180
MHs required for Product Y	3	4		7
Mfg O/H costs for Product Y	\$120	\$80		\$200

Had the company used a plant-wide rate, the manufacturing overhead rate would have been \$33.33 per MH (\$500,000 divided by 15,000 MH), instead of \$40 for the machining department and \$20 for the finishing department. By using departmental rates, products requiring more machine hours in a *high-cost* department will be assigned a higher cost than would be assigned if using one established plant-wide rate. Products requiring more time in a low-cost department will be assigned a lower cost as compared to one plant-wide rate.

Overhead (business)

Overheads and direct costs, when combined, equals total expenses endured by a business.

In business, **overhead** or **overhead expense** refers to an ongoing expense of operating a business; it is also known as an "operating expense". Overheads are the expenditure which cannot be conveniently traced to or identified with any particular cost unit. Therefore, overheads cannot be immediately associated with the products or services being offered, thus do not directly generate profits. However, overheads are still vital to business operations as they provide critical support for the business to carry out profit making activities. For example, overhead costs such as the rent for a factory allows workers to manufacture products which can then be sold for a profit. Such expenses are incurred for output generally and not for particular work order e.g., wages paid to watch and ward staff, heating and lighting expenses of factory etc. Overheads are also very important cost element along with direct materials and direct labor

Overheads are often related to accounting concepts such as fixed costs and indirect costs.

Overhead expenses are all costs on the income statement except for direct labour, direct materials, and direct expenses. Overhead expenses include accounting fees, advertising, insurance, interest, legal fees, labor burden, rent, repairs, supplies, taxes, telephone bills, travel expenditures, and utilities. There are essentially two types of business overheads, Administrative overheads and manufacturing overheads.

Administrative overheads

Administrative overheads include items such as utilities, strategic planning, and various supporting functions. These costs are treated as overheads due to the fact that they aren't directly related to any particular function of the organization nor does it directly result in generating any profits. Instead, these costs simply take on the role of supporting all of the business' other functions.

Examples

Employee salaries

This includes mainly monthly and annual salaries that are agreed upon. They are considered overheads as these costs must be paid regardless of sales and profits of the company. In addition, salary defers from wage as salary is not affected by working hours and time, therefore will remain constant. In particular, this would more commonly apply to more senior staff members as they are typically signed to longer tenure contracts, meaning that their salaries are more commonly predetermined.

Office equipment and supplies

This includes office equipment such as printer, fax machine, computers, refrigerator, etc. They are equipments that do not directly result in sales and profits as they are only used for supporting functions that they can provide to business operations. However, equipments can vary between administrative overheads and manufacturing overheads based on the purpose of which they are using the equipments. For example, for a printing company a printer would be considered a manufacturing overhead.

External legal and audit fees



A Google Company Car

This includes the cost of hiring external law and audit firms on behalf of the company. This would not apply if company has own internal lawyers and audit plans. Due to regulations and necessary annual audits to ensure a satisfactory work place environment, these costs often cannot be avoided. Also, since these costs do not necessarily contribute directly to sales, they are considered as indirect overheads. Although in most cases necessary, these costs can sometimes be avoided and reduced.

Company cars

Many companies provide usage of company cars as a perk for their employees. Since these cars do not contribute directly to sales and profits, they are considered an overhead. Similar company perks that are a one-off or constant payment such as partner contract fees with a gym will also fall under administrative overheads.

Travel and entertainment costs

This will include company-paid business travels and arrangements. As well as refreshments, meals, and entertainment fees during company gatherings. Although one might argue that these costs motivate workers to become more productive and efficient, the majority of economists agree that these costs are not direct contributors to sales and profits, therefore shall be categorized as an administrative overhead. Despite these costs occurring periodically and sometimes without prior preparation, they are usually one-off payments and are expected to be within the company's budget for travel and entertainment.

Manufacturing overheads

Manufacturing overheads are all costs endured by a business that is within the physical platform in which the product or service is created. Difference between manufacturing overheads and administrative overheads is that manufacturing overheads are categorized within a factory or office in which the sale takes place, Whilst administrative overheads is typically categorized within some sort of back-office or supporting office. Although there are cases when the two physical buildings may overlap, it is the usage of the overheads that separates them.

