**G**reater use of the cost-volume-profit (CVP) approach to hospitality profit planning is advocated.

# Hospitality Profit Planning in the Practical Environment:

## Integrating Cost-volume-profit Analysis with Spreadsheet Management

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In order to carry out profit planning effectively in the practical situation operators and managers need a sound working knowledge of:

- technical and business activities in terms of the market, operations and employee policies;
- cost-volume-profit analysis and the limitations of its underlying assumptions; and
- computer spreadsheet operation and design.

With such knowledge and skills it becomes possible to gain a greater insight into the future profit position of an undertaking and improve budgetary planning.

## Cost-volume-profit Analysis

CVP analysis provides a broad overview of the cost-volume-profit relationships in a business enterprise. "The breakeven chart may be compared to the use of a meat-axe, not a scalpel. The chart is useful as a frame of reference for analysis, as a vehicle for expressing overall performance and as a planning device"[1].

The CVP analysis technique is not necessarily a substitute for detailed budget preparation, but is an important complementary aid which should be used to support the profit planning and budget preparation process. Detailed operating statistics such as average room rate, occupancy, average spend, cost of sales and other expenses are regularly collected and used to control business performance. Instead of allowing these statistics to be used for the sole purpose of control, the figures, along with others, can be used as a basis for analysing and planning future business activities to give a global indication of the effect on profits associated with different scenarios. For example, a hotel CVP model for a given annual forecast may indicate a level of profit which is judged by management to be inadequate. On reflection it might be considered that a higher average room rate would resolve the position. Assuming the addition of a higher room rate in the model improved the profit to an acceptable level it would then be necessary to examine market segmentation rates to determine if this was likely to be practicable. If it was subsequently concluded that the market could stand the rate increase the budget would be recast. If not, then alternative solutions would need to be sought. Thus, CVP analysis can assist the role of profit planning without undermining the integrity of the budget process.

### *Determining Cost and Revenue Behaviour*
Clearly, the first step in applying CVP analysis in the practical situation is to ascertain how costs and revenues behave in a specific undertaking. This can be achieved by drawing upon the operating knowledge of the particular business and examining each cost and recenue item in the profit and loss statement. A restaurant example will illustrate the approach, outlined in Figure 1.

### Identifying Fixed and Variable Costs
Some expenses of operating a restaurant are not influenced by changes in the volume of sales. These fixed expenses may include occupation costs such as loan interest, property insurance, depreciation, certain rent agreements and business rate. They will also usually include management salaries, marketing, property maintenance and so on.

In contrast to fixed costs there are other costs which do change approximately in proportion to the volume of sales. In the case of a restaurant, these variable expenses include

**Figure 1.** *How Restaurant Costs Behave with Changes in Sales Volume*
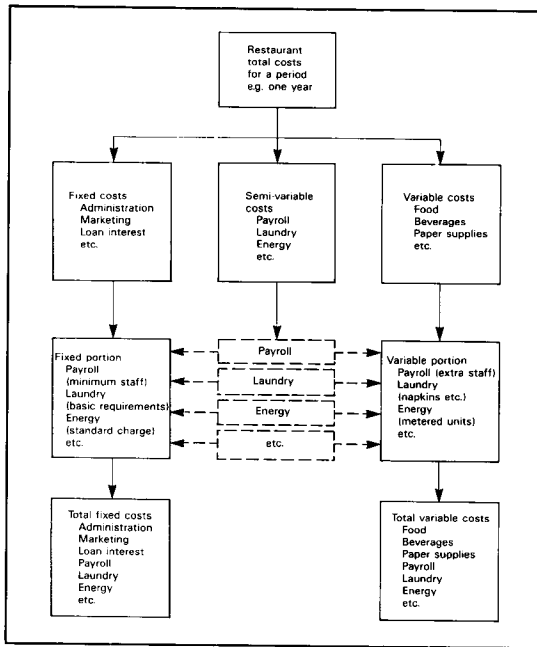


food cost, beverage cost and disposable items all of which tend to increase and decrease in line with sales volume.

