Chapter FIFTEEN

Segmental Profitability Analysis and Evaluation

Unless a business is a not-for-profit business, all businesses have as a primary goal the earning of profit. In the long run, sustained and satisfactory profit requires good decision-making and performance evaluation. The income statement, while serving many purposes, is a primarily a tool of performance evaluation from a management point of view. When prepared on a segmental basis, the use of the income statement for evaluation purposes can be highly effective.

Businesses tend to be complex and varied in nature. It is highly unlikely that a business will have only one product. Single product businesses exist only in text book theory for illustrative purposes of certain business principles. Many U.S. corporations have hundreds of products and also operate in different territories or regions. In today's business environment, the majority of enterprises are likely to be global in nature. Given the existence of many products and many different areas of operations, it is unlikely that over time all products or areas will be profitable. The need to evaluate profit performance systematically and regularly on a segmental basis has been recognized and has been a common practice since the early 1900s.

Even if a company had a single product, the need for segmental performance would still exists. The product may be sold in different markets and in different areas of the country. A single product business can be segmented in many different ways. For example, assume that the Widget Company operates in four territories. Does this mean that sales and, consequently, profit is equal in all territories? The obvious answer is, of course not. Many factors can contribute to why one territory is profitable and another is not. It logically follows that evaluation of profit in each segment is highly desirable. Unprofitably segments, if they can not be made profitable, should be discontinued.

A business can segment its operations in many different ways. Some of the more common ways of segmentation include the following:

1. Product lines
2. Departments
3. Divisions
4. Territories
5. States
6. Plants
7. Sales people
8. Operating hours

There has over a considerable period of time developed two primary ways of performing segmental analysis: (1) the full cost approach and (2) the contribution approach. The full cost approach attempts to measure the net income of each segment while the contribution approach attempts to measure the segmental contribution of each segment.

Full Cost Approach

On the surface, the full cost approach seems to be the logical method because of the fact that ultimately a business can not be successful without profit (net income). However, when the attempt to measure net income of a segment is made some problems come into existence that are not present when the objective is to simply measure the over-all net income of a business. From a segmental perspective, there are two types of expenses, (1) direct and (2) indirect. Direct expenses are those expenses of a segment that are caused by the existence of the segment and can, therefore, be eliminated by the closing of the segment. Indirect expenses or common expenses as they are sometimes called are those expenses that are not directly caused by any one particular segment. The key characteristic of indirect expenses from a segmental viewpoint is that they must be allocated in order to measure the net income of a segment. Examples of indirect expenses include the following:

1. Salaries of top management, for example the president's salary
2. Home office operating expenses
3. Insurance on home office and home office equipment
4. Salaries of home office staff

The theory underlying the full cost approach is that all expenses regardless of where and why incurred must be charged to the segments that benefit directly and indirectly. In order to do this, these types of expenses must be allocated. Because various methods of allocation are available and because different methods results in different allocation percentages, the allocated cost may be perceived to be somewhat arbitrary. Some of the methods used to allocate indirect expenses include the following:

1. Sales dollars
2. Units of dollars
3. Number of employees
4. Floor space occupied

Whatever method is used, it should appear to be logical and fair. An improper use of an allocation method can cause one segment to appear to be more profitable than another when in fact this is not the case. The basic principles of the full cost approach may be summarized as follows:

1. The objective is to measure net income of each operating segment.
2. Over-all net income of the business is the sum of the segmental net income.
3. All indirect expenses (common) must be allocated.
4. Allocation of indirect expenses involves selecting bases of allocation.
5. The segmental net income approach may be defined mathematically as follows:

Segmental net income = segmental sales - direct expenses - allocated indirect expenses, or in more symbolical terms

$$SNI = S - DE - AIE \quad (1)$$

Direct expenses are those expenses that can be eliminated by the closing of a segment. These types of expenses are also sometimes called escapable and indirect expenses called inescapable. Variable expenses because they are activity expenses are always considered escapable. For example, if in a clothing store the decision has been made to no longer sell children shoes, then the cost of goods sold for children shoes would no longer exist. Cost of costs sold, a variable expense, is a good example of an escapable segmental expense.