Examples

Employee salaries

Although the general concept is identical to the example under administrative overheads, the key difference is the role of the employee. In the case of manufacturing overheads, employees would have roles such as maintenance personnel, manufacturing managers, materials management staff, and quality control staff. It would also include the set wages for janitorial staff members. Once again, the key difference lies in the nature of their respective jobs and the physical location in which their jobs are carried out.

Depreciation of assets and equipment

This refers to the reduction in value of equipments as it becomes older and more obsolete. For example, if a printer has a potential useful life span of 5 years, the amount that it can be sold for will decrease each year. Therefore, this value in depreciation is calculated as a manufacturing overhead. Moreover, this also applies to vehicles as they tend to depreciate in value significantly after the first year. When calculating manufacturing overheads, accountants mainly use two methods: straight-line method and declining balance method.

Property Taxes on Production Facilities

Every single property unless government owned is subject to some form of property tax. Therefore, the taxes on production factories are categorized as manufacturing overheads as they are costs which cannot be avoided nor cancelled. In addition, property taxes do not change in relation to the business's profits or sales and will likely remain the same unless a change by the government administration.



The rent for factory buildings is considered a manufacturing overhead

Rent of Factory Building

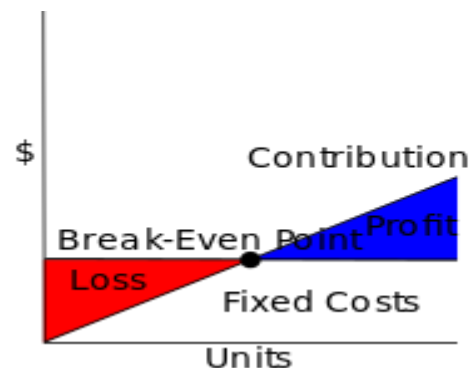
Unless the business decides to purchase land and build its own factory, it will be subject to some sort of rent due to the amount of capital required to build a privately owned factory. Therefore, this rent must be paid to the land lord on a regular basis regardless of the performance of the business. Although the rent for the building provides the physical platform for the company to produce its products and services, it is not a direct contributor.

Utilities for Factory

This would vary depending on how the utility bill is structured. In the case of it being an overhead, the utility bill is pre-negotiated meaning that the monthly utility bill will be the same regardless of the amount in which the factory actually consumes. This will only be relevant in various countries where there is an option for standardized utility bills. However, due to the vast consumption of electricity, gas, and water in most factories, most companies tend to not have standardized utility bills as it tends to be more expensive. Standardized utility bills are also oftentimes discouraged by governments as it leads to wastage of resources and negative externalities of production.

Application of Business Overheads

For most businesses, business overheads are calculated by accountants for budgeting purposes but also often so the business has an idea of how much they must charge consumers in order to make a profit. The following are common accounting tools which take account of business overheads.



A standard break-even analysis chart

Break-Even Analysis

The break-even analysis determines the point which the business's revenue is equivalent to the costs required to receive that revenue. It first calculates a margin of safety (the point which the revenue exceeds the break-even point) as that is the "safe" amount which the revenue can fall whilst still remaining to be above the break-even point. The graph on the right shows a typical break-even chart. Contribution refers to sales of the product or service; it can also be interpreted as the business's revenue stream. Fixed costs in this case serves the same purpose as business overheads, it will simply be shown as a straight horizontal line on the graph as shown.

Shut-Down Graph

In economics, revenue curves are often illustrated to show whether or not a business should stay in business, or shut down. In theory, if a business is able cover business overheads but unable to cover variable operational costs in the short run, the business should remain in business. On the other hand, if the business is not even able to cover business overheads let alone variable costs, it should shut down. Although this rule largely defers depending on the size of the business, the business's cash-flow, and the competitive nature of the business, it serves as a model rule for most small competitive businesses to operate on.

Balance Sheet

Balance sheet is a financial statement which outlines a company's financial assets, liabilities, and shareholder's equity at a specific time. Both assets and liabilities are separated into two categories depending on their time frame; current and long-term. Business overheads in particular fall under current liabilities as they are costs in which the company must pay for on a relatively short-term/immediate basis. Although balance sheet by itself does not offer much information, it is a useful piece of financial information when combined with other documents such as the income statement or ratio analysis as it offers a diverse and well-rounded description of the company's financial position.

Activity Cost Pool	Estimated Overhead
Purchasing	\$100,000
Quality control	80,000
Utilities	200,000
Total overhead	\$380,000

Add up total overhead

Total overhead includes indirect materials, indirect labor, and other manufacturing costs. Add up indirect materials, indirect labor, and all other product costs not included in direct materials and direct labor.

