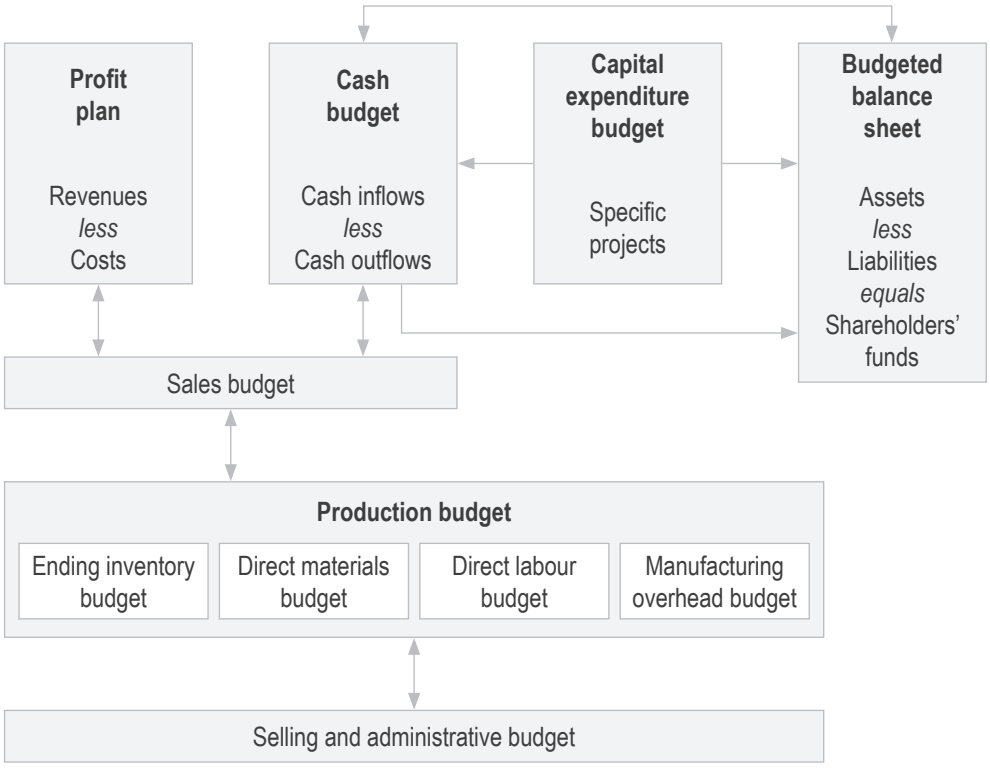
Reading 8.1

AGSM @ UNSW Business School,
'Budgeting: A basis for planning and control',
UNSW Sydney.

Budgeting: A basis for planning and control

A **master budget** is the set of budgets that summarises the quantitative outcomes of all sub-units of an organisation (e.g. sales, production, administration and finance) and brings this information together in a profit plan and cash budget, as well as a capital expenditure budget and budgeted balance sheet. The elements of a master budget are shown in the flowchart in Exhibit 1. Our concern here is with the preparation of the set of plans that comprise the master budget.

Exhibit 1 *Planning process and master budget – some connections*



In recent times, various approaches to developing a master budget have emerged. An **activity-based budget** differs from a traditional approach in that it is based on the identification of activities within a firm. The demand for each activity is determined and the cost of its provision forms the basis of the budgetary process. There are potential benefits in adopting such an approach, but there are also additional costs. These costs must be weighed up against the potential benefits of such a budgeting approach.

Conscious of the need to seek continual improvement in increasingly competitive markets, the Japanese have coined the term **kaizen budgets**. Kaizen budgets explicitly incorporate a margin of improvement into budgeted estimates of costs and revenues. For example, a firm may initially believe that the production of one unit of its product will require one minute

of direct labour. The budget will initially be based on that assumption but later periods will reduce this to 55 seconds, 50 seconds and so on. For managers to meet their budgetary targets, they must continually improve performance.

