

Cost Allocation,
Customer Profitability Analysis,
and
Sales-Variance Analysis

CHAPTER 14 LEARNING OBJECTIVES

1. Discuss why a company's revenues and costs differ across customers
2. Identify the importance of customer-profitability profiles
3. Understand the cost-hierarchy-based operating income statement
4. Understand criteria to guide cost-allocation decisions

CHAPTER 14 LEARNING OBJECTIVES, CONCLUDED

- 5. Discuss decisions faced when collecting and allocating indirect costs to customers
- 6. Subdivide the sales-volume variance into the sales-mix variance and the sales-quantity variance and the sales-quantity variance into the market-share variance and the market-size variance

CUSTOMER-PROFITABILITY ANALYSIS

- ◉ Customer-profitability analysis is the reporting and assessment of revenues earned from customers and the costs incurred to earn those revenues.
- ◉ The analysis reveals why differences exist in the operating income earned from different customers.
- ◉ This information is used to ensure that customers with large contributions to operating income receive a high level of attention from the company while those with lower or loss contributions to operating income do not use more resources than they provide.

CUSTOMER-REVENUE ANALYSIS

Let's look first at customer-revenue analysis, then we'll review customer-cost analysis.

Generally two variables will explain revenue differences across customers:

- ◉ The number of products purchased, and
- ◉ The magnitude of price discounting.

Tracking price discounts by customer and by salesperson helps to improve customer profitability.

CUSTOMER-COST ANALYSIS

- ◉ The second aspect of customer-profitability is a customer-cost analysis. We'll go back to the cost hierarchy first introduced in chapter 5.
- ◉ The customer-cost hierarchy categorizes costs related to customers into different cost pools on the basis of different types of cost drivers or cost- allocation bases, or different degrees of difficulty in determining a cause-and-effect or benefits-received relationship.
- ◉ Let's look at the 5 categories.

CUSTOMER-COST ANALYSIS; FIVE CATEGORIES

1. Customer output unit-level costs - these are per unit
2. Customer batch-level costs - cost per customer order, for example, or per delivery
3. Customer-sustaining costs - cost to support individual customers regardless of number of units or batches
4. Distribution-channel costs - these costs relate to the distribution channel rather than to each unit or customer. For example, we might have a wholesale distribution manager's salary and a retail distribution manager's salary.

CUSTOMER-COST ANALYSIS; FIVE CATEGORIES, CONCLUDED

5. Division-sustaining costs - costs that cannot be traced to a product, customer or even a distribution channel. An example would be the division manager's salary.

To understand how this works, let's walk through the example for Provalue Division from the textbook.

PROVALUE DIVISION COST AND COST DRIVER INFORMATION

We'll base our customer costs on this information.

	A	B	C	D	E	F	G	H
1	Marketing, Distribution, and Customer Service Costs for 150,000 units of Provalue in 2013							
2								
3	Activity Area	Cost Driver	Total Cost of Activity	Total Quantity of Cost Driver		Rate per Unit of Cost Driver		Cost Hierarchy Category
4	(1)	(2)	(3)	(4)		(5) = (3) ÷ (4)		(6)
5	<u>Marketing and Administration</u>							
6	Sales order	Number of sales orders	\$ 6,750,000	6,000	sales orders	\$1,125	per sales order	Customer batch-level costs
7	Customer visits	Number of customer visits	4,200,000	750	customer visits	\$5,600	per customer visit	Customer-sustaining costs
8	Wholesale channel marketing		800,000					Distribution-channel costs
9	Business-sales channel marketing		1,350,000					Distribution-channel costs
10	Provalue division administration		1,900,000					Division-sustaining costs
11	Total marketing & administration costs		\$15,000,000					
12								
13	<u>Distribution</u>							
14	Product handling	Number of cubic feet moved	\$ 4,500,000	300,000	cubic feet	\$ 15	per cubic foot	Customer output unit-level costs
15	Regular shipments	Number of regular shipments	3,750,000	3,000	regular shipments	\$1,250	per regular shipment	Customer batch-level costs
16	Rush shipments	Number of rush shipments	750,000	150	rush shipments	\$5,000	per rush shipment	Customer batch-level costs
17	Total distribution costs		\$ 9,000,000					
18								
19	<u>Customer Service</u>							
20	Customer service	Number of units shipped	\$ 3,600,000	150,000	units shipped	\$ 24	per unit shipped	Customer output unit-level costs

PROVALUE QUANTITY OF COST DRIVERS, SELECT CUSTOMERS

Next, we must determine how much of each resource the various customers consumed. That information is reported here.

