

5.5 Break-even analysis

Tool: Contribution (HL)

In [Section 5.5.1 \(/study/app/y12-business-management-a-hl-may-2024/sid-351-cid-174702/book/calculating-breakeven-id-39496\)](/study/app/y12-business-management-a-hl-may-2024/sid-351-cid-174702/book/calculating-breakeven-id-39496), you learned about the concept of contribution per unit. The contribution per unit is the amount of money left after the variable costs per unit have been subtracted from the price per unit. Total contribution is the sum of these contributions at a certain quantity (output).

As a reminder, the formulas for contribution are:

Contribution per unit = price per unit – variable cost per unit

Total contribution (at a certain quantity) = contribution per unit × quantity (output)

Exam tip

Remember that contribution is not the same as profit. Contribution is calculated as price minus variable costs. In order to calculate profit, fixed costs must also be taken from the sales revenue.

Uses of contribution calculations

There are several ways in which contribution calculations can be used in business:

Determining the break-even point

As you learned in [Section 5.5.1 \(/study/app/y12-business-management-a-hl-may-2024/sid-351-cid-174702/book/calculating-breakeven-id-39496\)](/study/app/y12-business-management-a-hl-may-2024/sid-351-cid-174702/book/calculating-breakeven-id-39496), contribution calculations enable a business to determine the break-even point. To reach the break-even point, a business must cover its fixed costs with the contributions. Thus, the formula for break-even is:

Break-even quantity = $\frac{\text{fixed costs}}{\text{contribution per unit}}$

Choosing work (orders)

Another use for contribution calculations is to help a business choose what work to take on, or which orders to accept. Generally, where a business has more work or orders than it can take on, the business should choose the work or orders that have the largest contribution value.

For example, Méndez Ltd manufactures chairs and tables and has received two orders. One order is for the production of 1000 chairs; the other order is for the production of 800 tables. However, Méndez Ltd only has the resources to accept one order so the company needs to decide which order to accept. **Table 1** shows the estimated revenue and cost details.



Figure 1. Should Méndez Ltd accept an order for making chairs or tables?

Credit: Jordan Lye, Getty Images

Table 1. Revenue and cost comparison for an order for producing chairs or tables for Méndez Ltd.

	Chairs (\$)	Tables (\$)
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Sales revenue	12 000	17 000
Variable costs	8900	15 400
Contribution	3100	1600

Following the calculation, and considering that only one order can be accepted, the business should accept the order of chairs, since the contribution of the chair (\$3100) is larger than the contribution of the tables (\$1600).

Make or buy analysis

Businesses often have a choice of whether to produce a product or component themselves, or to outsource the production to a third party. To make this decision, they need to consider both qualitative and quantitative factors. Keeping the work in-house allows for closer quality controls and overall management of the production process. On the other hand, using subcontractors helps companies deal with fluctuations in demand.

Contribution plays a role in the quantitative analysis of the make or buy decision. A business needs to be careful to consider the revenues and costs involved with the decision. When dealing with products that make a contribution to fixed costs, a business will need to consider contribution in the make or buy decision; if the business chooses to buy rather than make, then the contributions of the product will be 'lost' and will need to be made up by other product lines.

Allocating direct and indirect costs for contribution calculations

In Subtopic 3.3 (/study/app/y12-business-management-a-hl-may-2024/sid-351-cid-174702/book/the-big-picture-id-39300), you learned about costs and revenues and about the distinction between direct costs and indirect costs.

Direct costs are those that can only be attributed to a single part of the business – that is, directly linked to the sale of the goods or the provision of the service. Examples include the resource costs for a particular product, operations costs for a particular department, utility costs of a single branch of a chain store, and so on.

Direct costs are relatively easy to allocate for the purposes of calculating contribution. They are clearly associated with a particular product or department. However, indirect costs are not easy to allocate. Indirect costs involve a number of business activities that support the business as a whole, such as nationwide advertising campaigns, salaries of the board of directors, IT costs, and so on. It is difficult to determine how to allocate these indirect costs when calculating the contribution for a particular product.

A business has the following options when dealing with indirect costs for contribution calculations:

- contribution costing
- absorption costing

Contribution costing

Contribution costing involves using costs to support decision-making that only considers the direct costs of the product, department or region and their contribution to the indirect costs of the business as a whole. For example, if Méndez Ltd produced chairs, tables and bed frames, the business could calculate the contribution for each product line, as shown in **Table 2**. These contributions combined would cover the indirect costs for the entire business, in this case, \$1 000 000.

Table 2. Contributions for various furniture products at Méndez Ltd.

	Chairs (\$)	Tables (\$)	Bed frames (\$)
Total revenue	1 500 000	2 000 000	2 300 000
Total direct costs	750 000	1 200 000	1 500 000
Contribution	750 000	800 000	800 000

Total contribution for all products = \$750 000 + \$800 000 + \$800 000 = \$2 350 000

Indirect costs = \$1 000 000

Profits = \$1 350 000

Using contribution costing, it seems that tables and bed frames are contributing more to the overall profit than chairs for Méndez Ltd.

