

Lecture 4: Ch 7 Allocating Costs & Ch 8 Budgeting

IE618 Eng Cost & Production Economics

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Dr. Reggie J. Caudill

Professor of Mechanical and Industrial Engineering

caudill@njit.edu

973-596-3330

203 MEC

<http://web.njit.edu/~caudill/>

Chapter 7 Objectives

1. Describe the difference between support departments and producing departments.
2. Calculate charging rates, and distinguish between single and dual charging rates.
3. Allocate support center costs to producing departments using the direct method, the sequential method, and the reciprocal method.
4. Calculate departmental overhead rates.
5. Identify the characteristics of the joint production process, and allocate joint costs to products.

An Overview of Cost Allocation

- Allocation
 - A means of dividing a pool of costs and assigning those costs to various subunits
 - Total cost is neither *reduced* or *increased* by allocation
 - But ...the amounts assigned to the subunits CAN be affected by the allocation procedure chosen
- First Step in Cost Allocation.....determine what the cost objects are! Usually the cost objects are departments
 - Producing departments: directly responsible for creating the products or services sold to customers
 - Support departments: provide essential services for producing departments

An Overview of Cost Allocation

Examples of Departmentalization for a Manufacturing Firm and a Service Firm

Manufacturing Firm: Furniture Maker	
Producing Departments	Support Departments
Assembly: Supervisors' salaries Small tools Indirect materials Depreciation on machinery	Materials Storeroom: Clerk's salary Depreciation on forklift
Finishing: Sandpaper Depreciation on sanders and buffers	Cafeteria: Food Cooks' salaries Depreciation on stoves
	Maintenance: Janitors' salaries Cleaning supplies Machine oil and lubricants
	General Factory: Depreciation on building Security Utilities

An Overview of Cost Allocation

Examples of Departmentalization for a Manufacturing Firm and a Service Firm

Service Firm: Bank	
Producing Departments	Support Departments
Auto Loans: <ul style="list-style-type: none">Loan processors' salariesForms and supplies	Drive Through: <ul style="list-style-type: none">Tellers' salariesDepreciation on equipment
Commercial Lending: <ul style="list-style-type: none">Lending officers' salariesDepreciation on office equipmentBankruptcy prediction software	Data Processing: <ul style="list-style-type: none">Personnel salariesSoftwareDepreciation on hardware
Personal Banking: <ul style="list-style-type: none">Supplies and postage for statements	Bank Administration: <ul style="list-style-type: none">Salary of CEOReceptionist's salaryTelephone costsDepreciation on bank and vault

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An Overview of Cost Allocation

EXHIBIT 7.2

Steps in Allocating Support Department Costs to Producing Departments

1. Departmentalize the firm.
2. Classify each department as a support department or a producing department.
3. Trace all overhead costs in the firm to a support or producing department.
4. Allocate support department costs to the producing departments.
5. Calculate predetermined overhead rates for producing departments.
6. Allocate overhead costs to the units of individual product through the predetermined overhead rates.

An Overview of Cost Allocation

EXHIBIT 7.3

Examples of Possible Activity Drivers for Support Departments

Accounting:

Number of transactions

Cafeteria:

Number of employees

Data Processing:

Number of lines entered

Number of hours of service

Engineering:

Number of change orders

Number of hours

Maintenance:

Machine hours

Maintenance hours

Materials Storeroom:

Number of material moves

Pounds of material moved

Number of different parts

Payroll:

Number of employees

Personnel:

Number of employees

Number of firings or layoffs

Number of new hires

Direct labor cost

Power:

Kilowatt-hours

Machine hours

Purchasing:

Number of orders

Cost of orders

Shipping:

Number of orders

Allocating One Department's Costs to Other Departments

- The costs of a support department are often allocated to other departments through the use of a charging rate
- Major factors to consider are:
 - The choice of a single or dual charging rate
 - The use of budgeted or actual support department costs

Allocating One Department's Costs to Other Departments

- Using a single rate is similar in concept to a plant wide overhead rate
 - All support department costs are accumulated in the numerator and some measure of usage in the denominator in the denominator

$$\text{Single rate} = \frac{\text{Fixed costs} + \text{estimated variable costs}}{\text{Estimated usage}}$$

Allocating One Department's Costs to Other Departments

- Sometimes when using a single charging rate, it will mask the causal factors that lead to a support department's total costs
 - Some companies will develop a dual rate with a fixed component and a variable component
 - The allocation of fixed costs follows a three step procedure:
 - Determination of budgeted fixed support service costs
 - Computation of the allocation ratio
 - allocation