In addition to the wholly fixed and variable costs there is the third category, semi-variable costs, which comprises both fixed and variable portions. These are more difficult to separate into their behavioural components, but with the personal knowledge and experience of a particular restaurant, the task is achievable. For instance, payroll and related expenses is a prime example of a semi-variable cost associated with restaurants. In order to ascertain the fixed portion of payroll it is first necessary to determine the minimum staff level for the restaurant to function for a given period, e.g. a manager, food preparation and service staff, office employees, and then compute the associated value. Once the fixed portion is established the variable cost portion will comprise all additional staff employed as the number of covers rises beyond the minimum staff capacity to cope.

The critical point to keep in mind when identifying the fixed and variable portions of semi-variable costs is to determine the proportions in a pragmatic manner. As these costs represent the most subjective area of cost behaviour analysis, the quality of the behavioural judgements will have a direct bearing on the final cost structure determined for the undertaking, which in turn will influence the accuracy of the CVP model. The key for all semi-variable

cost behaviour analysis lies in the ability to build up the fixed portion of each cost item for a given period based on the option of the minimum requirement to "open the doors" and function.

The time period used to build up the cost classification will vary according to the size and operating style of the particular business. In most cases it should be possible to carry out the analysis on an annual, monthly, weekly or even a daily basis, though, to some extent, this will depend upon the records available. A resort hotel for example, with a high room rate market in the summer season and a lower rate in the winter season, could operate two CVP models to reflect the different cost-volume-profit relationships according to season.

## Identifying Fixed and Variable Revenues

Sales is the other major component associated with generating a profit. Sales revenue is often passed over when managers become preoccupied with cost analysis and control, but it is just as important to determine how revenue responds in relation to the volume of sales as it is for costs. Thus revenues which broadly change in proportion to the number of customers are classed as variable revenues, e.g. food and beverage revenues and public room rentals. On the other hand revenues which remain constant regardless of the numbers of covers served are classed as fixed revenues, e.g. shop rentals, show case rentals and regular local club and society room hire charges.

As with costs, there can also be a semi-variable category for revenue. One semi-variable item relates to shop rentals. In some cases an agreement is made which provides for a fixed annual rent with a variable portion based on shop sales. Hence, the total rental is semi-variable although it can readily be separated into its fixed and variable portions.

## Classifying Revenues and Expenses

Having identifed the possible categories of revenue and expense items in a restaurant profit and loss statement as being wholly or partially fixed or variable, it is useful to consider a summary classification for a typical restaurant business, illustrated in Table I.

The particular type and style of operation will determine the precise revenue and expense items and their degree of variability. As far as determining the distribution between fixed and variable revenue and expense items is concerned, those who operate and manage a restaurant on a day-to-day basis will probably be in the best position to make the judgements. The important point to remember when analysing revenue and expenses is not to over-complicate the procedure in order to give an impression of exactness. In dealing with CVP relationships