	A	B	C	D	E	F
1			CUSTOMER			
2	Activity	Quantity of Cost Driver	A	B	G	J
3	<u>Marketing</u>					
4	Sales orders	Number of sales orders	1,200	1,000	600	300
5	Customer visits	Number of customer visits	150	100	50	25
6	<u>Distribution</u>					
7	Product handling	Number of cubic feet moved	60,000	50,000	10,000	8,000
8	Regular shipments	Number of regular shipments	600	400	300	120
9	Rush shipments	Number of rush shipments	25	5	20	3
10	<u>Customer Service</u>					
11	Customer service	Number of unit shipped	30,000	25,000	5,000	4,000

CUSTOMER-PROFITABILITY ANALYSIS FOR PROVALUE- WHOLESALE CUSTOMERS

- ◉ Now that we've identified the activities that drive costs and determined the usage for those activities for our select customers, we can calculate profitability by customer.
- ◉ In this example, we'll look at Provalue's 4 wholesale customers and compare profitability.

PROVALUE CUSTOMER- PROFITABILITY ANALYSIS

Looking at this chart, if you were the manager, what would you do?

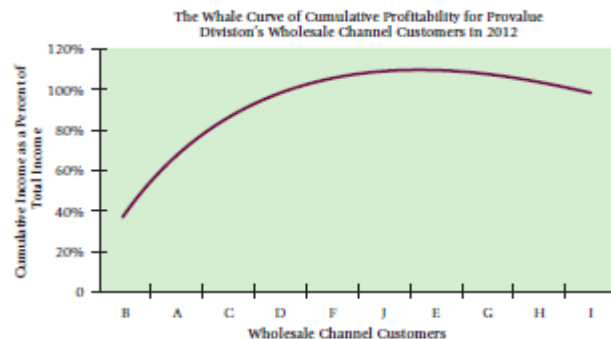
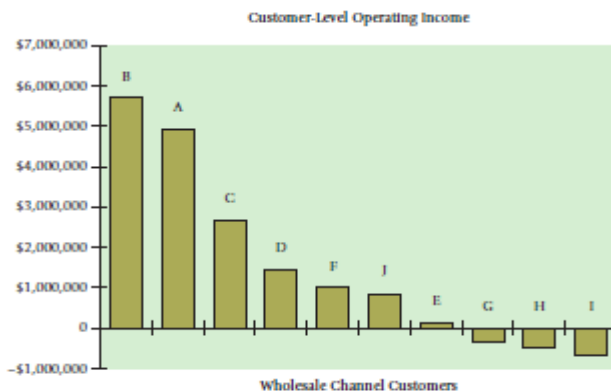
	A	B	C	D	E
1		A	B	G	J
2	Revenues at list price	\$33,000,000	\$27,500,000	\$5,500,000	\$4,400,000
3	Price discount	3,000,000	1,250,000	750,000	-
4	Revenues	30,000,000	26,250,000	4,750,000	4,400,000
5					
6	Cost of goods sold ^a	20,400,000	17,000,000	3,400,000	2,720,000
7					
8	Gross margin	9,600,000	9,250,000	1,350,000	1,680,000
9					
10	Customer-level operating costs				
11	<u>Marketing Costs</u>				
12	Sales orders ^b	1,350,000	1,125,000	675,000	337,500
13	Customer visits ^c	840,000	560,000	280,000	140,000
14	<u>Distribution Costs</u>				
15	Product handling ^d	900,000	750,000	150,000	120,000
16	Regular shipments ^e	750,000	500,000	375,000	150,000
17	Rush shipments ^f	125,000	25,000	100,000	15,000
18	<u>Customer Service Costs</u>				
19	Customer service ^g	720,000	600,000	120,000	96,000
20					
21	Total customer-level operating costs	4,685,000	3,560,000	1,700,000	858,500
22					
23	Customer-level operating income	\$ 4,915,000	\$ 5,690,000	\$ (350,000)	\$ 821,500
24	^a \$680 x 30,000; 25,000; 5,000; 4,000 ^b \$1,125 x 1,200; 1,000; 600; 300 ^c \$5,600 x 150; 100; 50; 25 ^d \$15 x 60,000; 50,000; 10,000;				
25	8,000 ^e \$1,250 x 600; 400; 300; 120 ^f \$5,000 x 25; 5; 20; 3 ^g \$24 x 30,000; 25,000; 5,000; 4,000				