How to Calculate Overhead Costs?

All businesses have regular expenses that are not directly related to producing goods or services. These indirect expenses are termed "overhead" costs. Most businesses calculate overhead cost on a monthly basis. Typically, overhead cost is expressed as a percentage of sales or of labor cost. Keeping the proportion of overhead cost low gives a business a competitive advantage, either by increasing the profit margin or by allowing the business to price its products more competitively.

1. Step 1

Draw up a list of your business expenses. Your list should be comprehensive and include items like rent, utilities, taxes and building maintenance, which are examples of overhead costs. Other items are inventory, raw materials and production labor, which are not considered overhead.

2. Step 2

Categorize each item on your list of expenses according to whether it is the result of producing a good or service. For example, shop floor labor and the cost of raw materials are direct costs since they are incurred only when some item is being manufactured. All indirect costs are overhead. Keep in mind that some items won't fall easily into one category or the other, so you must make some judgment calls. For example, most businesses classify legal expenses as overhead. However, for a law firm, a lawyer's salary is a direct cost, since her work is directly linked to producing the legal services which are the firm's product. Most business people find it helpful to follow the accepted conventions used in their particular industry for classifying expenses as direct or overhead costs.

3. Step 3

Add all of the overhead costs for the month to calculate the aggregate (total) overhead cost. You can choose another time period, but most business people find one month to be the most useful.

4. Step 4

Calculate the proportion of overhead costs compared to sales. Knowing the percentage of each dollar that goes to overhead allows you to properly allocate costs when

setting prices and drawing up budgets. Divide your monthly overhead cost by monthly sales and multiply by 100 to find the percentage of overhead cost. For example, a business with monthly sales of \$900,000 and overhead costs totaling \$225,000 has $(\$225,000/\$900,000) * 100 = 25$ percent overhead.

5. Step 5

Calculate overhead cost as a percentage of labor cost. This measure is useful as an estimate of how efficiently resources are utilized. The lower the percentage, the more effectively your business is utilizing its resources. Divide the monthly labor cost into the total overhead cost for the month and multiply by 100 to express as a percentage.

STEP 1. Insert your cost per year At 40 operating hours per week, 2 weeks paid vacation and 5 paid holidays, you actually are open for business 49 weeks or 1960 hours per year. (If you are open 6 days a week, compute those hours.)

STEP 2. Divide by 1960 hours (or your calculated hours)

Labor

- Employee wages/salary _____
- Employer's contribution for FICA (Social Security) _____
- Health Insurance _____
- Worker's Compensation _____
- Vacation Pay _____
- Holiday pay _____
- Jury duty/military reserve _____
- Sick pay _____
- Daily coffee break _____
- Uniforms/aprons _____
- Unlisted expenses _____
- 15% unproductive labor between jobs _____
- Yearly bonuses _____
- Commissions over labor _____
- Total Labor Per year** _____
- Divided by calculated _____

Overhead/Expense Worksheet

The following worksheet is for members and business owner to develop good universal business practices. Money expended in the promotion of any business must be recaptured through the sale of your product and its pricing. It offers the following data. Fill in the blanks to get the cost to run your business for each operating hour. This cost added to direct labor should be your minimum shop rate. Since profits on raw materials are widely variable with each job, it is ignored in this cost analysis.

Costs Excluding Labor

- Mortgage/Rent _____
- Utilities-Heat, water, etc. _____
- Office Supplies-Postage, etc. _____
- Bank Loans (not mortgage) _____
- Insurance _____
- Worker's Compensation _____
- Accounting Fees _____
- Association Dues (business) _____
- Travel Expenses/trade shows _____
- Fed.,state, local bus. taxes _____
- Owners: Salary _____
- Retirement funding _____
- Health Insurance _____
- Personal Medical _____
- Saving funds: tool Replacement _____
- Bad Debts _____
- Insurance, benefits _____
- Travel expenses _____
- Business vehicles/payments _____
- Depreciation _____
- Insurance _____
- Maintenance/repairs _____
- Gas, oil, wash, tags _____
- Advertising-all Medias _____
- Contributions/Donations _____
- Unlisted specific expenses _____
- Total yearly cost less Labor** _____
- Divided by Calculated hours _____

hours _____ **Total hourly cost less Labor** _____
Total Labor per hour _____

Now add your hourly shop costs to your hourly labor charge and you will have the bottom line figure you need to produce in order for your business to 'just' survive and retain a living wage.