Master budgets often incorporate **sensitivity analysis** that allows managers to model the effects of changes in the underlying data and assumptions upon which the budget was originally based.

Profit plan

Profit planning commences with an examination of the factors that limit the generation of profits. These factors include product demand, available production capacity, and the supply of raw materials and appropriately skilled labour.

Identifying the major limiting factors is important because it provides the starting point for budget preparation. For example, if an organisation could sell all the products it could make, the production budget would be the starting point. For a consulting firm with excess demand, the hours available from senior staff could be the limiting factor. For government departments, the appropriation from the Commonwealth may be the limiting factor on services to be provided. Here we will assume that sales demand is the major constraint on profit. Accordingly, we will commence the budgetary process with the preparation of the sales budget.

Typically, the steps involved in the development of a profit plan are as follows:

1. determine sales forecast by product
2. determine product mix
3. prepare sales budget by product
4. prepare production budget by department and by product
5. prepare purchasing budget by raw material type
6. prepare departmental budgets by responsibility area
7. compile departmental budgets into the profit plan
8. compare the profit plan with corporate objectives.

Some of the steps may be taken concurrently. There are, however, some key steps that must be completed before progress to the next step is possible. For example, the sales budget provides the volume base for the entire firm.

For a retail organisation, the main differences are:

a. there is no production budget
b. the purchase budget would be for finished goods instead of raw materials.

For a service organisation, assuming that sales is still the limiting factor, there would be neither a production nor a purchasing budget.

Sales budget

The sales budget is constructed by multiplying the expected sales in units by the sales price. Many organisations set their sales budgets for a one-year period and divide this budget into four quarters. Some organisations subdivide the first-quarter sales budget into months.

Sales forecasts provide the basis for the sales budget. These forecasts are based on numerous factors, including:

- past sales volume
- general economic and industry conditions
- relation of sales to economic indicators (e.g. gross national product, personal income, employment, prices and industrial production)
- relative product profitability
- market research studies
- pricing policies and their impact on demand
- advertising and other promotion
- quality of sales force
- competition
- seasonal variations
- unfilled backlogs.

An effective aid to accurate forecasting is to approach the task using several methods; each forecast then acts as a check on the others.

We will consider two of the most common approaches to forecasting. One, which we will term a **macro approach**, develops a model to forecast total sales. The other (we will call this a **micro approach**) projects sales by product, customer, territory or salesperson, and then groups these individual estimates into an overall sales forecast.

The macro approach attempts to develop a mathematical model that describes the relationship between relevant variables and company sales. Statistical methods may be used to measure the relationship between sales of the firm (the dependent variable) and some relevant variable upon which sales depend (the independent variable). Ideally, changes in the independent variable will lead (precede) changes in sales. For example, for a firm selling a product used in home construction, the number of residential building permits issued in the market area may be closely related to potential sales. If there is a close relationship between sales and building permits issued, and permits lead sales by one period, then statistical analysis can provide an estimate of the next period's sales based

on housing starts in this period. Where sales are influenced by more than one variable, more sophisticated models are required. Instead of using only building permits, as in our earlier example, the firm might also use consumer disposable income and the availability of mortgage money as additional independent variables.

Another approach to forecasting total sales is **market share analysis**. By applying a company's expected share of the market to economic forecasts of an entire market or industry, a projection of that firm's sales is obtained. For example, assume that one pharmaceutical firm's share of all drug sales in the country is 10%. Further, assume that all legitimate drug sales may be positively related to 1% of personal disposable income.

The firm can use government forecasts of personal disposable income to estimate total drug sales and forecast its share of these sales.

Note that too much reliance on the macro approach can be dangerous because chance variation in statistical data may upset a forecast. In addition, market share analysis can be upset by changes in prices, new competitors and the introduction of new and substitute products.