CUSTOMER PROFITABILITY PROFILES

- ◉ Customer profitability profiles are a useful tool for managers.
- ◉ Cumulative customer profitability profiles provide information that shows what percentage of operating income each additional customer contributes.
- ◉ Customers are presented in order of contribution to operating income so any customers in a loss position are highlighted at the bottom of the analysis.

CUSTOMER PROFITABILITY PROFILES, CONT'D

- Customer profitability profiles can be presented in graphical form as well as table form.



	A	B	C	D	E	F
	Retail Customer Code	Customer-Level Operating Income	Customer Revenue	Customer-Level Operating Income Divided by Revenue	Cumulative Customer-Level Operating Income	Cumulative Customer-Level Operating Income as a % of Total Customer-Level Operating Income
1						
2		(1)	(2)	(3) = (1) ÷ (2)	(4)	(5) = (4) ÷ \$15,027,500
3	B	\$ 5,690,000	\$26,250,000	21.7%	\$ 5,690,000	38%
4	A	4,915,000	30,000,000	16.4%	10,605,000	71%
5	C	2,655,000	13,000,000	20.4%	13,260,000	88%
6	D	1,445,000	7,250,000	19.9%	14,705,000	98%
7	F	986,000	5,100,000	19.3%	15,691,000	104%
8	J	821,500	4,400,000	18.7%	16,512,500	110%
9	E	100,000	1,800,000	5.6%	16,612,500	111%
10	G	(350,000)	4,750,000	-7.4%	16,262,500	108%
11	H	(535,000)	2,400,000	-22.3%	15,727,500	105%
12	I	(700,000)	2,600,000	-26.9%	15,027,500	100%
13	Total	\$15,027,500	\$97,550,000			

CUSTOMER PROFITABILITY PROFILES, CONCLUDED

- Managers must explore ways to make unprofitable customers profitable. When doing so, they should include factors other than the current profitability level including:
 - Likelihood of customer retention.
 - Potential for sales growth.
 - Long-run customer profitability.
 - Increases in overall demand from having well-known customers (if applicable).
 - Ability to learn from customers.

USING THE FIVE-STEP DECISION-MAKING PROCESS TO MANAGE CUSTOMER PROFITABILITY, 1 - 3

1. Identify the problem and uncertainties: how to manage and allocate resources across customers.
2. Obtain information: managers identify past revenues generated by and costs incurred for each customer.
3. Make predictions about the future: managers estimate the revenues they expect from each customer with the related customer-level costs expected to be incurred. In doing so, managers should consider future price discounts, customers' demand for special services like rush deliveries, etc.

USING THE FIVE-STEP DECISION-MAKING PROCESS TO MANAGE CUSTOMER PROFITABILITY, 4 AND 5

4. Make decisions by choosing among alternatives: managers use the customer-profitability profiles to identify customers who deserve the highest service and priority and also to identify ways to make the less profitable customers more profitable.
5. Implement the decision, evaluate performance and learn: After the decision is implemented, managers compare actual results to predicted results, and evaluate the decision to determine how they might improve profitability.