**Table  I.**  *Classification of Restaurant Revenues and Expenses in Terms of Fixed and Variable Portions*

|  | Fixed portion | Variable portion |
|---|---|---|
| Sales revenue: | | |
| Food | — | All |
| Beverage | — | All |
| Other | — | All |
| Public room rental | — | All |
| Shop space rental | Fixed annual amount | Rental portion (if any) based upon percentage of sales revenue |
| Cost of sales: | | |
| Food (after allowance for employee meals) | — | All |
| Beverage | — | All |
| Controllable expenses: | | |
| Payroll and related | Minimum staff for restaurant to function (manager, chef, service staff, office employees) | Additional staff as number of covers rises beyond minimum staff capacity to cope, probably 20-40 per cent of total annual cost |
| Music and entertainment | All, because cost committed regardless of number of covers | — |
| Laundry | Amount to outfit minimum staff and cloth-up all tables initially | Uniform of additional staff plus guest napkins and table linen above fixed amount |
| China, glass, silver and linen | Probably 80 per cent of total annual cost | Probably 20 per cent of total annual cost due to breakages and damage |
| Paper supplies | — | All |
| Menus, printing etc. | All | — |
| Admin. and general | Almost all | — |
| Marketing | All, but franchise fee based on sales revenue | Franchise fee portion based on percentage of sales revenue |
| Energy and utilities | Almost all (amount affected by season and decision to open more or fewer hours, but not affected by number of covers) | — |
| Repairs and maintenance | Almost all | — |
| Fixed charges: | | |
| Rent | All fixed amount | Only the amount (if any) based on a percentage of sales revenue |
| Property insurance | All | — |
| Business rate | All | — |
| Loan interest | All | — |
| Depreciation | All | — |
| Net profit before tax | — | All |

precision is almost an illusion, so that while the analysis should be as accurate as possible, it should also be simple to use, otherwise the costs will outweigh the benefits.

## Cost-volume-profit Worksheet

Having outlined the approach to analysis revenue and expense variability the next step is to prepare a CVP worksheet[2]. This is effected by obtaining a restaurant profit and loss statement and applying the personal knowledge of the establishment and its surrounding environment to build up the revenue and cost classification summarized in Table I. For illustration purposes the assumed results of The Cherry Tree Restaurant are presented in Table II.

As indicated in this example, the restaurant's revenue is all classed as variable, whereas the expenses comprise both fixed and variable portions. The summary presented at the foot of the worksheet gives fixed and variable totals

**Table II.** *Cost-volume-profit Worksheet: The Cherry Tree Restaurant*

| Profit and loss statement for year ended 31 December 19x1 | | | | |
|---|---|---|---|---|
| | | Classification | | |
| | Year 19x1 £ | Fixed £ | Variable £ | Explanation |
| Sales revenue: | | | | |
| Food | 200,000 | — | 200,000 | |
| Beverage | 150,000 | — | 150,000 | |
| Gift items | 40,000 | — | 40,000 | |
| Total | 390,000 | | | |
| Cost of sales: | | | | |
| Food | 80,000 | — | 80,000 | |
| Beverage | 70,000 | — | 70,000 | |
| Gift items | 20,000 | — | 20,000 | |
| Total | 170,000 | — | | |
| Gross profit | 220,000 | | | |
| Other income | 30,000 | — | 30,000 | Banquet/meeting room rentals |
| Total income | 250,000 | — | | |
| Controllable expenses: | | | | |
| Payroll | 90,000 | 60,000 | 30,000 | Extra staff $33\frac{1}{3}$ per cent of total payroll |
| Laundry | 5,300 | 2,000 | 3,300 | |
| China, glass, etc. | 12,000 | 10,000 | 2,000 | |
| Paper supplies | 2,500 | — | 2,500 | |
| Menus and printing | 2,000 | 2,000 | — | |
| Admin. and general | 14,000 | 14,000 | — | |
| Marketing | 16,000 | 9,000 | 7,000 | Franchise fee 2 per cent food and beverage sales |
| Repairs and maintenance | 8,500 | 8,500 | — | |
| Energy | 9,000 | 7,500 | 1,500 | |
| Total | 159,300 | | | |
| Profit before fixed charges | 90,700 | | | |
| Fixed charges: | | | | Fixed £6,000 plus 3 per cent of food and beverage sales |
| Rent | 16,500 | 6,000 | 10,500 | |
| Business rate and insurance | 8,000 | 8,000 | — | |
| Loan interest | 15,000 | 15,000 | — | |
| Depreciation | 14,000 | 14,000 | — | |
| Total | 53,500 | | | |
| Profit for year | 37,200 | | | |