Micro methods of sales forecasting depend upon building up a firm-wide forecast by looking at segments of the total firm. If a firm has a close relationship with its customers, it may go directly to those customers and ask them what they expect to purchase in coming periods. The results from these enquiries (or at least the results from key customers) may enable the firm to forecast total sales using a micro approach. Where the firm's relationship with its customers is not close enough to permit it to go to them directly, it may use the micro approach by obtaining sales forecasts from the individual sales staff.

Sales staff have several **sources for predicting sales** and some of these are noted below.

- In many cases, it will be possible to obtain the potential purchase of a customer directly from a purchasing agent, buyer or other responsible individual within the customer business (account). At times, customer personnel might not be able to give you their anticipated total purchases of the products that you market for the current year, but they might very well be able and willing to give you the amount they have purchased from all sources in the previous year. With this information, you should be able to come up with a useful forecast.
- The customer's potential purchases may also be arrived at through observations made of the type of equipment at the customer's location that either consumes the products you make or could possibly be replaced by products you make.
- Relationships can also be inferred between the type of industry and the total number of employees working at an account which closely resembles or corresponds to a similar size plant in a similar industry where the potential is known.
- In some cases, you may have a reliable estimate of the amount of one

or two product lines, which complement or supplement other product lines that you market, consumed at a specific point. It might be possible to arrive at an estimate of the unknown product line potentials because of their relationship with products of known potential.

- Refer to government contracts and contract awards, as well as requests for bids from accounts in private industry.
- Sometimes, salespeople who sell product lines that are complementary to your firm's can be quite helpful. For example, a machine tooler may know of a plan to buy a certain number of tools which happen to be used in conjunction with one of your products or processes.

A weakness of the micro approach is the possible bias of the people making the predictions. Customers may be reluctant to indicate what they think the real total of their purchases will be, while sales personnel, as a group, probably tend to be optimistic. Their forecasts of sales are likely to reflect this optimism, unless they feel that their predictions of sales in their territories will be used as a basis for setting sales quotas, in which case they might tend to understate their predictions. To guard against this potential bias, companies that use micro approaches for prediction frequently develop histories of the customers' or sales staff's predictions to be compared with the actual results. Comparisons of predicted and actual sales for several years may permit management to adjust the sales staff's initial predictions to more realistic levels.

A firm need not choose exclusively either a micro or macro approach to sales forecasting. For some products, the macro approach may be used, and for others the micro approach. In many cases, the two approaches are both used to arrive at a meaningful forecast.

Sales forecasting illustrated: Sydney Shirt Ltd

1. The sales manager of a Sydney-based shirt manufacturer, Sydney Shirt Ltd (compiled sales forecasts by each salesperson and arrived at the following range of expected sales. This range is based on the belief that the market is very competitive so the sales price of the product is beyond the control of the firm.

   T-shirts @ $10.00 each – 7,500 to 9,000 units.

   The sales manager decided to assess the salespeople's ranges through the use of statistical decision theory. This approach seemed appropriate because of uncertainty about the future sales; the use of probability analysis is one way to deal with this uncertainty.

   Probability analysis is based on the assumption that there is a statistical chance (probability) that a specific event will occur. Given that a range of possible outcomes can be expected, the manager must first identify them.

   Secondly, the manager must assign probabilities to these possible outcomes. For example, if the manager were to flip a coin they might

assign a 50% chance of tails, or a probability of 0.5, and a 50% chance of heads, also a probability of 0.5. The sum of the probabilities must always equal 1.0 since probability analysis assumes the events are all-inclusive and each event is mutually exclusive (no two events can happen at the same time).

Thirdly, the manager multiplies each of the possible outcomes by the probability of its occurrence and sums the results. This sum is called the **expected value**.

The sales manager prepared the following analysis based upon subjective probabilities.

Exhibit 2

Possible outcomes of sales in units	Probability outcome will occur	Expected value
7,500	0.30	2,250
8,000	0.40	3,200
8,500	0.20	1,700
9,000	0.10	900
	1.00	8,050

Using probability analysis, the expected value of sales was 8,050 T-shirts.