Absorption costing

Absorption costing involves dividing the indirect costs among the products, departments or regions based on predetermined criteria such as output, sales revenue, number of employees, or the value of the equipment. The indirect costs would be allocated proportionally based on the differences between the products, departments or regions. This provides a more accurate picture of the various contributions to a business's profits. However, it is more complex to calculate.

Again, using the example of Méndez Ltd, the indirect costs were \$1 million. Examine the information in **Table 3** below to consider two ways that the business could use absorption costing to allocate these indirect costs.

Table 3. Data on sales revenue and employees at Méndez Ltd.

Product	Sales revenue (\$ millions)	% of total sales revenue	Employees	% of total employees
Chairs	1 500 000	26	3	30
Tables	2 000 000	34	4	40
Bed frames	2 300 000	40	3	30

If Méndez Ltd decided to allocate the \$1 million indirect costs to the different products based on the relative sales revenues of each product in the third column, then the indirect costs would be allocated as follows:

Indirect costs for chairs = $\$1\,000\,000 \times 0.26 = \$260\,000$

Indirect costs for tables = $\$1\,000\,000 \times 0.34 = \$340\,000$

Indirect costs for bed frames = $\$1\,000\,000 \times 0.40 = \$400\,000$

With this information, it is now possible to determine the profits earned by each product rather than just the contribution as was done in **Table 2**. The new calculations that include indirect costs are in **Table 4** below.

Table 4. Profits earned by each product at Méndez Ltd using the absorption costing method for indirect costs based on relative sales revenue.

	Chairs (\$)	Tables (\$)	Bed frames (\$)
Total revenue	1 500 000	2 000 000	2 300 000
Total direct costs	750 000	1 200 000	1 500 000
Allocated indirect costs	260 000	340 000	400 000
Profit	490 000	460 000	400 000

Notice that the total profit for producing chairs, tables and bed frames is still \$1 350 000. In **Table 2**, where contribution costing was used, it looked like tables and chairs were making the largest contribution to covering the indirect costs. However, using absorption costing based on relative sales revenue, the data shows that chairs are making the largest contribution to the profits of Méndez Ltd. This might have an influence on how the business makes decisions on allocating financial, human or physical resources moving forward.

However, using different absorption costing criteria, Méndez Ltd may see a different outcome. If Méndez Ltd decided to allocate the \$1 million indirect costs to the different products based on the percentage of employees, then the indirect costs would be allocated as below:

Indirect costs for chairs = \$1 000 000 × 0.30 = \$300 000

Indirect costs for tables = \$1 000 000 × 0.40 = \$400 000

Indirect costs for bed frames = \$1 000 000 × 0.30 = \$300 000

You can see the impact of this allocation of indirect costs in the profit calculations in **Table 5**.

Table 5. Profits earned by each product at Méndez Ltd using the absorption costing method for indirect costs based on relative number of employees.

	Chairs (\$)	Tables (\$)	Bed frames (\$)
Total revenue	1 500 000	2 000 000	2 300 000
Total direct costs	750 000	1 200 000	1 500 000
Allocated indirect costs	300 000	400 000	300 000
Profit	450 000	400 000	500 000

Notice that the total profit for producing chairs, tables and bed frames is still \$1 350 000. In **Table 4**, where the relative sales revenue was used to allocate costs, it looked as though chairs were contributing the most to profit. However, using absorption costing based on relative employees, the data shows that bed frames are contributing the most to the profits of Méndez Ltd. Again, this might have an influence on how the business makes decisions on allocating financial, human or physical resources moving forward.

Evaluation of contribution analysis

You have already been introduced to a number of uses of the contribution tool. **Table 6** also outlines some limitations.

Table 6. Uses and limitations of contribution analysis for business decision-making.

Uses of contribution analysis	Limitations of contribution analysis
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<p>Break-even. Contribution calculations are part of the break-even analysis that is needed to determine the viability of a business.</p>	<p>Assumptions. Contribution analysis is based on many assumptions about conditions in the internal and external environment, and how indirect costs may be integrated. If assumptions change, the result of the contribution analysis may be different. The calculations might also change depending on the time period used.</p>
<p>Choosing work (orders). When a business has more work or orders than it can take on, it should choose the work or orders that have the largest contribution value.</p>	<p>Only one tool among many. Contribution analysis is a valuable quantitative tool, but it is only one of many tools for decision-making. Businesses should consider both quantitative and qualitative information, including ethics concerns.</p>
<p>Make or buy. Contribution analysis is a quantitative tool used to determine whether a business should make or buy a product or component.</p>	

Activity

Consider the following information about Company Z, which comprises two centres (Centre A and Centre B).

Centre A

Price of product: \$120

Quantity sold: 1500

Variable costs: 50% of the price

Centre B

Price of product: \$130

Quantity sold: 1350

Variable costs per unit: \$80

Indirect costs of Company Z: \$20 000

Questions

1. Calculate the total contribution for Centre A and Centre B separately.
2. Calculate the total profits for Company Z.
3. Assume that Company Z decides to use absorption costing to get a more accurate picture of the contribution of each centre. It decides to allocate indirect costs as follows: Centre A 80% and Centre B 20%. Calculate the profits earned by Centre A and Centre B separately using absorption costing. Double check your work by confirming that the sum of these two profits equals the profit you calculated in question 2.
4. Comment on the different results for questions 1 and 3.