*Summary*

| Revenue | Fixed £ | Variable £ | Expenses | Fixed £ | Variable £ |
|---|---|---|---|---|---|
| Foods sales | — | 200,000 | Food cost | — | 80,000 |
| Beverage sales | — | 150,000 | Beverage costs | — | 70,000 |
| Gift items sales | — | 40,000 | Gift items cost | — | 20,000 |
| Banquet/meeting room rentals | — | 30,000 | Controllable expenses | 113,000 | 46,300 |
| | | 420,000 | Fixed charges | 43,000 | 10,500 |
| | | | | 156,000 | 226,800 |

Total revenue £420,000 — Total expenses £382,800 = Profit £37,200

between the difference which can be seen to equal the profit for the year. The worksheet provides the basis to gain a thorough understanding of the CVP relationships in the restaurant and, as will be demonstrated later, also provides an effective vehicle for introducing spreadsheet management to profit planning.

From the information assembled in The Cherry Tree Restaurant's worksheet it is possible to make a number of calculations which will be helpful in preparing profit projections for the annual budget and assessing alternative courses of action. The first of these calculations relates to the break-even position, but before discussing the mechanics it is important to reflect on the notion of "break-even".

## Break-even Sales Volume

Some practitioners display a cynical attitude towards the break-even concept. They regard break-even as an irrelevance and contend that a business exists to generate profits and not simply to recover costs. At first sight the argument is appealing, but on closer examination it can be seen to be flawed because until a business passes through the break-even threshold profits will not be forthcoming. Although break-even may not be the end objective in itself, it is by definition a critical intermediate point which must be reached before profits are realized.

The motivational qualities inherent in the break-even concept have for too long been underestimated or ignored. Just how powerful is the knowledge that above a given level of turnover the contribution margin generated from additional sales revenue constitutes net profit before tax is largely unknown, as little, if any, formal research has been carried out in the area. However, personal observation suggests that the psychological significance of the break-even point should not be disregarded in the profit-planning process.

In the practical situation break-even sales volume should normally be determined using the contribution margin (CM) percentage. Most hospitality undertakings have a wide variety of products and services and therefore the composite nature of the CM percentage provides a more pragmatic and satisfying representation of sales mix and variable costs.

Referring to Table II, the break-even sales volume can readily be determined as follows:

$$\text{Break-even sales volume} = \frac{\text{fixed costs}}{1 - \frac{(\text{variable costs})}{\text{sales}}}$$

$$= \frac{£156,000}{0.46}$$

$$= £339,130$$

Although the break-even sales in the illustration is determined for a year, the CVP worksheet can accommodate similar computations on a weekly, monthly or quarterly basis as appropriate to the specific business under consideration. Other computations can be made according to the needs of the establishment, for example:

$$\text{Sales volume for a target profit} = \frac{£156,000 + £37,200}{0.46}$$

$$= £420,000$$

This simply reaffirms the sales revenues required to achieve the restaurant's profit. Additional practical CVP computations can be determined for a variety of situations[3].

## Cost-volume-profit Graph

The CVP graph is a useful tool because it provides additional insights into the sales, cost and profit relationships of a business. Again using The Cherry Tree Restaurant, the CVP graph will appear as illustrated in Figure 2.

The graph provides a broad visual picture of how costs and revenues behave in relation to changes in the volume of business. It also gives an impression of the cost structure of an undertaking and acts as a guide as to business orientation[4], often more effectively than figures alone can do.

To be able to make practical use of CVP formulas and graphs two basic assumptions need to be satisfied, which are that:

(1) Revenues and costs can be realistically separated into fixed and variable categories.

(2) Revenues and costs respond in a linear pattern in relation to sales volume and mix.