The sales manager also noted that last year's sales were $74,580 and that the firm's sales had been growing at approximately 7% per year. At this growth rate, next year's expected sales would be $79,800 or 7,980 T-shirts.

Using the above information about the market and the established selling price, a management committee made a final sales forecast as follows:

Total sales of T-shirts 8,000 units @ $10.00 = $80,000.

The sales of the company's products are seasonal, and the following historical pattern of sales is expected to continue in the subsequent year.

Exhibit 3

Quarter	T-shirt
1	20%
2	10%
3	30%
4	40%
	100%

Using the above information, it was possible to prepare the following year's sales budget.

Exhibit 4

Sydney Shirt Ltd
Sales budget for the following year ending 31 December

	Quarter				Total
	1	2	3	4	for year
Budgeted sales in units	1,600	800	2,400	3,200	8,000
Unit selling price	$10	$10	$10	$10	$10
Total sales	$16,000	$8,000	$24,000	$32,000	$80,000

Production budget

The production budget provides the activity base (i.e. necessary volumes) for planning variable production cost levels, including direct materials, direct labour and manufacturing overhead.

The production budget estimates the volume of production required to meet budgeted sales, and to provide for the desired level of ending inventory of finished goods (i.e. final product).

Producing for sales and for inventory

Firms produce goods for both sales and inventory. If inventory levels are too low at the end of a period, there may be insufficient stocks of finished goods to meet sales in the following period. This may cause expensive 'crash' production in the following period and lost sales. In addition, firms produce for inventory as a way of stabilising the use of production personnel and facilities. This is particularly the case where there are seasonal fluctuations in sales. Against this, however, is the desire to minimise inventory holdings at the end of a period in order to minimise the carrying costs of surplus stock.

Sufficient goods will need to be produced to meet sales and to provide for desired ending inventory of finished goods. Some of these goods will already exist in the form of beginning inventory, left over from the previous period's production activities. The remaining required goods will have to be produced in the current period.

$$\text{Required production} = \text{Budgeted sales} + \text{Desired ending inventory (finished goods)} - \text{Opening inventory (finished goods)}$$

Exhibit 5 illustrates these relationships for Sydney Shirt Ltd.

Exhibit 5

Sydney Shirt Ltd
Production budget for the following year ending 31 December (in units)

		Quarter				Total
		1	2	3	4	for year
Plus	Budgeted sales (Exhibit 4)	1,600	800	2,400	3,200	8,000
	Desired ending inventory of finished goods[a]	80	240	320	200[b]	200
Less	Total	1,680	1,040	2,720	3,400	8,200
	Opening inventory of finished goods	200[c]	80	240	320	200
	Required production	1,480	960	2,480	3,080	8,000

a. Assumes desired ending inventory is 10% of next quarter's sales.
b. Assumes that sales in the first quarter of the next will be 2,000 units.
c. Taken from the previous balance sheet which is not shown in these notes.

Direct materials budget

The direct materials budget estimates the materials that will be required in the production process. Raw materials are necessary to meet production requirements, and to provide for the desired ending inventory of raw materials for the budget period.

Consider the costs and benefits associated with holding raw materials inventory.

Part of required raw materials will already exist in the form of opening inventory, left over from the previous period's purchases of raw material. The remaining required raw materials will have to be purchased from suppliers.