Fixed expenses may either be direct or indirect depending on the circumstances. If a store is closed but the contract for rent is a five year lease and only one year has expired on the lease, then for the next four years the rent is inescapable. However, if the sales manager of the store is let go, then his or her salary, a fixed expense, is escapable. The contractual nature of fixed expenses must be examined carefully to determine whether or not the expense is direct.

Segmental Contribution Approach

The major problem of the full cost approach is that it is technically possible for a segment to show an operating loss yet at the same time be making a positive contribution to net income. In other words, if the seemingly unprofitable segment is closed, then the overall net income of the business will decrease. The paradox will be examined more closely later in this chapter.

To overcome this adverse feature of the full cost approach, many businesses prefer to use the contribution approach to measuring segmental profitability. The segmental contribution approach as indicated by its name measures segmental contribution. Segmental contribution may simply be defined as sales less direct expenses. As a student, you should be careful to distinguish between segmental contribution and contribution margin. Contribution margin, which was discussed and defined in chapter 7, is sales less variable expenses. Because some fixed expenses can be direct expenses, segmental contribution and contribution margin are not the same.

The basic principles of computing segmental contribution may be outlined as follows:

1. Only the contribution of each segment is computed. No attempt is made to compute the net income of the segment.
2. Indirect or common expenses of each segment are not allocated.
3. Indirect or common expenses, however, are usually deducted from total segmental contribution in order to arrive at overall business net income.
4. A segment is considered profitable if sales of the segment exceed the direct expenses of the segment.

5. The segmental contribution approach may be presented mathematically as follows:

Segmental contribution = segmental sales - direct expenses

In more symbolical terms:

$$SC = S - DE \quad (2)$$

$$DE = V(Q) + F^D \quad (3)$$

$$S = P(Q) \quad (4)$$

Where:

DE - direct expenses
P - price of the product in the segment
V - variable cost rate for the segment
Q - units of sales in a specific segment
F^D - direct fixed expenses of the segment

Therefore, equation (2) may be restated as follows:

$$SC = P(Q) - V(Q) - F^D \quad (5)$$

It is apparent from equation (3) that the principles of cost-volume-profit analysis covered in chapter 7 apply to segmental decision-making. Variable costs are always direct costs. When activity ceases variable costs cease. When activity increases, variable costs by definition increase. Indirect expenses are almost always fixed expenses.

The indirect expenses of a segment will continue to be incurred regardless of whether the segment is continued or not continued. Therefore, as long as the segment is making a contribution towards indirect fixed expenses, continuing operations at least in the short run makes the business better off.

The following example illustrates the basic principles of the full cost and segmental contribution approaches.

Full Cost Approach

Widget Company
Segmental Income Statement

	A	B	Total
Sales	$30,000	$20,000	$50,000
Expenses			
Cost of goods sold	15,000	12,000	27,000
Sales Salaries	7,000	5,000	12,000
Executive salaries	6,000	4,000	10,000
Total expenses	$28,000	$21,000	$49,000
Net income /loss	$ 2,000	($1,000)	$ 1,000

Segmental Contribution Approach

Widget Company
Segmental Income Statement

	A	B	Total
Sales	$30,000	$20,000	$50,000
Direct expenses:			
Cost of goods sold	15,000	12,000	27,000
Sales salaries	7,000	5,000	12,000
Total direct expenses	$22,000	$17,000	$39,000
Segmental contribution	8,000	$ 3,000	11,000
Indirect expenses:			
Executive salaries			10,000
Net Income/loss			$ 1,000

In the above example, cost of goods sold and sales salaries are direct expenses of each segment. Executive salaries, an indirect expense, consequently were charged to the segments by being allocated. In the segmental contribution approach, executive salaries are not allocated.

A number of observations from the above example should be made. First, the full cost approach shows that segment B is operating at a net loss of $1,000. It would appear that the business would be better off by $1,000 if this segment is closed. However the segmental contribution approach shows that segment B is making a contribution of $3,000. Secondly, it should be observed that executive salaries were allocated in the ratio of 60:40. The allocation percentages were determined by dividing segmental sales by total sales.