Allocating One Department's Costs to Another Department

Use of Budgeted Data for Product Costing: Comparison of Single- and Dual-Rate Methods

Single-Rate Method

	Number of Copies	×	Total Rate	=	Allocated Cost
Audit	94,500				
Tax	67,500				
MAS	108,000				
Total	<u>270,000</u>				

Photocopy Department (support)

MAS – Mgt Advisory Services

Fixed Cost = \$26,190
Var Cost=\$0.023/copy

$$\text{Total Rate} = (\$26,190 + \$0.023 \times 270,000) / 270,000 = \$0.12$$

Allocating One Department's Costs to Another Department

Use of Budgeted Data for Product Costing: Comparison of Single- and Dual-Rate Methods

Single-Rate Method

	Number of Copies	×	Total Rate	=	Allocated Cost
Audit	94,500		\$0.12		\$11,340
Tax	67,500		0.12		8,100
MAS	<u>108,000</u>		0.12		<u>12,960</u>
Total	<u><u>270,000</u></u>				<u><u>\$32,400</u></u>

Photocopy Department (support)

MAS – Mgt Advisory Services

Fixed Cost = \$26,190
Var Cost=0.023/copy

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Allocating One Department's Costs to Another Department

Use of Budgeted Data for Product Costing: Comparison of Single- and Dual-Rate Methods

Single-Rate Method

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Audit	94,500		\$0.12		\$11,340
Tax	67,500		0.12		8,100
MAS	108,000		0.12		12,960
Total	<u>270,000</u>				<u>\$32,400</u>

Dual-Rate Method

	Number of Copies	×	Variable Rate	+	Fixed Allocation	=	Allocated Cost
Audit	94,500		\$0.023				
Tax	67,500		0.023				
MAS	108,000		0.023				
Total	<u>270,000</u>						

Fixed Allocation = \$26,190 x (94,500/270,000) = \$9,167

Photocopy Department (support)

MAS – Mgt Advisory Services

Fixed Cost = \$26,190
Var Cost=0.023/copy

For budgeted Allocation Single rate and Dual rate produce the same result..

Allocating One Department's Costs to Another Department

Use of Budgeted Data for Product Costing: Comparison of Single- and Dual-Rate Methods

Single-Rate Method

	Number of Copies	×	Total Rate	=	Allocated Cost
Audit	94,500		\$0.12		\$11,340
Tax	67,500		0.12		8,100
MAS	108,000		0.12		12,960
Total	<u>270,000</u>				<u>\$32,400</u>

Dual-Rate Method

	Number of Copies	×	Variable Rate	+	Fixed Allocation	=	Allocated Cost
Audit	94,500		\$0.023		\$ 9,167		\$11,340*
Tax	67,500		0.023		6,548		8,100*
MAS	108,000		0.023		10,476		12,960
Total	<u>270,000</u>						<u>\$32,400</u>

$$\text{Fixed Allocation} = \$26,190 \times (94,500/270,000) = \$9,167$$

Photocopy Department (support)

MAS – Mgt Advisory Services

Fixed Cost = \$26,190
Var Cost=0.023/copy

For budgeted Allocation
Single rate and Dual rate produce the same result..

Allocating One Department's Costs to Another Department

Use of Actual Data for Performance Evaluation Purposes: Comparison of Single- and Dual-Rate Methods

Single-Rate Method

	Number of Copies	×	Total Rate	=	Allocated Cost
Audit	92,000		\$0.12		\$11,040
Tax	65,000		0.12		7,800
MAS	115,000		0.12		13,800
Total	<u>272,000</u>				<u>\$32,640</u>

Budgeted Rate Was \$32,400

Dual-Rate Method

	Number of Copies	×	Variable Rate	+	Fixed Allocation	=	Allocated Cost
Audit	92,000		\$0.023		\$ 9,167		\$11,283
Tax	65,000		0.023		6,548		8,043
MAS	115,000		0.023		10,476		13,121
Total	<u>272,000</u>						<u>\$32,447</u>

Budgeted Rate Was \$32,400

Allocating One Department's Costs to Other Departments

When allocating support department costs, should actual or budgeted costs be allocated?

