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Cost Volume Profit Analysis (CVP)

4.1 Introduction and objectives

Cost volume profit analysis is a technique used to explore the relationship between the three elements of financial performance; the volume of activity (sales), the costs associated with them, and the profit (the difference between them). A key aspect of this is to be able to understand how costs respond to changes in level of activity and to use this awareness in the planning and decision making process.

After studying this chapter you should be able to:

- Understand the concept and terminology of CVP
- Have a working knowledge of CVP calculations
- Appreciate the usefulness of CVP to managers as a decision making tool; and
- Explore the use of 'What if?' case scenarios with the aid of computer spreadsheets.

4.2 CVP terminology and concept

At a basic level we know that:

$$\text{Profit} = \text{Total Sales Revenue} - \text{Total costs}$$

For planning and decision-making purposes it is important to look at this relationship and how it varies in different situations. For example a manager could ask the questions related to impact on profit, such as:

- What if my sales volume reduces/increases by 10%?
- What if my supplier puts his costs up by 10%?
- What would be the impact of reducing/increasing the selling price by 5%?
- How many sales do I need to make to break even?

- How many sales are needed to produce a given profit?
- What price needs to be charged to return a specific profit from a specific level of activity?

An important aspect in answering such questions is identifying what type of costs you have and how they respond to changes in levels of activity. In the previous chapter it has been identified that variable costs vary in direct proportion to the volume of activity and fixed costs vary with time (no cost remains constant forever). Given this knowledge it is important that fixed and variable costs can be separated if the relationship between costs, volume of activity and the profit achieved are to be explored. Costs cannot be left in the semi-fixed or semi-variable category – such costs have to be split into their fixed and variable components. How to do this is discussed in the previous chapter using methods such as the high/low method, scatter graph approach or by using linear regression.

CVP emphasises the ‘contribution margin’, which is the contribution made towards fixed costs and profit. The formula for this is:

$$\text{Contribution margin} = \text{Sales revenue} - \text{Variable costs}$$

So it is the amount left from sales revenue once variable costs have been removed that is available to contribute towards the fixed costs in the first instance and once fixed costs have been met, it is a contribution to profit. It is important to note that contribution is not profit, there is often confusion and the terms ‘contribution margin’ and ‘profit’ should not be confused. The concept of variable costs was discussed in some depth in the previous chapter.

4.2.1 Example: Oriental Delight Restaurant

This restaurant is an ‘All-you-can-eat’ buffet style restaurant with a set price of £10 per customer (cover). Its ‘relevant range’ (see previous chapter) in a typical month are sales of between 15,000–30,000 units (meals). Their variable costs are £4 per unit and their fixed costs are £120,000.

Table 4.1: Contribution margin profit statement for Oriental Delight Restaurant

Oriental Delight Restaurant				
Relevant range (meals)	15,000	Unit	30,000	Unit
Sales revenue	£150,000	£10	£300,000	£10
Less: variable costs	<u>£60,000</u>	<u>£4</u>	<u>£120,000</u>	<u>£4</u>
Contribution margin	£90,000	<u>£6</u>	£180,000	<u>£6</u>
Less: fixed costs	<u>£120,000</u>		<u>£120,000</u>	
Net profit (loss)	<u><u>-£30,000</u></u>		<u><u>£60,000</u></u>	

The contribution statement shows the impact of sales volume on profit. Within the relevant range the selling price and variable costs have remained constant per unit sold, as has the total fixed costs. In effect, what the unit information is telling

the manager is for every £10 that comes in £4 goes directly towards covering the variable costs of that sale, in this case food costs. That means for every sale there is a £6 contribution.

Selling price – variable costs per unit = contribution per unit

£10 – £4 = £6 contribution per unit

Each time a unit (meal) is sold there is a £6 contribution towards fixed costs; once those are covered is the contribution goes towards profit. Oriental Delight Restaurant has fixed costs of £120,000, but when it sells 15,000 units the total contributions (£6 * 15,000) only equals £90,000, so a loss of £30,000 is made.

Total contribution – Fixed costs = Profit (loss)

@15,000 units £90,000 – £120,000 = (£30,000)

@30,000 units £180,000 – £120,000 = £60,000

Looking at the relationship between costs, volume and profit it can be seen here that volume of activity has a massive impact on profits when variable costs remain constant per unit and fixed costs remain constant as a total. The situation moves from a loss of (£30,000) to a £60,000 profit. So doubling the volume improves the profit/loss position threefold.

With CVP calculations this information can be utilised further to give deeper insights into the data. And this is discussed in depth in the next sections.

4.3 CVP calculations

There are a number of calculations that can aid us in the decision making process using CVP. The knowledge that Oriental Delight made a loss of –£30,000 when it sold 15,000 units and a profit of £60,000 when it sold 30,000 units is useful, but at what point did it neither make a profit or a loss? The point where neither a profit nor loss is made is called the 'breakeven point'. At this point total sales revenue = total costs. In the example above a £6 contribution is made for every sale and the fixed costs are £120,000. The question is how many amounts of £6 are needed in order to cover the total fixed costs?

4.3.1 Breakeven point (BEP)

There is a formula that is simple to aid managers in calculating when neither a profit nor loss is made:

Breakeven point (BEP) in units = Fixed costs/contribution per unit

£120,000/£6 = 20,000 units

This identifies that they need to sell 20,000 units to breakeven, to neither make a loss or a profit.