The question that needs to be asked and analyzed is this: will the company be better off if segment B is closed, or stated differently, will overall net income of the business increase by $1,000? The answer is NO. To prove this answer, suppose segment B is closed and, therefore, the company's entire operations consists only of segment A. The company's income statement would, therefore, be as shown below.

Surprisingly, rather than net income increasing by $1,000, the closing of segment B causes the company to be operating at a total net loss of $2,000.The company is worse off without segment B in the short run than with the segment closed. Eliminating the $1,000 loss of segment B had the opposite effect of the desired result. Rather than increasing net income of the business, it caused the income of the business to substantially decline.

Widget Company
Income Statement
(Segment A Only)

Sales	$30,000
Expenses	
Cost of goods sold	15,000
Sales salaries	7,000
Executive salaries	10,000
	32,000
Net loss	$ 2,000

The obvious reason why net income did not increase is that executive salaries are an inescapable expense. Where before $4,000 had been allocated to segment B, segment A must now be charged with the entire $10,000 of executive salaries. The $3,000 contribution of segment B towards common expenses was lost when this segment was closed. The loss of $3,000 segmental contribution means that the overall net income of $1,000 now becomes an overall company loss of $2,000.

However, the segmental contribution approach to measuring segmental profitability is not without its own flaws. The questions needs to be asked: is it possible for each

segment to be making a contribution and yet at the same time for the company as a whole to be operating at a loss? The answer is YES.

In the above example, assume that the executive salaries are increased to $12,000 The company as a whole would then be operating at a net loss of $1,000 even though both segment A and B are still making a contribution. In the above example, the total contribution of segment A and segment B was $11,000. Now with executive salaries at $12,000, the net company loss would be $1,000 rather than a company income of $1,000.

Total contribution (A and B)	$11,000
Executive salaries	12,000
Net loss	($ 1,000)

A better example of why segmental contribution in all segments is not enough to make a business profitable is the following:

	A	B	C	Total
Sales	$200,000	$100,000	$50,000	$350,000
Variable expenses	150,000	60,000	30,000	240,000
Direct fixed expenses	20,000	30,000	15,000	65,000
	170,000	90,000	45,000	305,000
Segmental contribution	$ 30,000	$ 10,000	$ 5,000	$ 45,000
Indirect expenses				$ 50,000
Net loss				$ 5,000

The question then remains: which method is best for evaluating overall profitability of a segment? To answer this question, another question needs to be asked. What does net loss mean when a segment is shown to be operating at a loss under the full cost approach?

Assuming the allocation of indirect expenses has been done as fairly as possible, a segmental net loss means that the contribution of the segment is not considered adequate. In the long run, each segment should make a fair share contribution to the indirect expenses. In the short run, the segment clearly should not be closed, if segmental contribution is positive. The existence of segmental net loss is a clear signal that ways should be found to increase the segmental contribution. If this can not be done in the long run, then it might be wise to consider closing the segment and devoting the resources, both financial and human, to another segment.

Improving Segmental Contribution

When the use of the full cost approach reveals that a segment is operating at a loss, the first step is not to discontinue the operations but to search for ways to increase the amount of contribution. There are two rather obvious ways to increase contribution: (1) increase sales and (2) decrease direct expenses. In order to increase

segmental contribution, whether concentrating on sales or direct expenses or both methods, considerable detailed analysis is required.

There are two ways to increase sales. One is to increase the sales volume and the other is to change price without affecting volume. However, changing price without affecting volume is not likely. The interdependence of price and volume must be recognized in most instances. Some avenues for increasing sales include more effective advertising, a more motivated sales force, and perhaps a better or more effective use of credit. Sales people training and more effective means of compensating sales people are obvious decision areas to study.