Because it is not possible to be absolutely sure that both assumptions have been satisfied it is necessary to limit the

**Figure 2.** *The Cherry Tree Restaurant Cost-volume-profit Graph*
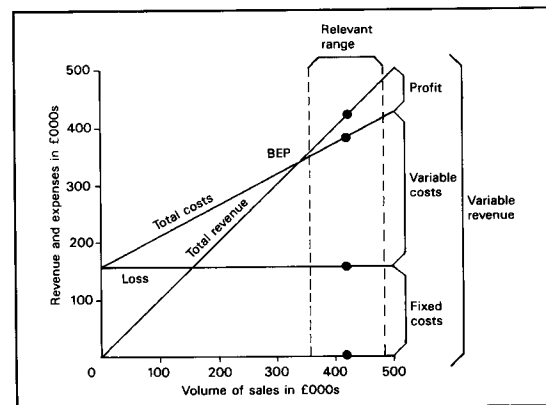
analysis to the "relevant range" on both the graph and for the forumla computations. Empirical data and personal observations suggest that this range is generally accurate up to 20 per cent above and below a given sales volume. Clearly, this will vary according to particular circumstances, but the range is sufficient to facilitate the majority of routine profit planning decisions.

If the relevant range for The Cherry Tree Restaurant is established at, say, 15 per cent above or below the present

**Figure 3.** *The Olde Barn Restaurant*

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | | | | Classification | | |
| 2 | INPUT SCREEN: Decision variables | | | Fixed | Variable | |
| 3 | Number of covers | | | | 20,000 | 17,340 |
| 4 | Average spend: food | | | — | 8 | per cover |
| 5 | Average spend: beverage | | | — | 3.5 | per cover |
| 6 | Shop and public room rental | | | 5,000 | 15,000 | |
| 7 | Cost of sales per cent: food | | | — | 0.4 | food sales |
| 8 | Cost of sales per cent: beverage | | | — | 0.5 | beverage sales |
| 9 | Payroll and related | | | 25,500 | 0.15 | total sales |
| 10 | Music and entertainment | | | 6,800 | — | |
| 11 | Laundry | | | 2,000 | 0.01 | total sales |
| 12 | China, glass, linen, etc. | | | 1,000 | 0.005 | total sales |
| 13 | Paper supplies | | | — | 0.005 | total sales |
| 14 | Menus, printing, etc. | | | 1,700 | — | |
| 15 | Admin. and general | | | 8,500 | — | |
| 16 | Marketing | | | 4,000 | 0.02 | food and beverage sales |
| 17 | Repairs and maintenance | | | 3,900 | 0.004 | total sales |
| 18 | Energy | | | 3,800 | 0.008 | total sales |
| 19 | Fixed charges | | | 30,000 | — | |
| 20 | | | | | | |
| 21 | OUTPUT SCREEN No. 1: Sales, gross profit and rental income | | | | | |
| 22 | | Annual | | Classification | | |
| 23 | | amounts | | Fixed | Variable | |
| 24 | Sales revenue: | £ | | £ | £ | |
| 25 | Food | 160,000 | | — | 160,000 | |
| 26 | Beverage | 70,000 | | — | 70,000 | |
| 27 | | | | | | |
| 28 | Total | 230,000 | | | | |
| 29 | | | | | | |
| 30 | Cost of sales: | | | | | |
| 31 | Food | 64,000 | | — | 64,000 | |
| 32 | Beverage | 35,000 | | — | 35,000 | |
| 33 | | | | | | |
| 34 | Total | 99,000 | | | | |
| 35 | | | | | | |
| 36 | Gross profit | 131,000 | | | | |
| 37 | Shop and public room rental | 20,000 | | 5,000 | 15,000 | |
| 38 | | | | | | |
| 39 | Total income | 151,000 | | | | |
| 40 | | | | | | |
| 41 | OUTPUT SCREEN No. 2: Expenses, fixed charges and profits | | | | | |
| 42 | Controllable expenses: | £ | | £ | £ | |
| 43 | Payroll and related | 60,000 | | 25,500 | 34,500 | |
| 44 | Music and entertainment | 6,800 | | 6,800 | — | |
| 45 | Laundry | 4,300 | | 2,000 | 2,300 | |
| 46 | China, glass, linen, etc. | 2,150 | | 1,000 | 1,150 | |
| 47 | Paper supplies | 1,150 | | — | 1,150 | |
| 48 | Menus, printing, etc. | 1,700 | | 1,700 | — | |
| 49 | Admin. and general | 8,500 | | 8,500 | — | |
| 50 | Marketing | 8,600 | | 4,000 | 4,600 | |
| 51 | Repairs and maintenance | 4,820 | | 3,900 | 920 | |
| 52 | Energy | 5,640 | | 3,800 | 1,840 | |
| 53 | | | | | | |
| 54 | Total | 10,3660 | | | | |
| 55 | | | | | | |
| 56 | Profit before fixed charges | 47,340 | | | | |
| 57 | Fixed charges | 30,000 | | 30,000 | — | |
| 58 | | | | | | |
| 59 | Net profit or loss | | | | | |
| 60 | | 17,340 | | | | |