COST HIERARCHY-BASED OPERATING INCOME STATEMENT

- ◉ We've assigned customer-level costs to customers but what about corporate costs, R&D and design costs, etc.
- ◉ Customer actions do not influence these costs which raises two important questions:
 1. Should these costs be allocated to customers when calculating customer profitability, and
 2. If they are allocated, on what basis should they be allocated given the weak cause-and-effect relationship between these costs and customer actions?

COST HIERARCHY-BASED OPERATING INCOME STATEMENT, CONCLUDED

- ◉ Some managers and management accountants advocate fully allocating all costs to customers and distribution channels because all costs are incurred to support the sales of products to customers.
- ◉ Sometimes only those corporate and other costs that are widely perceived as causally related to customer actions or that provide explicit benefits to customer profitability are allocated.
- ◉ Let's take a look at some criteria to guide cost allocations.

FOUR CRITERIA FOR COST-ALLOCATION DECISIONS

1. Cause-and-effect—variables are identified that cause resources to be consumed.
 - Most credible to operating managers
 - Integral part of ABC
 - Best way
2. Benefits received—the beneficiaries of the outputs of the cost object are charged with costs in proportion to the benefits received.

FOUR CRITERIA FOR COST-ALLOCATION DECISIONS, CONT'D

3. Fairness (equity)—the basis for establishing a price satisfactory to the government and its suppliers.
 - Cost allocation here is viewed as a “reasonable” or “fair” means of establishing selling price.
4. Ability to bear—costs are allocated in proportion to the cost object’s ability to bear them.
 - Generally, larger or more profitable objects receive proportionally more of the allocated costs.

CRITERIA FOR COST-ALLOCATION DECISIONS, CONCLUDED

Here we see a summary of the 4 criteria:

1. Cause and Effect. Using this criterion, managers identify the variables that cause resources to be consumed. For example, managers may use number of sales orders as the variable when allocating the costs of order taking to products and customers. Cost allocations based on the cause-and-effect criterion are likely to be the most credible to operating personnel.

2. Benefits Received. Using this criterion, managers identify the beneficiaries of the outputs of the cost object. The costs of the cost object are allocated among the beneficiaries in proportion to the benefits each receives. Consider a corporatewide advertising program that promotes the general image of the corporation rather than any individual product. The costs of this program may be allocated on the basis of division revenues; the higher the revenues, the higher the division's allocated cost of the advertising program. The rationale behind this allocation is that divisions with higher revenues apparently benefited from the advertising more than divisions with lower revenues and, therefore, ought to be allocated more of the advertising costs.

3. Fairness or Equity. This criterion is often cited in government contracts when cost allocations are the basis for establishing a price satisfactory to the government and its suppliers. Cost allocation here is viewed as a "reasonable" or "fair" means of establishing a selling price in the minds of the contracting parties. For most allocation decisions, fairness is a matter of judgment rather than an operational criterion.