If sales can not be increased while holding expenses down, a second approach would be to look for ways to decrease direct expenses. Direct expenses as pointed out before may be either variable or fixed in nature. As discussed in chapter 5, aggregate fixed and variable costs may be defined as follows:

$$V = V^m + V^l + V^o + V^s + V^a$$

Where:

V^m - variable material cost rate
V^l - variable labor cost rate
V^o - variable overhead rate
V^s - variable selling expense rate
V^a - variable administrative rate

Also, in chapter 5, fixed expenses were mathematically defined as follows:

$$F = F^1 + F^o + F^s + F^a$$

Where:

F^l - fixed labor cost
F^o - fixed overhead costs
V^s - fixed selling expenses
F^a - fixed administrative expenses

Equations (1) and (2) reveal that each type of cost/expenses consist of components that need to be examined separately. These equations indicate that opportunities for expense/cost reductions exist in five cost areas:

1. Materials
2. Factory labor
3. Manufacturing overhead
4. Selling
5. General and administrative

Material cost may decreased in several ways. A search for a different supplier with a lower cost might be in order. Also, purchasing in larger quantities might be considered. Furthermore, the amount of material put into a product might be examined. A more efficient use of material with less waste might be explored. Ways to increase the productivity of labor should be considered .

Reduction in fixed expenses should also be considered. Those fixed expenses that are considered to be direct in nature should be analyzed. Advertising obviously could be cut to zero, but the consequences might be a substantial decrease in sales. However, the advertising budget still needs to be examined closely and the budget spent wisely in advertising media that will be the most effective for the company.

Using Management Accounting Tools In Segmental Decision-making

The management of a segment requires careful attention to many kinds of decisions and an array of different kinds of expenses. Periodic evaluation of each segment is required. The management accountant with his or her knowledge of various decision-making and performance evaluation tools should be involved continually in the evaluation process and should be a valuable resource to management. The following tools, if used properly, should be valuable in finding ways to improve segmental contribution.

1. Business budgeting
2. Incremental analysis
3. Segmental contribution reporting
4. Cost-volume-profit analysis
5. Cost behavior analysis
6. ROI analysis
7. Flexible budgeting and variance analysis
8. Economic order quantity models

One of the more effective tools is cost-volume-profit analysis which was discussed in some depth in chapter 7. Earlier in this chapter, the contribution approach to segmental evaluation, was presented in the form of the following equation:

$$SC = P(Q) - V(Q) - F^D \qquad (5)$$

This equation mathematical states that segmental contribution is simply sales less direct expenses where direct expenses can be either variable or direct fixed expenses. An important question in any segmental operations is: how many units must be sold to attain a desired amount of contribution? The answer can easily be found by solving for quantity ***(Q)***:

$$P(Q) + V(Q) = SC + F^D$$

$$Q(P - V) = SC + F^D$$

$$Q = \frac{SC + F^D}{P - V} \qquad (6)$$

To illustrate, assume that the following information was taken from the K & L Widget Company for one of its segments:

Price	$ 100
Variable cost rate	$ 80
Direct fixed expenses	$ 5,000

The company has set a target segmental contribution at $10,000. How many units must be sold to attain this desired level of contribution? Equation (6) above may be used to answer this question:

$$Q = \frac{10{,}000 + 5{,}000}{100 - 80} = \frac{15{,}000}{20} = 750$$

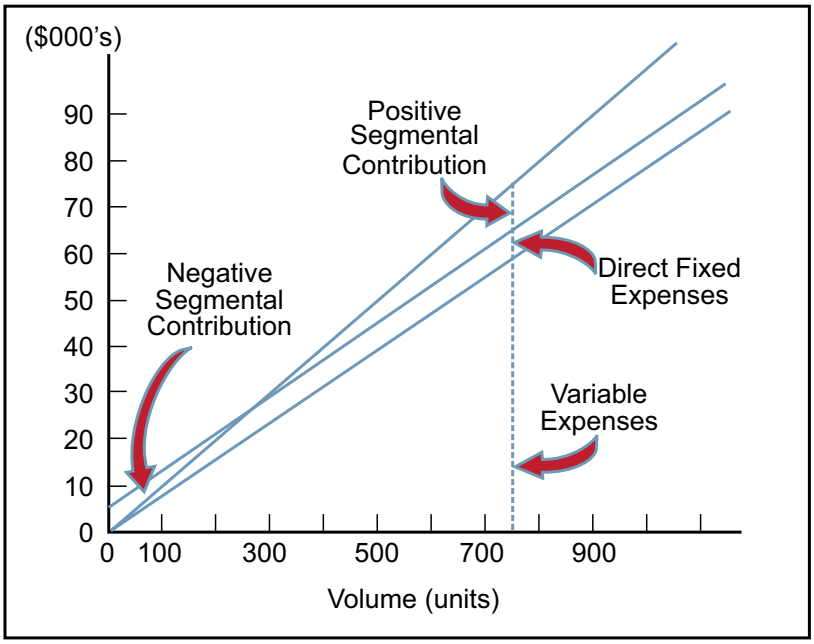
At sales of 750 units, the segment in question would make a contribution of $10,000. However, how to increase volume to this level without increasing either the variable cost rate or the amount of direct fixed expenses might be a substantial challenge. Segmental contribution can be presented graphically as shown in Figure 15.1.