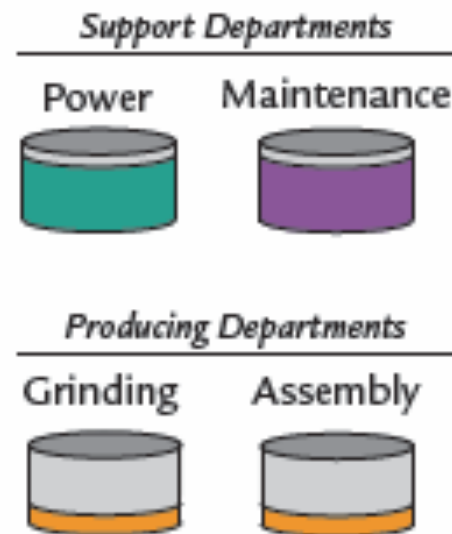
Answer: Budgeted – to prevent the transfer of efficiencies or inefficiencies from one department to another

Choosing a Support Department Cost Allocation Method

Allocation of Support Department Costs to Producing Departments Using the Direct Method

Suppose there are two support departments, Power and Maintenance, and two producing departments, Grinding and Assembly, each with a “bucket” of directly traceable overhead cost.

Objective: Distribute all power and maintenance costs to Grinding and Assembly using the direct method.



Choosing a Support Department Cost Allocation Method

- **Direct** method
 - Costs are allocated only to producing departments
- **Sequential** (step) method
 - Costs allocations are performed in a step-down fashion, using predetermined ranking procedures (e.g., degree of support)
- **Reciprocal** method
 - Recognizes interactions of support departments prior to allocation to producing departments

Choosing a Support Department Cost Allocation Method

Data for Illustrating Allocation Methods				
	Support Departments		Producing Departments	
	Power	Maintenance	Grinding	Assembly
Direct costs*	\$250,000	\$160,000	\$100,000	\$ 60,000
Normal activity:				
Kilowatt-hours	—	200,000	600,000	200,000
Maintenance hours	1,000	—	4,500	4,500
Allocation ratios:				
Direct method:				
Kilowatt-hours	—	—	0.75	0.25
Maintenance hours	—	—	0.50	0.50

Note: \$410,000 in overhead to be allocated from support departments to producing departments and a total of \$570,000 in overhead to be assigned to products.

Direct allocation

Allocate Power Dept costs based on kilowatt-hours:

$$\text{Grinding} \quad \frac{600,000}{(600,000 + 200,000)} \times \$250,000 = \$187,500$$

$$\text{Assembly} \quad \frac{200,000}{(600,000 + 200,000)} \times \$250,000 = \$62,500$$

Allocate Maintenance Dept costs based on maintenance-hours:

$$\text{Grinding} \quad \frac{4,500}{(4,500 + 4,500)} \times \$160,000 = \$80,000$$

$$\text{Assembly} \quad \frac{4,500}{(4,500 + 4,500)} \times \$160,000 = \$80,000$$

Direct Allocation

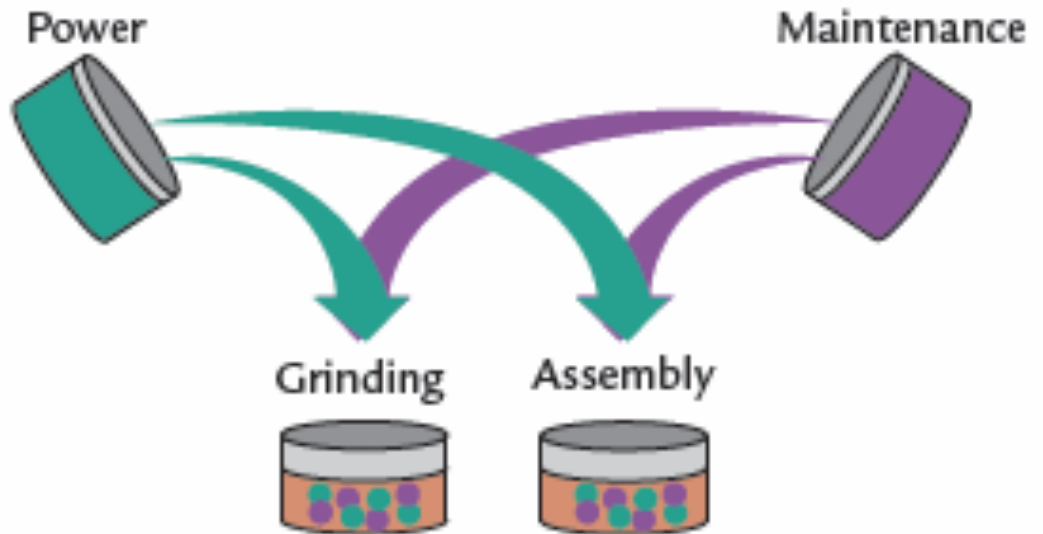
	Support Departments		Producing Departments	
	Power	Maintenance	Grinding	Assembly
Direct costs	\$ 250,000	\$ 160,000	\$100,000	\$ 60,000
Power ^a	(250,000)	—	187,500	62,500
Maintenance ^b	—	(160,000)	80,000	80,000
Total	<u>\$ 0</u>	<u>\$ 0</u>	<u>\$367,500</u>	<u>\$202,500</u>

Note: Total of \$570,000 in overhead is assigned.