Raw material purchases = Raw materials required for production + Desired ending inventory (raw materials) – Opening inventory (raw materials)

Exhibit 6 illustrates these relationships for Sydney Shirt Ltd, using the cost specifications for T-shirts given below:

Labour per T-shirt: 0.2 direct labour hours @ $20.00/hour

Raw materials per T-shirt: 1 metre of cloth @ $0.50/metre

Exhibit 6 *Sydney Shirt Ltd direct materials budget*

Sydney Shirt Ltd
Direct materials budget for the year ending 31 December

		Quarter				Total for
		1	2	3	4	year
	Units to be produced (Exhibit 5)	1,480	960	2,480	3,080	8,000
	Raw material (fabric) needs per T-shirt (metre)*	1	1	1	1	1
	Production needs (metres)	1,480	960	2,480	3,080	8,000
Plus	Desired ending inventory of raw materials (metres)[a]	192	496	616	200[b]	200
	Total (metres)	1,672	1,456	3,096	3,280	8,200
Less	Opening inventory of raw materials (metres)	250[c]	192	496	616	250
	Raw materials to be purchased (metres)	1,422	1,264	2,600	2,664	7,950
	Raw materials cost per metre*	$0.50	$ 0.50	$ 0.50	$ 0.50	$ 0.50
	Cost of raw materials purchases	$711	$632	1,300	$1,332	$3,975

a. Assumes desired ending inventory is 20% of the next quarter's production needs.
b. Estimated.
c. Taken from the previous balance sheet which is not shown in the notes.

* Refer previous cost specifications

Direct labour budget

The direct labour budget estimates the amount and cost of the labour required in the production process. The amount of labour required is obtained from estimates of the direct labour hours required to produce a single unit and the number of units of finished product required in a given period. The cost of labour is simply the amount of labour required multiplied by the direct labour cost per hour.

Direct labour hours required = Required production × Direct labour hours per unit
Direct labour cost = Direct labour hours required × Direct labour cost per hour

Exhibit 7 illustrates these relationships for Sydney Shirt Ltd.

Exhibit 7

Sydney Shirt Ltd
Direct labour budget for the year ending 31 December

	Quarter				Total for year
	1	2	3	4	
Production required (Exhibit 5)	1,480	960	2,480	3,080	8,000
Direct labour hours per unit*	0.2	0.2	0.2	0.2	0.2
Direct labour hours required	296	192	496	616	1,600
Direct labour cost per hour*	$20	$20	$20	$20	$20
Total direct labour cost	$5,920	$3,840	$9,920	$12,320	$32,000

* Refer previous cost specifications.

Manufacturing overhead budget

The manufacturing overhead budget provides a schedule of all manufacturing costs, other than direct materials and direct labour. Often, overhead costs are broken down by cost behaviour (i.e. fixed and variable costs). In addition, as these costs are only indirectly traceable to units of finished goods, it is somewhat unrealistic to prepare a budget on a quarterly basis. Accordingly, Exhibit 8 provides the overhead budget for Sydney Shirt Ltd for the entire year.

Exhibit 8

Sydney Shirt Ltd
Manufacturing overhead budget for the year ending 31 December

Variable overhead		
Supplies	$ 1,000	
Electricity	1,500	
Maintenance	2,000	
Total variable overhead		$4,500
Fixed overhead		
Supplies	10,000	
Electricity	1,500	
Maintenance		$11,500
Total overhead		$16,000

Ending inventory (finished goods) budget

This stage of the budget preparation requires the valuation of ending finished goods inventory. This information is necessary to prepare the budgeted statement of financial position. Recall that the production budget shows desired ending inventory in terms of physical units. They are valued by multiplying the number of units by the computed cost of a unit of finished product.

As shown below, this unit cost is the sum of the unit costs associated with direct material, direct labour and manufacturing overhead. The unit cost of manufacturing overhead, sometimes referred to as the **predetermined overhead (recovery) rate**, is obtained by dividing total budgeted overhead by the budgeted level of activity. The level of activity is measured either in terms of the expected number of units to be produced or an associated index (e.g. the expected number of direct labour hours given expected production). The most accurate application of overheads to products would be made at year end when actual overheads are known. However, this does not allow for product costing during the year. **A predetermined overhead application rate** is therefore established.

Historically, this rate is often based on the volume of activity expressed in labour hours. This assumes labour hours and overheads are highly correlated; activity-based costing may be more appropriate in certain circumstances.