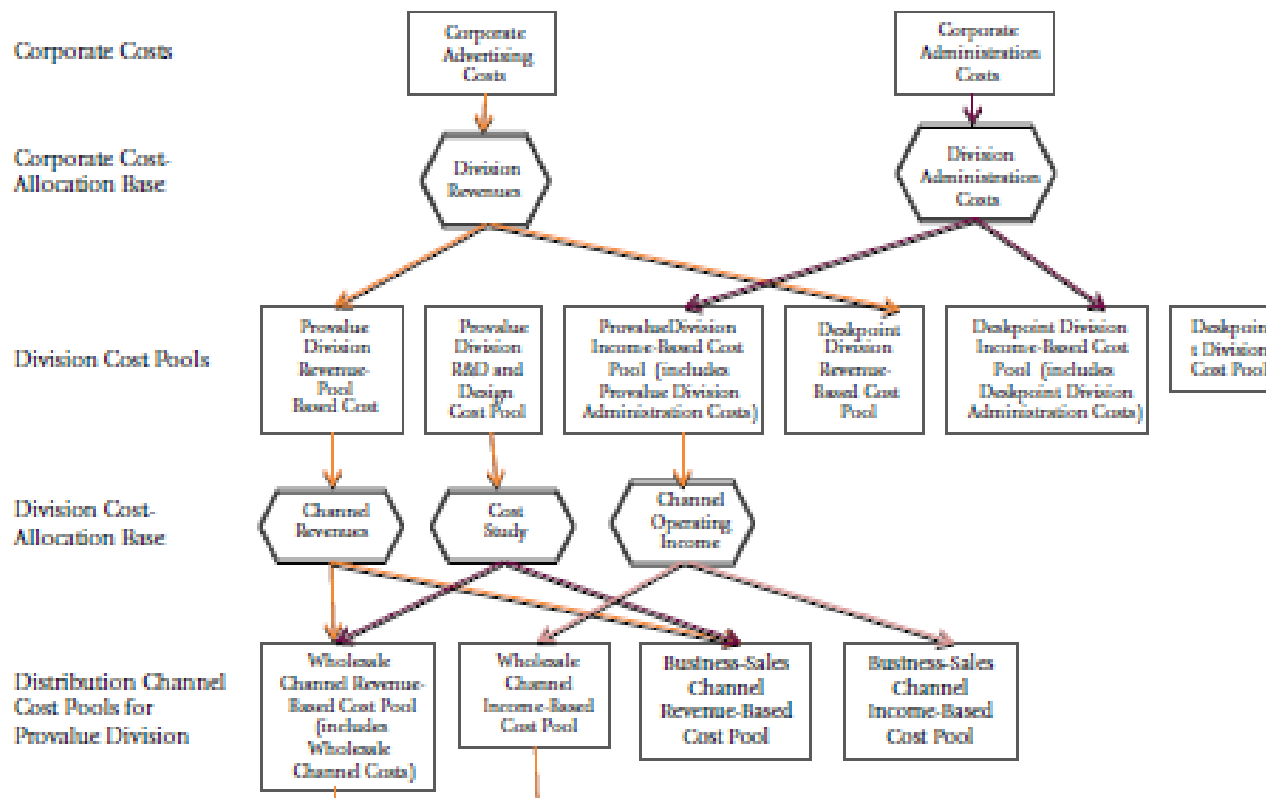
4. Ability to Bear. This criterion advocates allocating costs in proportion to the cost object's ability to bear costs allocated to it. An example is the allocation of corporate administration costs on the basis of division operating income. The presumption is that the more-profitable divisions have a greater ability to absorb corporate administration costs.

FULLY ALLOCATED CUSTOMER PROFITABILITY

- Recall that the first purpose of cost allocation is to provide information for economic decisions, such as pricing, by measuring the full costs of delivering products to different customers based on an ABC system.
- Cost categories can be summarized into:
 - Corporate costs
 - Division costs
 - Channel costs.