Choosing a Support Department Cost Allocation Method

Allocation of Support Department Costs to Producing Departments Using the Direct Method

Direct Method—allocate power and maintenance costs only to Grinding and Assembly.



Sequential Allocation

- Rank support departments by their direct costs
- Allocate
 - First support department's direct cost to all other support departments and producing departments
 - Next support department's costs (direct + previously allocated) to subsequent support and producing
 - Etc.
- Once a support department's costs are allocated it never receives a subsequent allocation

Choosing a Support Department Cost Allocation Method

	Support Departments		Producing Departments	
	Power	Maintenance	Grinding	Assembly
Direct costs*	\$250,000	\$160,000	\$100,000	\$ 60,000
Normal activity:				
Kilowatt-hours	—	200,000	600,000	200,000
Maintenance hours	1,000	—	4,500	4,500
Allocation ratios:				
Direct method:				
Kilowatt-hours	—	—	0.75	0.25
Maintenance hours	—	—	0.50	0.50
Sequential method:				
Kilowatt-hours	—	0.20	0.60	0.20
Maintenance hours	—	—	0.50	0.50

Sequential Allocation

Step 1: Allocate Power Dept costs based on kilowatt-hours:

$$\frac{200,000 \text{ Maint kWh}}{\left(\begin{array}{ccc} 200,000 & 600,000 & 200,000 \\ \text{Maint kWh} & + \text{Grinding kWh} & + \text{Assembly kWh} \end{array} \right)} \times \$250,000 = \$50,000$$

To Maintenance

$$\frac{600,000 \text{ Grinding kWh}}{\left(\begin{array}{ccc} 200,000 & 600,000 & 200,000 \\ \text{Maint kWh} & + \text{Grinding kWh} & + \text{Assembly kWh} \end{array} \right)} \times \$250,000 = \$150,000$$

To Grinding

$$\frac{200,000 \text{ Assembly kWh}}{\left(\begin{array}{ccc} 200,000 & 600,000 & 200,000 \\ \text{Maint kWh} & + \text{Grinding kWh} & + \text{Assembly kWh} \end{array} \right)} \times \$250,000 = \$50,000$$

To Assembly

Sequential Allocation

Step 2: Allocate Maintenance Dept costs (direct + allocated) based on maintenance-hours:

Costs to allocate: \$160,000 direct + \$50,000 allocated = \$210,000

$$\frac{4,500 \text{ Grinding}}{\left(\begin{array}{c} 4,500 \\ \text{Grinding} \end{array} + \begin{array}{c} 4,500 \\ \text{Assembly} \end{array} \right)} \times \$210,000 = \$105,000$$

To Grinding

$$\frac{4,500 \text{ Assembly}}{\left(\begin{array}{c} 4,500 \\ \text{Grinding} \end{array} + \begin{array}{c} 4,500 \\ \text{Assembly} \end{array} \right)} \times \$210,000 = \$105,000$$

To Assembly

Sequential Allocation

	Support Departments		Producing Departments	
	Power	Maintenance	Grinding	Assembly
Direct costs	\$ 250,000	\$ 160,000	\$100,000	\$ 60,000
Power ^a	(250,000)	50,000	150,000	50,000
Maintenance ^b	—	(210,000)	105,000	105,000
Total	<u>\$ 0</u>	<u>\$ 0</u>	<u>\$355,000</u>	<u>\$215,000</u>

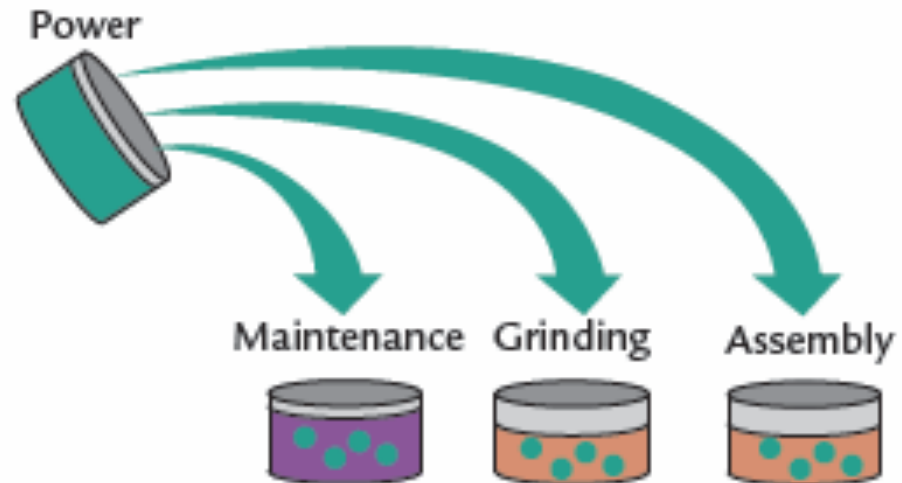
Note: Total of \$570,000 in overhead is assigned.