Hourly shop Costs per Hour _____
Hourly Labor Costs per Hour + _____
TOTAL Hourly Work Charge = _____

Practical exercises

These two exercises demonstrate how to calculate an overhead percentage and use it to compute a selling price using the terminology and steps above.

Calculating the overhead percentage for a service business

Jones Painting Company is a small service business that provides painting and related services to commercial and residential customers. In addition to the owner, there are four direct labor employees. The employees are paid union scale, which is \$20/hr, and the owner is paid \$25/hr. Normally, the company does not schedule weekend work. It recognizes 10 holidays each year. It also provides each employee and the owner with 10 paid vacation days. Employees and the owner average one unscheduled absence per month. In a typical eight-hour workday, employees average two hours in non-billable activities and the owner averages four hours. The company has budgeted \$400,000 for all business expenses found on its income statement for the current calendar year. This includes \$80,000 for direct materials and \$10,000 for subcontractors.

Required:

1. What is the average direct labor wage paid per hour?

Employee 1 \$ 20

Employee 2 \$ 20

Employee 3 \$ 20

Employee 4 \$ 20

Owner \$ 25

\$105/5 employees = \$21/hr

2. How many workdays are available to Jones Painting Company in the above scenario?

Calendar days = 365

Less non-work days:

Weekends -104
Holidays - 10
Vacation - 10
Personal - 12
Non-work days = -136
Workdays available = 229

3. What is the total number of direct labor man-hours projected to be billed during the work year for the owner and employees?

Total workdays available = 229
Scheduled work hours x 8
Hours available per employee = 1,832
Number of employees x 5
Total hours available = 9,160
Less non-billable time* -2,748
Billable direct labor hours = 6,412

*Note: Each employee averages two non-billable hours per day x 229 workdays.

Owner averages four non-billable hours per day x 229 workdays.

2 hrs x 229 workdays x 4 employees = 1,832

4 hrs x 229 workdays x 1 owner + 916

Non-billable direct labor hours = 2,748

4. What is the dollar value of the billable direct labor?

Billable direct labor hours = 6,412
Average direct labor wage x \$21/hr
Estimated billable direct labor dollars = \$134,652

5. What is the dollar value of the non-billable direct labor?

Man-hours available per employee/work year = 2,088 hrs (261 workdays x 8 hrs)

Number of direct labor employees x 5

Total man-hours available	10,440
Less billable direct labor hours	- <u>6,412</u>
Non-billable direct labor hours	4,028
Average direct labor wage per hour	x <u>\$21/hr</u>
Non-billable direct labor dollars	\$84,588

6. What is the projected overhead dollar expense for the work year?

Business expenses = \$400,000

Less:

Direct labor - \$134,652

Direct materials - \$ 80,000

Subcontractors - \$ 10,000

Projected overhead expense - \$175,348

7. What is the annual overhead percentage for Jones Painting Company?

Yearly overhead expense = Annual overhead rate

Yearly direct labor cost

\$175,348 = 1.302 or 130%

\$134,652

8. What should Jones Painting Company's labor charging rate be if it wants a 15% gross margin on sales?

Average direct labor rate = \$21/man-hr

Overhead rate @ 130% + \$27.30/man-hr

Direct labor cost = \$48.30/man-hr

15% gross margin on selling price = $\$48.30 / .85 = \56.82 charging rate/man-hr

Calculating the price of a product

Countryside Specialties is a small specialty food business that creates new recipes for bread, cake and drink products then packages the required dry ingredients for sale to specialty food and drink shops, gourmet coffee shops and large department stores. The owner is planning to introduce a new lemon poppy seed muffin mix and needs assistance pricing it. The company has four direct labor employees including the owner. Two employees are paid \$6/hr, one employee is paid \$7/hr and the owner is paid \$13/hr. Because of the seasonal nature of its business, the company

averages 165 non-work days per year. On typical workdays, employees average six hours and the owner averages two hours in production-related activities. The company's projected cash outlay for the coming 12 months will be \$197,944. This includes \$75,000 for direct materials, \$35,600 for direct labor including the owner's contribution, \$21,944 in owner's salary and \$65,400 in other business expenses. The owner has determined that one batch of muffin mix will require four man-hours of production time and will produce 120 units. Ingredients and packaging materials will cost \$.73 per unit.