Product cost per unit =
Quantity of raw materials per unit of product × Unit cost of raw materials
+
Direct labour hours per unit of product × Direct labour cost per hour
+
Unit cost of manufacturing overhead

Unit cost of manufacturing overhead

In the case of Sydney Shirt Ltd, the predetermined overhead recovery rate, in terms of both expected number of units to be produced and expected direct labour hours (DLH), is calculated as follows:

$$\text{Predetermined overhead recovery rate} = \frac{\text{Total budgeted manufacturing overhead}}{\text{Level of activity}}$$

$$= \frac{\$16{,}000}{8{,}000 \text{ units}} \quad \begin{matrix}\text{(Exhibit 8)} \\ \text{(Exhibit 5)}\end{matrix}$$

$$= \$2/\text{unit of product}$$

or

$$= \frac{\$16{,}000}{1{,}600 \text{ DLH}} \quad \begin{matrix}\text{(Exhibit 8)} \\ \text{(Exhibit 7)}\end{matrix}$$

$$= \$10/\text{DLH}$$

Exhibit 9 uses this information to develop the unit product cost for Sydney Shirt Ltd, and Exhibit 10 illustrates the ending inventory of finished goods budget.

Exhibit 9

Sydney Shirt Ltd
Product cost per unit for the year ending 31 December

	Quantity	Cost	Total
Direct materials (metres)	1	$ 0.50	$0.50
Direct labour (hours)	0.2	$20.00	$4.00
Manufacturing overhead (hours)	0.2	$10.00	$2.00
			$6.50

Exhibit 10

Sydney Shirt Ltd
Ending inventory of finished goods budget for the year ending 31 December

Budgeted finished goods inventory in units (Exhibit 5)	200
Total production cost per unit (Exhibit 9)	× $6.50
Ending inventory of finished goods	$1,300

The information on budgeted direct materials, direct labour and overheads, together with forecast inventory levels is brought together in determining the forecasted cost of goods and services manufactured and sold, and the resulting gross margins or profit. From here the process moves on to selling and administrative expenses.

Selling and administrative budget

This budget lists all the anticipated expenses for the budget period that will be incurred in the non-manufacturing sub-units, including sales, finance, personnel, administration and so on. If the number of items in each of these areas is large, separate budgets and/or supporting schedules will be needed in each area. In some cases, those expenses are also classified by cost behaviour patterns. Exhibit 11 illustrates the selling and administrative budget for Sydney Shirt Ltd.

Exhibit 11

Sydney Shirt Ltd
Selling and administrative budget for the year ending 31 December

Variable expenses		
Sales commissions	$10,000	
Travel	2,000	
Total variable expenses		$12,000
Fixed expenses		
Advertising	500	
Salaries	25,000	
Insurance	2,500	
Total fixed expenses		$28,000
Total expenses		$40,000

Profit plan reconsidered

A budgeted income statement or profit plan can be prepared from the data developed in Exhibit 4 to Exhibit 11. The budgeted income statement is one of the key documents in the budget process because it provides a basis for determining how profitable operations are anticipated to be in the forthcoming period. A simple income budget for Sydney Shirt Ltd is shown in Exhibit 12.

Exhibit 12

Sydney Shirt Ltd
Financial performance budget for the year ending 31 December

	$
Sales (8,000 units at $10) (Exhibit 4)	80,000
Less cost of goods sold (8,000 units at $6.50) (Exhibit 9)	52,000
Gross profit	28,000
Less selling and administrative expense (Exhibit 11)	40,000
Net profit (loss)	($12,000)

If the profit plan is consistent with corporate objectives, it stands as a benchmark against which subsequent company performances can be measured. Our focus is then in terms of control. If the profit plan is unacceptable, it provides a basis for reconsidering operations with the view to making the changes that are necessary to bring the profit plan into line with corporate objectives.