Choosing a Support Department Cost Allocation Method

Allocation of Support Department Costs to Producing Departments Using the Sequential Method

Step 1: Rank support departments—
#1 Power, #2 Maintenance.

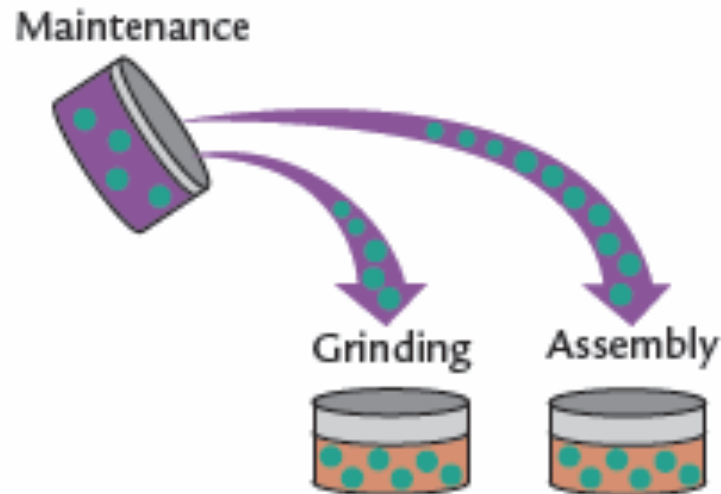
Step 2: Distribute power costs to Maintenance, Grinding, and Assembly.



Choosing a Support Department Cost Allocation Method

Allocation of Support Department Costs to Producing Departments Using the Sequential Method

Then, distribute maintenance costs to Grinding and Assembly.



Reciprocal Allocation

	Support Departments		Producing Departments	
	Power	Maintenance	Grinding	Assembly
Direct costs:*				
Fixed	\$200,000	\$100,000	\$ 80,000	\$50,000
Variable	50,000	60,000	20,000	10,000
Total	<u>\$250,000</u>	<u>\$160,000</u>	<u>\$100,000</u>	<u>\$60,000</u>
Normal activity:				
Kilowatt-hours	—	200,000	600,000	200,000
Maintenance hours	1,000	—	4,500	4,500
	Proportion of Output Used by			
	Power	Maintenance	Grinding	Assembly
Allocation ratios:				
Power	—	0.20	0.60	0.20
Maintenance	0.10		0.45	0.45

Reciprocal Allocation

Utilize a series of simultaneous linear equations

$$M = \$160,000 + .2P$$

$$P = \$250,000 + .1M$$

Reciprocal Allocation

Utilize a series of simultaneous linear equations

$$M = \$160,000 + .2P$$

$$M = \$160,000 + .2(250,000 + .1M)$$

$$M = \$160,000 + 50,000 + .02M$$

$$.98M = \$210,000$$

$$M = \$214,286$$

$$P = \$250,000 + .1 M$$

Reciprocal Allocation

Utilize a series of simultaneous linear equations

$$M = \$160,000 + .2P$$

$$M = \$160,000 + .2(250,000 + .1M)$$

$$M = \$160,000 + 50,000 + .02M$$

$$.98M = \$210,000$$

$$M = \$214,286$$

$$P = \$250,000 + .1M$$

$$P = \$250,000 + .1(214,286)$$

$$P = \$250,000 + 21,429$$

$$P = \$271,429$$

Reciprocal Allocation

	Total Cost	Allocated to	
		Grinding ^a	Assembly ^b
Power	\$271,429	\$162,857 (60%)	\$ 54,285* (20%)
Maintenance	214,286	96,429 (45%)	96,429 (45%)
Total		<u>\$259,286</u>	<u>\$150,714</u>

Note: All \$410,000 in overhead from support departments is assigned to producing departments.