**Figure 4.** *The Olde Barn Restaurant*

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | | | | Classification | | |
| 61 | OUTPUT SCREEN: No. 3: Break-even chart computations | | | | | |
| 62 | | | | Zero | Budget | |
| 63 | | | | range | range | |
| 64 | Sales revenue range (*X* axis) | | | 0 | 20,000 | |
| 65 | | | | £ | £ | |
| 66 | Sales revenue: Variable | | | 0 | 245,000 | |
| 67 | Fixed | | | 5,000 | 5,000 | |
| 68 | | | | | | |
| 69 | Total revenue | | | 5,000 | 250,000 | |
| 70 | | | | | | |
| 71 | | | | | £ | |
| 72 | Expenses: Variable | | | | 145,460 | |
| 73 | Fixed | | | 87,200 | 87,200 | |
| 74 | | | | | | |
| 75 | Total expenses | | | 87,200 | 232,660 | |
| 76 | | | | | | |
| 77 | Net profit or loss | | | | 17,340 | |
| 78 | | | | | | |
| 79 | BEP in sales revenue | | | | 202,320.7 | |
| 80 | BEP in covers | | | | 16,515.97 | |

sales level of £420,000, the CVP analysis accuracy will be between £357,000 and £420,000 sales volume. Thus, in terms of profit planning activities, the profits (or losses) at any level of volume between these two figures can reasonably be regarded as being accurate.

## CVP: Spreadsheet Management

In order to derive the maximum benefit from the use of CVP analysis in profit planning advantage should be taken of a computer spreadsheet. The spreadsheet is an ideal vehicle for the analysis because the model can be built in a similar style and format to the CVP worksheet. The spreadsheet will facilitate various "what if" scenarios such as the effect on bottom-line profit of change in sales volume.

For a spreadsheet model to be efficient and error free two important aspects should be addressed, namely design and methodology.

### Design
A number of spreadsheet design principles have evolved and been developed which will assist the manager and accountant in building an effective model[5]. Among the most critical of these concern "designing the model on paper" and "identifying input and output screens" on the spreadsheet grid (a screen being defined as the number of columns and rows visible on a VDU screen at any one time).

The paper design will help to minimize error and frustration by providing an overview of the spreadsheet model and drawing attention to otherwise unforeseen problems in the detail. With the inclusion of a flow diagram it will also indicate the overall structure of the model, the likely number of input and output screens and the relationship between them.

Input and output screens should be clearly distinguished. The input screens should mainly contain decision variables, i.e. items that can change such as average spend, number of covers, cost of sales percentages, fixed costs and so on. As these screens are used to input data for alternative scenarios they should be compact and kept to a minimum. Output screens comprise calculations and results and should contain only formulas.

### Methodology
It is difficult to be prescriptive about creating a spreadsheet model, but one logical way takes the form of a three-stage approach, as follows:

(1) Decide on an appropriate structure and layout of the financial information and enter labels and simple sample values in the output screen(s).