Sydney Shirt Ltd and cost–volume–profit analysis: An example

A review of Exhibit 12 shows that Sydney Shirt Ltd will potentially operate at a loss. Given the data in Exhibit 4 to Exhibit 12, we can split costs into fixed and variable categories, as in Exhibit 13.

Exhibit 13

Type of cost		Fixed	Variable/ Unit	Notes
a.	Cost of goods sold			
	Direct materials (Exhibit 9)		$0.50	
	Direct labour (Exhibit 9)		$4.00	
	Overhead (variable) (Exhibit 8)		$0.56	(i)
	Overhead (fixed)	11,500		
b.	Selling and administrative expenses (Exhibit 11)	28,000	$1.50	(ii)
		$39,500	$6.56	

Notes:

i. Exhibit 8

$$\text{Variable overhead/unit} = \frac{\text{Total variable overhead}}{\text{Level of activity (production)}}$$

$$= \frac{\$4{,}500}{8{,}000}$$

$$= \$0.5625 \text{ rounded to } \$0.56$$

ii. Exhibit 11

$$\text{Variable selling and administrative expense/unit} = \frac{\text{Total variable selling and administrative expense}}{\text{Level of activity (sales)}}$$

$$= \frac{\$12{,}000}{8{,}000}$$

$$= \$1.50$$

$$\text{Break-even volume} = \frac{FC}{CM} = \frac{FC}{SP - VC}$$

$$= \frac{39{,}500}{10 - 6.56}$$

$$= \frac{39{,}500}{3.44}$$

$$= 11{,}486 \text{ T-shirts}$$

a. What volume of sales is necessary for the firm to make a profit of $30,000 before tax?

$$\text{Required volume} = \frac{FC + \text{Desired profit}}{CM}$$

$$= \frac{39{,}500 + 30{,}000}{3.44}$$

$$= \frac{69{,}500}{3.44}$$

$$= 20{,}204 \text{ T-shirts}$$

b. Given the loss in Exhibit 12, by how much would it be necessary to reduce fixed costs in order to break even?

Break-even volume at 8,000 T-shirts, reduction in FC:

$$\text{Let } 8{,}000 = \frac{FC}{3.44}$$

$$\text{that is, } FC = \$27{,}520$$

Therefore, FC needs to be reduced by:

$39,500 – $27,520

or

$11,980

c. If an additional $2,500 is spent on advertising, what volume of sales is necessary to break even?

New break-even volume given increase in advertising of $2,500:

$$BE = \frac{FC + \text{Advertising}}{CM}$$

$$= \frac{39{,}500 + 2{,}500}{3.44}$$

$$= 12{,}209 \text{ T-shirts}$$

d. Given the data in Exhibit 4 to Exhibit 12, what could be done to improve the profitability of Sydney Shirt Ltd?

i. Depending on the effectiveness of the advertising program, alternative c. might be viable.

ii. Given idle productive capacity particularly in the second quarter (see Exhibit 5), it might be possible to introduce a new line of thermal singlets with little change in fixed costs.

Budget preparation for service industries

The principles set out earlier in this reading are equally applicable to service industries. The following basic steps can be followed:

1. Estimate the services to be provided.
2. Prepare a revenue budget based on current charges in order to estimate budgeted revenue.
3. Set up an expense budget for each department to show the estimated costs of providing the services determined in 1 above.
4. Bring the revenue and expense budgets together to form a profit plan. For not-for-profit organisations, this would be a surplus/deficit budget.

For example, if we were considering a hospital, such factors as bed capacity, operating facilities, outpatient capacity and staff capacity would be considered in determining the possible services to be provided.

The estimates of patient days on a monthly basis would be determined based on the above factors. The expected patient-day revenue would be estimated for various types of services and, combined with estimates of patient days, would determine estimated revenue. The expense budget would include factors such as salaries, supplies and general overheads for the hospital. If after developing a profit plan it were decided that the result is not satisfactory, factors such as increasing capacity, increasing charges, reducing costs or eliminating certain services, could all be considered.