Choosing a Support Department Cost Allocation Method

Comparison of Direct Method, Sequential Method and Reciprocal Method

	Direct Method		Sequential Method		Reciprocal Method	
	Grinding	Assembly	Grinding	Assembly	Grinding	Assembly
Direct costs	\$100,000	\$ 60,000	\$100,000	\$ 60,000	\$100,000	\$ 60,000
Allocated from power	187,500	62,500	150,000	50,000	162,857	54,285
Allocated from maintenance	<u>80,000</u>	<u>80,000</u>	<u>105,000</u>	<u>105,000</u>	<u>96,429</u>	<u>96,429</u>
Total cost	<u>\$367,500</u>	<u>\$202,500</u>	<u>\$355,000</u>	<u>\$215,000</u>	<u>\$359,286</u>	<u>\$210,714</u>

Note: Total amount of overhead allocated to both dept same for each method (\$570K)

Remember Cramer's Rule for solving set of linear equations?

Given: $Ax = b$ then $x_i = |D_i| / |A|$ where $D_i = A$ with column i replaced by b and $|A|$ denotes determinant of matrix A .

Choosing a Support Department Cost Allocation Method

Methods for Allocating Support Costs:

- Reciprocal Method
 - Recognizes all interactions of support departments
 - The usage of one support department by another is used to determine the total cost of each support department – after the equations are solved, the total costs of each support department are known.
 - **Total cost = direct costs + allocated costs**

Departmental Overhead Rates and Product Costing

After allocating all support service costs to producing departments, an overhead rate is calculated for each department.

Allocated service costs + Producing department overhead costs

Measure of activity (direct labor hours, machine hours)

Departmental Overhead Rates and Product Costing

A product cost is now determined by:

Materials

+ Labor

+ Overhead

Product Cost

The accuracy of product costs depends on the accuracy of the assignment of overhead costs

Accounting for Joint Production Processes

Joint Products are two or more products produced simultaneously by the same process up to a 'split-off' point.

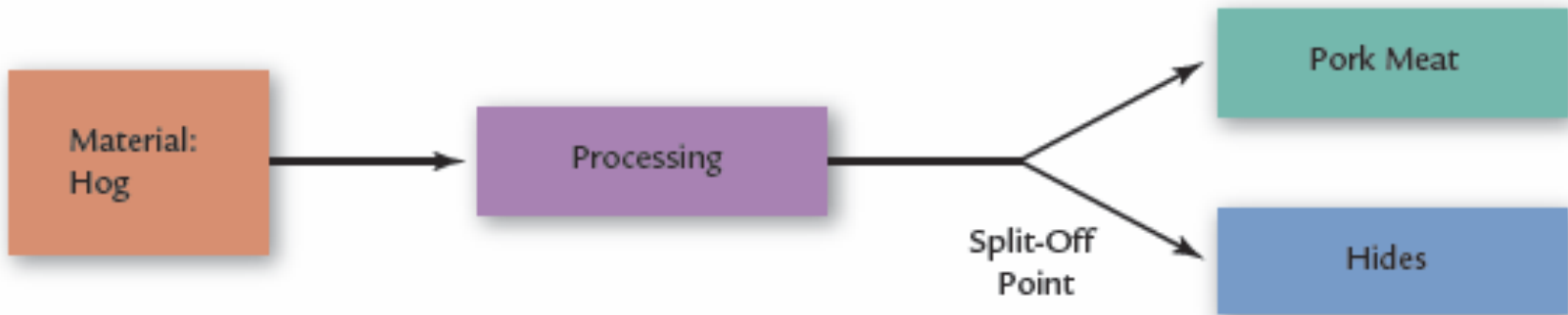
The split-off point is the point at which the joint products become separate and identifiable.

Separable costs are easily traced to individual products and offer no particular problem.

Accounting for Joint Production Processes

(EXHIBIT 7.10)

Joint Production Process



Accounting for Joint Production Processes

(EXHIBIT 7.11)

Independent Multiple-Product Production Using the Same Material



Accounting for Joint Production Processes

- The distinction between joint and by-products rests solely on the relative importance of their sales value.
 - A by-product is a secondary product recovered in the course of manufacturing a primary product.

Accounting for Joint Production Processes

Physical Units Method

- Joint costs distributed on the basis of a physical measure – like pounds, tons, gallons, board feet, atomic weight, or heat units

Weighted Average Method

- Uses weighted factors (like amount of material used, time consumed) to distribute joint costs

Joint Cost Allocation: Physical Units Method

A sawmill processes logs into four grades of lumber and incurs total joint costs of \$186,000:

<i>Grades</i>	<i>Board Feet</i>	<i>Percent of Units</i>	<i>Joint Cost Allocation</i>
First and second	450,000	15.00%	\$ 27,900
No. 1 common	1,200,000	40.00%	74,400
No. 2 common	600,000	20.00%	37,200
No. 3 common	750,000	25.00%	46,500
	<u>3,000,000</u>		<u>\$ 186,000</u>

Joint Cost Allocation: Weighted Average Method

A peach canning factory purchases \$5,000 of peaches and grades and cans them by quality.