(2) Determine the output screen formulas and simultaneously build the input screen(s), thereby creating the spreadsheet model.
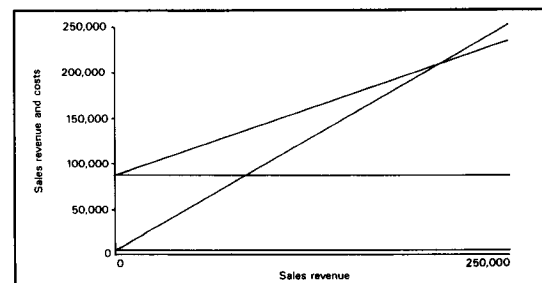
**Figure 5.** *The Olde Barn Restaurant Cost-volume-profit Graph*

**Figure 6.** *The Olde Barn Restaurant*

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | | | | Classification | |
| 21 | OUTPUT SCREEN: No 1: | | | | |
| 22 | | Annual | | Classification | |
| 23 | | Amounts | | Fixed | Variable |
| 24 | Sales revenue: | £ | | £ | £ |
| 25 | Food | =E25 | | — | =E3*E4 |
| 26 | Beverage | =E26 | | — | =E3*E5 |
| 27 | | | | | |
| 28 | Total | =B25 + B26 | | | |
| 29 | | | | | |
| 30 | Cost of sales: | | | | |
| 31 | Food | =E31 | | — | =E25*E7 |
| 32 | Beverage | =E32 | | — | =B26*E8 |
| 33 | | | | | |
| 34 | Total | =B31 + B32 | | | |
| 35 | | | | | |
| 36 | Gross profit | =B28 – B34 | | | |
| 37 | Shop and public room | =D37 + E37 | | =D6 | =E6 |
| 38 | | | | | |
| 39 | Total income | =B36 + B37 | | | |
| 40 | | | | | |
| 41 | OUTPUT SCREEN No 2: | | | | |
| 42 | Controllable expenses | £ | | £ | £ |
| 43 | Payroll and related | =D43 + E43 | | =D9 | =B28*E9 |
| 44 | Music and entertainment | =D10 | | =D10 | — |
| 45 | Laundry | =D45 + E45 | | =D11 | =B28*E11 |
| 46 | China, glass, linen | =D46 + E46 | | =D12 | =B28*E12 |
| 47 | Paper supplies | =E47 | | — | =B28*E13 |
| 48 | Menus, printing | =D48 | | =D14 | — |
| 49 | Admin. and general | =D49 | | =D15 | |
| 50 | Marketing | =D50 + E50 | | =D16 | =(B25 + B26)*E16 |
| 51 | Repairs and maintenance | =D51 + E51 | | =D17 | =B28*E17 |
| 52 | Energy | =D52 + E52 | | =D18 | =B28*E18 |
| 53 | | | | | |
| 54 | Total | =SUM(B43:B52) | | | |
| 55 | | | | | |
| 56 | Profit before fixed charges | =B39 – B54 | | | |
| 57 | Fixed charges | =D57 | | =D19 | — |
| 58 | | | | | |
| 59 | Net profit or loss | =B56 – B57 | | | |
| 60 | | | | | |
| 61 | OUTPUT SCREEN No 3: | | | | |
| 62 | | | | Zero | Budget |
| 63 | | | | range | range |
| 64 | Sales revenue range | | | 0 | 20,000 |
| 65 | | | | £ | £ |
| 66 | Sales revenue: Variable | | | 0 | =E25 + E26 + E37 |
| 67 | Fixed | | | =E67 | =D37 |
| 68 | | | | | |
| 69 | Total | | | =D67 | =E66 + E67 |
| 70 | | | | | |
| 71 | | | | | £ |
| 72 | Expenses: Variable | | | | =B34 + SUM(E43:E52) |
| 73 | Fixed | | | =E73 | =SUM(D43:D52) + D57 |
| 74 | | | | | |
| 75 | Total expenses | | | =D73 | =E72 + E73 |
| 76 | | | | | |
| 77 | Net profit or loss | | | | =E69 – E75 |
| 78 | | | | | |
| 79 | BEP in sales revenue | | | | =(E73 – E67)/((E66 – E72)/E66) |
| 80 | BEP in covers | | | | =E79/(E66/E3) |

(3) Test the model for correct functioning by changing each decision variable in turn and observing the effect on profit and break-even.