Required:

1. What is the average direct labor wage paid per hour?

Employee 1 - \$ 6

Employee 2 - \$ 6

Employee 3 - \$ 7

Owner - \$13

\$32/4 employees = \$8/hr

2. How many workdays are available to Countryside Specialties, assuming there are 365 days in this calendar year?

Calendar days = 365

Less non-workdays - 165

Total workdays available = 200

3. What is the total number of direct labor man-hours projected to be billed during the work year for the owner and employees?

Total workdays available = 200

Scheduled work hours x 8

Hours available per employee = 1,600

Number of employees x 4

Total hours available = 6,400

Less non-billable time * - 2,400

Billable direct labor hours = 4,000

*Note: Each employee averages 2 non-billable hours per day x 200 workdays

Owner averages 6 non-billable hours per day x 200 workdays

2 hrs x 200 workdays x 3 employees = 1,200 hours

6 hrs x 200 workdays x 1 owner = 1,200 hours

Non-billable direct labor hours = 2,400 hours

4. What is the projected overhead dollar expense for the work year?

Projected cash outlay for 12 months = \$197,944

Less:

Direct labor - \$35,600

Direct materials - \$75,000

Projected overhead expense \$87,344

5. What is the annual overhead percentage for Countryside Specialties?

Yearly overhead expense = Annual overhead percentage

Yearly direct labor cost

\$87,344 = 2.453 or 245%

\$35,600

6. What will one package of lemon poppy seed muffin mix cost to produce?

Average direct labor rate = \$ 8 /man-hr

Overhead rate @ 245% = \$19.60/man-hr

Direct labor cost = \$27.60/man-hr

4 man-hours per batch = 240 minutes/120 units per batch = 2 minutes per unit

Direct labor cost/minute (\$27.60/60 minutes) = \$.46 x 2 minutes = \$.92

Direct material costs = \$.73

Per unit cost of muffin mix = \$1.65

7. What should Countryside Specialties selling price of this muffin mix be if the company wants a 25 percent gross margin on sales?

Margin on selling price = \$1.65/.75 = \$2.20

Advantages of Absorption Costing

Absorption costing offers an advantage when you do not sell all of your manufactured products during the accounting period. You may have finished goods in inventory. Because you assign a per-unit amount for fixed expenses, each product in inventory has a value that includes part of the fixed overhead. You do not show the

expense until you actually sell the items in inventory. This can improve your profits for the period.

Disadvantages of Absorption Costing

Absorption costing can artificially inflate your profit figures in any given accounting period. Because you will not deduct your entire fixed overhead if you haven't sold

all of your manufactured products, your profit-and-loss statement does not show the full expenses you had for the period. This can mislead you when you are analyzing your profitability.

Conclusion

In short, the financial statements can be considered as accurate even with improper allocation to individual products, but management's needs dictate that (1) the allocations of manufacturing overhead be truly accurate and (2) that the nonmanufacturing costs be accurately assigned to individual products and customers. For example, if an inaccurate allocation results in too much cost assigned to some products, management might seek price increases on those products when in reality such price increases are not necessary. If customers react to the proposed unnecessary price increases by seeking bids from other manufacturers, the company may end up losing sales, profits, and customers. Conversely, if inaccurate allocations result in *too few* costs assigned to some products, a company may not realize that a specific product's selling price is inadequate to cover the true costs needed to produce and sell that product. If the company does not pursue a price increase or improvements in efficiency, the company might be selling that product at a loss. Absorption costing is a method whereby you apply part of your fixed overhead costs to the cost of manufacturing products. You do this on a per-unit basis. Simply divide your fixed costs by the number of units you manufactured and sold during the period. The result is a cost per unit for each unit you made and sold.

Failure to take all business expenses into consideration when pricing goods and services is a key problem for many business owners. They often lack a methodology for doing this, and many times will choose to ignore or overlook some of their costs to price their goods and services competitively. Using the overhead percentage ensures they will take all of their business expenses into account and help highlight the impact their day-to-day management decisions have on selling prices. After using the overhead percentage, their reaction is often one of surprise and disbelief — “I couldn't charge those prices if I wanted to!” Perhaps this is true, but when they know where their prices should be, they can begin taking corrective action to either increase prices or look at alternatives to decrease costs. Such action is necessary to operate their business profitably and successfully.

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