<i>Grades</i>	<i>Number of Cases</i>	<i>Weight Factor</i>	<i>Weighted Number of Cases</i>	<i>Percent</i>	<i>Joint Cost Allocation</i>
Fancy	100	1.30	130	21.67%	\$ 1,083
Choice	120	1.10	132	22.00%	1,100
Standard	303	1.00	303	50.50%	2,525
Pie	70	0.50	35	5.83%	292
			<u>600</u>		<u>\$ 5,000</u>

Accounting for Joint Production Processes

Sales Value at Split-Off Method

- Allocates joint cost based on each product's proportionate share of market value or sales value at the split-off point
- The higher the market value, the greater the share of joint cost charged against the product

Net Realizable Value Method

- Used if there is no ready market price for the individual products at the split off point
- Useful when one or more products cannot be sold at the split-off point but must be processed further

Chapter 8 - Budgeting for Planning and Control

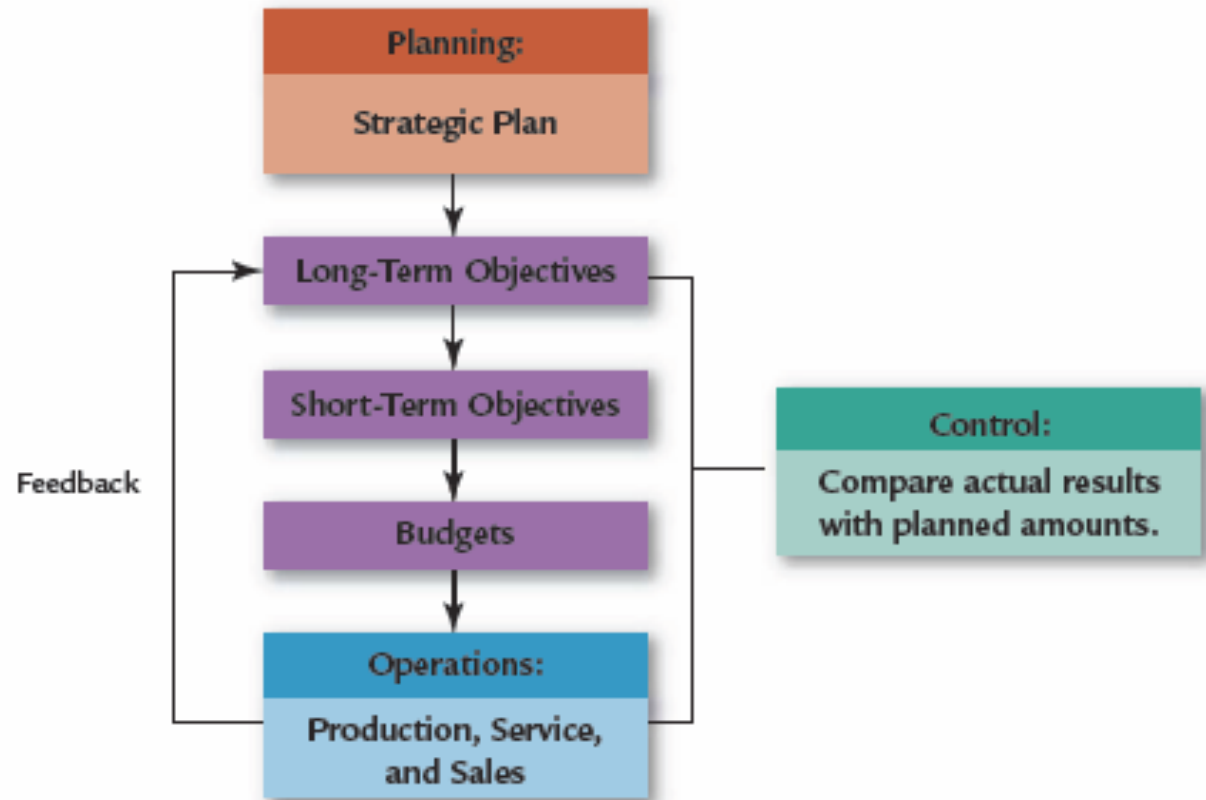
Chapter 8 Objectives

1. Define Budgeting, and discuss its role in planning, controlling, and decision making.
2. Prepare the operating budget, identify its major components, and explain the interrelationships of the various components.
3. Identify the components of the financial budget, and prepare a cash budget.
4. Define flexible budgeting, and discuss its role in planning, control, and decision making.
5. Define activity-based budgeting, and discuss its role in planning, control, and decision making.
6. Identify and discuss the key features that a budgetary system should have to encourage managers to engage in goal-congruent behavior.