Summary

Segmental statements, if properly used, can be a powerful tool in evaluating profitability of various segments of the business. Even evaluating segments in terms of operating hours can be very useful. If staying open from 9:00 p.m. to 12:00 midnight does not show a contribution, then these hours should be discontinued. This tool can highlight products that have ceased to be profitable and also highlight products that need, perhaps, to be more aggressively promoted. There are many ways to increase segmental contribution. The use of segmental reporting does not preclude the use of other tools. Both the full cost approach and the segmental contribution approach can be useful in identifying segments that need attention. A good understanding of these two approaches to measuring profitability requires understanding the following terminology:

1. Segments
2. Segmental reporting
3. Full cost approach
4. Contribution approach
5. Indirect costs/expenses
6. Common costs/expenses
7. Inescapable expenses
8. Escapable expenses
9. Allocated costs
10. Contribution margin
11. Segmental net income
12. Segmental contribution

Figure15.1 • C-V-P Analysis applied to segmental operations



QUESTIONS

Q. 15.1 List eight ways to segment a business.

Q. 15.2 What two methods may be used to evaluate segmental profitability?

Q. 15.3 What is the measure of profitability under the full cost approach?

Q. 15.4 What is the measure of profitability under the contribution approach?

Q. 15.5 What is the basic profitability formula for the full cost approach?

Q. 15.6 What is the basic profitability formula for the segmental contribution approach?

Q. 15.7 What is the main weakness of using segmental contribution to measure the profitability of a segment?

Q. 15.8 What is the main weakness of using segmental net income to measure the profitability of a segment?

Q. 15.9 Under the full cost approach, what type of costs require allocation?

Q. 15.10 Under the segmental contribution approach, how are indirect or common costs handled?

Q. 15.11 What terms may be used as synonyms for direct and indirect costs?

Q. 15.12 Identify these two equations:

$$SNI = S - DE - AIE$$

$$SC = S - DE$$

EXERCISES

Exercise 15.1 • Segmental Contribution

The following income statement was given to you:

	Segment A	Segment B	Total
Sales	$ 75,000	$100,000	$175,000
Expenses			
Cost of goods sold	$30,000	$ 60,000	$ 90,000
Selling	$20,000	$ 35,000	$ 55,000
General and administrative	$15,000	$ 10,000	$ 25,000
Total expenses	$65,000	$105,000	$170,000
Net income	$10,000	($ 5,000)	$ 5,000

An analysis of the expenses revealed the following:

	Variable	Direct Fixed	Common (Indirect)
Segment A			
Cost of goods sold	$30,000	———	———
Selling	$10,000	$6,000	$4,000
Gen. and administrative	$ 8,000	$2,000	$5,000
Segment B			
Cost of goods sold	$60,000	———	———
Selling	$20,000	$8,000	$7,000
Gen. & administrative	$ 6,000	$2,000	$2,000

Required:

Should segment B be closed? (Show computations in detail.)

Exercise 15.2 • Computing Segmental Contribution

	Case I Dept. W	Case II Dept. X	Case III Dept. Y	Case IV Dept. Z
Sales	$50,000	$50,000	$50,000	$50,000
Cost of goods sold:	45,000	45,000	55,000	40,000
Gross profit	$ 5,000	$ 5,000	($ 5,000)	$10,000
Operating expenses*	8,000	8,000	6,000	5,000
Gross profit	($3,000)	($ 3,000)	($11,000)	$ 5,000
* Escapable expenses	$ 1,000	$ 6,000	$ 4,000	$ 2,000

Required:

For each case, show whether or not the department is making a contribution to the business.