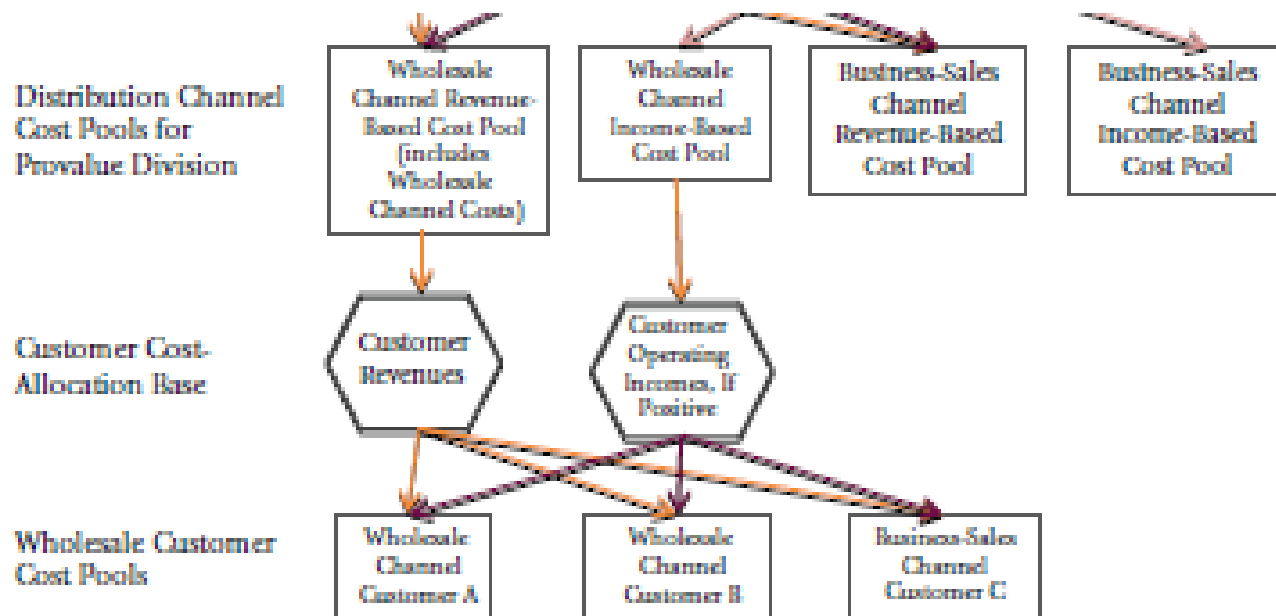
OVERVIEW DIAGRAM FOR ALLOCATION OF CORPORATE, DIVISION AND CHANNEL COSTS

Follow the arrows to determine how the costs are allocated:



OVERVIEW DIAGRAM FOR ALLOCATION OF CORPORATE, DIVISION AND CHANNEL COSTS, CONCLUDED

Beginning with the last row in the prior screen, we continue with the allocation.



What issues, if any, should Astel's management consider as they accumulate and allocation these costs?

ISSUES IN ALLOCATING CORPORATE COSTS TO DIVISIONS/CUSTOMERS

Let's take a look at two questions, then we'll contemplate the better answers:

1. When allocating corporate costs to divisions, should a company allocate only costs that vary with division activity or assign fixed costs as well?
2. When allocating costs to divisions, channels and customers, how many cost pools should be used?

ISSUES IN ALLOCATING CORPORATE COSTS TO DIVISIONS/CUSTOMERS, CONCLUDED

Companies should look to their particular situations, but the probable best answers to these questions are:

1. To make good long-run decisions, managers need to know the cost of all resources (variable or fixed in the short-run) required to sell products to customers, taking into account only relevant costs for the specific decision.
2. Managers must balance the benefit of using a multiple cost-pool system against the cost of implementing it. Advances in IT technology make it more likely that a multiple cost-pool system will pass the cost-benefit test.

SALES VARIANCES

- ◉ Level 1: Static-budget variance—the difference between an actual result and the static-budgeted amount.
- ◉ Level 2: Flexible-budget variance—the difference between an actual result and the flexible-budgeted amount.
- ◉ Level 2: Sales-volume variance
- ◉ Level 3: Sales-quantity variance
- ◉ Level 3: Sales-mix variance

FLEXIBLE-BUDGET AND SALES-VOLUME VARIANCES, EXAMPLE

	Actual Results: Actual Units of All Provalues Sold × Actual Sales Mix × Actual Contribution Margin per Unit	Flexible Budget: Actual Units of All Provalues Sold × Budgeted Contribution Margin per Unit	Static Budget: Budgeted Units of All Provalues Sold × Budgeted Sales Mix × Budgeted Contribution Margin per Unit
Panel A: Wholesale channel	$(150,000 \times 0.6667) \times \$226.275$ $100,000 \times \$226.275$	$(150,000 \times 0.6667) \times \$225$ $100,000 \times \$225$	$(155,000 \times 0.60) \times \$225$ $93,000 \times \$225$
	\$22,627,500	\$22,500,000	\$20,925,000
Level 2		\$127,500 F	\$1,575,000 F
		Flexible-budget variance	Sales-volume variance
Level 1		\$1,702,500 F	
		Static-budget variance	
Panel B: Business- sales channel	$(150,000 \times 0.3333) \times \$264.45$ $50,000 \times \$264.45$	$(150,000 \times 0.3333) \times \$275$ $50,000 \times \$275$	$(155,000 \times 0.40) \times \$275$ $62,000 \times \$275$
	\$13,222,500	\$13,750,000	\$17,050,000
Level 2		\$527,500 U	\$3,300,000 U
		Flexible-budget variance	Sales-volume variance
Level 1		\$3,827,500 U	
		Static-budget variance	
Panel C: All Provalues	\$35,850,000	\$36,250,000	\$37,975,000
Level 2		\$400,000 U	\$1,725,000 U
		Total flexible-budget variance	Total sales-volume variance
Level 1		\$2,125,000 U	
		Total static-budget variance	