Thus, having designed the structure of the model, the detailed labels and sample values for the output screens should be entered prior to entering the formulas. As the formula for each output screen value is determined and entered the input screen variables should simultaneously be included. The reason for this is that the contents of the output screen cells determine the decision variables in the input screens. Finally, when testing the completed model the sample values should comprise simple numbers as this will make it easier to check the model for proper functioning.

## CVP Spreadsheet Model

A profit planning CVP spreadsheet model, The Olde Barn Restaurant, is presented in Figure 3. Due to constraints of space the model is slightly less detailed than The Cherry Tree Restaurant depicted in Table II. It does, however, show how a CVP analysis worksheet can readily be transformed on to a spreadsheet.

The decision variables are separated into their fixed and variable components as shown in Figure 3. The estimated fixed components relating to sales revenue and costs are entered as absolute amounts, while the variable cost components are entered as percentages of the relevant sales items as found in column E. Thus all variations in sales, costs and profits, reflected in the output screens, are prompted by change in decision variables.

The output screens have accommodated the layout and style of a CVP worksheet which reflects the *Uniform System of Accounts for Restaurants*[6]. This is a significant aspect as outputs are more easily read and evaluated if they relate to the needs of the user, in this instance the restaurant manager. The value of £17,340 in cell F3 is simply the net profit referenced from cell B59. This enables the user to be instantly aware of the impact on profit of a change in decision variables without having to page down or use the "go to" function.

Reference to Figure 4 shows Output Screen No. 3 which contains the data or the program to draw the CVP graph for The Olde Barn Restaurant.

A spreadsheet program produces a graph in a similar manner to a graph drawn manually. The graphics are usually based on a linear model and thus require two data points in order to draw each straight line. To allow for this it is necessary to introduce a second set of data for the restaurant. The additional set of data entered is based on zero sales to give a range of activity for the program to draw the CVP graph presented in Figure 5.

Most spreadsheet packages have the facility to display and print the cell formulas in the same configuration as the layout of the model. Reference to Figure 6 shows the formulas in the model's three output screens (input screens remain the same as in Figure 3). This enables the user to understand, review and, if necessary, revise the model as appropriate.

The CVP spreadsheet model can be used to assess the break-even and profit position prompted by a variety of changes to decision variables. In effect the model almost becomes a flexible budget because, albeit separately, it can show the profit or loss resulting from various levels of activity, up to 20 per cent above or below the current level of business.

Once the initial model is operating it can be adapted and extended to become a fully functioning flexible budget for both planning and control purposes. It can also be developed to determine the profit multiplier profile of the restaurant using sensitivity analysis and a number of other applications[7].

## Conclusion

This article set out to show how cost-volume-profit analysis, with the support of the computer spreadsheet, can be an effective practical aid to hospitality profit planning. A critical factor in its use is the ability to determine the revenue and cost behaviour of a particular undertaking, which in itself relies on a sound knowledge of operations. The CVP technique facilitates the identification of break-even sales volume, an important intermediate target that must be reached prior to achieving a profit. It provides the basis for numerous business opportunities to be tested for profit worthiness and also gives an indication of the cost structure and thereby the business orientation of an undertaking.

While a CVP analysis should be as accurate as possible, it should be remembered that precision in profit planning is mostly an illusion. Over-complicating the process to gain, or give an impression of, exactness usually results in the technique being discarded for not being cost-effective.

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