PROBLEMS

Problem 1 • Segmental Profitability Reporting

The Acme Manufacturing Company manufactures and sells four different products. Each product is sold in a separate territory by a different set of sales people. Segmental net income statements prepared each year by the accounting department consistently reveal that territories 1 and 3 operate at a loss. Management is seriously contemplating closing these "unprofitable" territories.

Detailed operating data on a territorial basis was made available as follows:

	Terr. 1	Terr. 2	Terr. 3	Terr. 4	
Price	$20	$55	$75	$55	
Quantity	2,000	4,000	3,500	3,000	
Direct expenses:					
Variable expense rates:					
Cost of goods sold (cgs)	$12	$19	$28	$25	
Packaging (s)	$ 2	$ 3	$ 1	$ 3	
Travel (s)	$ 1	$ 2	$ 2	$ 3	
Commissions (s)	$ 2	$ 3	$ 5	$ 4	
Fixed costs/expenses:					
Advertising(s)	$20,000	$25,000	$45,000	$26,000	
Sales people salaries (s)	$14,000	$21,000	$18,000	$15,000	
Salaries (g & a)	$ 2,000	$ 3,000	$ 2,000	$ 3,000	
Indirect Costs\Expenses:					
Building rent (g&a)					$15,000
Executive salaries (g&a)					$35,000
Staff salaries (g&a)					$25,000
Sales managers salaries (s)					$40,000
Manufacturing					$12,000

The allocation base for indirect costs should be the sales measured in dollars.

Required:

1. Compute the segmental net income of each territory.

Terr. 1 _____ Terr. 2 _____ Terr. 3 _____ Terr. 4 _____

Which territories, if any, are operating at a loss? _____

Explain the meaning of segmental net loss. _____

_____

2. Compute the segmental contribution of each territory.

   Terr. 1 _____ Terr. 2 _____ Terr. 3 _____ Terr. 4 _____

   Explain the meaning of segmental contribution if the contribution is:

   a. Positive_____

   _____

   b. Negative_____

   _____

3. If the "unprofitable" territory 4 were closed, what would be:

   a. total net income of the business? _____

   b. total segmental contribution of the business? _____

   Explain why the net income of the business decreased when territories 4 was closed:

4. If the "unprofitable" territory 1 were closed what would be:

   a. total net income of the business? $ _____

   b. total segmental contribution of the business? $ _____

   Explain why the net income of the business increased when territory 1 was closed:

   _____

   _____

5. Assume that in territory 1:

   Price is increased to $25, cost of goods sold is reduced to $10, and that advertising is increased by $5,000. As a consequence of these decisions, assume that sales will increase to 3,000 units. Given these changes:

   a. segmental contribution would be: $ _____

   b. segmental net income would be: $ _____

6. List the conditions under which a segment should be closed:

   _____

   _____

Problem 2 • Segmental Reporting: Products and Operating Hours

The L. J. Widget Company has two products, A and B. The company's current operating hours are from 8:00 a.m. until 9:00 p.m . The two products are sold in the same store building and occupy about the same amount of space.

An analysis of the store's average sales for the two products is as follows:

Product A	$123.07 per hour
Product B	$102.31 per hour

Sales records on an operating hours basis shows average sales per hour to be:

Hours	Product A	Product B
8:00 a.m. to 10:00 p.m.	$30	$20
10:00 a.m. to 5:00 p.m.	$180	$150
5:00 p.m. to 9:00 p.m.	$ 40	$30

The following information was provided concerning operating expenses:

Utility expense per hour	$ 8.00	
Salary per hour of clerks (1 clerk per product)	$ 10.00	
Managers salary	$ 5,000	per month
Monthly cost of leasing store building	$ 1,500	per month
Advertising per month:		
Product A	$ 500	
Product B	$ 800	

The store on the average is open 22 days of the month.

Cost of goods sold is as follows:

Product A	60% of sales
Product B	45% of sales

Required:

1. Determine of the segmental contribution of products A and B.
2. Determine the segmental contribution of operating hours for both products.