Let's look at how these variances are calculated.

SALES-MIX VARIANCE

- Measures shifts between selling more or less of higher or lower profitable products

$$\text{Sales-Mix Variance} = \text{Actual Units of All Products Sold} \times \left[\text{Actual Sales-Mix Percentage} - \text{Budgeted Sales-Mix Percentage} \right] \times \text{Budgeted Contribution Margin per Unit}$$

Recall that the sales-quantity and sales-mix variances are level 3 variances that subdivide the sales-volume variance.

Here is the formula for the sales-mix variance.

SALES-QUANTITY VARIANCE

$$\text{Sales-Quantity Variance} = \left[\begin{array}{c} \text{Actual} \\ \text{Units of All} \\ \text{Products} \\ \text{Sold} \end{array} - \begin{array}{c} \text{Budgeted} \\ \text{Units of all} \\ \text{Products} \\ \text{Sold} \end{array} \right] \times \begin{array}{c} \text{Budgeted} \\ \text{Sales-Mix} \\ \text{Percentage} \end{array} \times \begin{array}{c} \text{Budgeted} \\ \text{Contribution} \\ \text{Margin per Unit} \end{array}$$

Presented here is the formula for the sales-quantity variance. This variance in conjunction with the sales-mix variance explains the sales-volume variance.

SALES-MIX AND SALES-QUANTITY VARIANCES, EXAMPLE

Presented here is the sales-mix and sales-quantity variance analysis for the Provalue Division.

	Flexible Budget: Actual Units of All Provalues Sold × Actual Sales Mix × Budgeted Contribution Margin per Unit	Actual Units of All Provalues Sold × Budgeted Sales Mix × Budgeted Contribution Margin per Unit	Static Budget: Budgeted Units of All Provalues Sold × Budgeted Sales Mix × Budgeted Contribution Margin per Unit
Panel A: Wholesale channel	$(150,000 \times 0.6667) \times \$225$ $100,000 \times \$225$	$(150,000 \times 0.60) \times \$225$ $90,000 \times \$225$	$(155,000 \times 0.60) \times \$225$ $93,000 \times \$225$
	\$22,500,000	\$20,250,000	\$20,925,000
Level 2		\$2,250,000 F	\$675,000 U
		Sales-mix variance	Sales-quantity variance
Level 1		\$1,575,000 F	
		Sales-volume variance	
Panel B: Business- sales channel	$(150,000 \times 0.3333) \times \$275$ $50,000 \times \$275$	$(150,000 \times 0.40) \times \$275$ $60,000 \times \$275$	$(155,000 \times 0.40) \times \$275$ $62,000 \times \$275$
	\$13,750,000	\$16,500,000	\$17,050,000
Level 2		\$2,750,000 U	\$550,000 U
		Sales-mix variance	Sales-quantity variance
Level 1		\$3,300,000 U	
		Sales-volume variance	
Panel C: All Provalues	\$35,850,000	\$36,250,000	\$37,975,000
Level 2		\$500,000 U	\$1,225,000 U
		Total sales-mix variance	Total sales-quantity variance
Level 1		\$1,725,000 U	
		Total sales-volume variance	

SALES VARIANCES OVERVIEW

This chart provides insight into the relationships among the sales variances.