The Role of Budgeting in Planning and Control

EXHIBIT 8.1

The Master Budget and Its Interrelationships



The Role of Budgeting in Planning and Control

EXHIBIT 8.2

Components of the Master Budget



Components of the Operating Budget

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Objective 1

Preparing the Operating Budget

The first budget is the sales budget which is based on the sales forecast.

Schedule 1 (in thousands)

Sales Budget For the Year Ended December 31, 2010

	<i>Quarter</i>				<i>Year</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
Units	2,000	6,000	6,000	2,000	16,000
Unit selling price	$\times \$0.70$	$\times \$0.70$	$\times \$0.80$	$\times \$0.80$	$\times \$0.75$
Sales	<u>\$1,400</u>	<u>\$4,200</u>	<u>\$4,800</u>	<u>\$1,600</u>	<u>\$12,000</u>

Starting point for Production Budget

Starting point for Marketing Expense Budget

Goes to Budgeted Income Statement

Preparing the Operating Budget

Schedule 2 (in thousands)

Production Budget For the Year Ended December 31, 2010

	<i>Quarter</i>				<i>Year</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
Sales (Schedule 1)	2,000	6,000	6,000	2,000	16,000
Desired ending inventory	<u>500</u>	<u>500</u>	<u>100</u>	<u>100</u>	<u>100</u>
Total needs	2,500	6,500	6,100	2,100	16,100
Less: Beginning inventory	<u>100</u>	<u>500</u>	<u>500</u>	<u>100</u>	<u>100</u>
Units to be produced	<u><u>2,400</u></u>	<u><u>6,000</u></u>	<u><u>5,600</u></u>	<u><u>2,000</u></u>	<u><u>16,000</u></u>

Starting point for Direct Materials Purchases Budget

Starting point for Direct Labor Budget

**Units to be produced = Units in Ending Inventory +
Unit Sales – Units in Beginning Inventory**

Preparing the Operating Budget

Schedule 3 (in thousands)

Direct Materials Purchases Budget For the Year Ended December 31, 2010

	<i>Quarter</i>				<i>Year</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
Units to be produced (Schedule 2)	2,400	6,000	5,600	2,000	16,000
Direct materials per unit (lbs.)	× 26	× 26	× 26	× 26	× 26
Production needs (lbs.)	62,400	156,000	145,600	52,000	416,000
Desired ending inventory (lbs.)	8,000	8,000	5,000	5,000	5,000
Total needs	70,400	164,000	150,600	57,000	421,000
Less: Beginning inventory*	5,000	8,000	8,000	5,000	5,000
Direct materials to be purchased (lbs.)	65,400	156,000	142,600	52,000	416,000
Cost per pound	× \$0.01	× \$0.01	× \$0.01	× \$0.01	× \$0.01
Total purchase cost	\$ 654	\$ 1,560	\$ 1,426	\$ 520	\$ 4,160

* Follows the inventory policy of having 8 million pounds of materials on hand at the end of the first and second quarters and 5 million pounds on hand at the end of the third and fourth quarters.

Goes to Cost of Goods Sold Budget ←

Materials Purchase = Desired materials in ending inventory + Expected Usage – Direct Materials in Beginning inventory

Preparing the Operating Budget

Schedule 4 (in thousands)

Direct Labor Budget For the Year Ended December 31, 2010

	<i>Quarter</i>				<i>Year</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
Units to be produced (Schedule 2)	2,400	6,000	5,600	2,000	16,000
Direct labor time per unit (hrs.)	<u>×0.015</u>	<u>×0.015</u>	<u>×0.015</u>	<u>×0.015</u>	<u>×0.015</u>
Total hours needed	36	90	84	30	240
Wage per hour	<u>× \$8</u>	<u>× \$8</u>	<u>× \$8</u>	<u>× \$8</u>	<u>× \$8</u>
Total direct labor cost	<u>\$ 288</u>	<u>\$ 720</u>	<u>\$ 672</u>	<u>\$ 240</u>	<u>\$1,920</u>

Starting point for Overhead Budget

Goes to Cost of Goods Sold Budget

Preparing the Operating Budget

Schedule 5 (in thousands)

Overhead Budget For the Year Ended December 31, 2010

	<i>Quarter</i>				<i>Year</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
Budgeted direct labor hours (Schedule 4)	36	90	84	30	240
Variable overhead rate	$\times \$8$	$\times \$8$	$\times \$8$	$\times \$8$	$\times \$8$
Budgeted variable overhead	\$288	\$ 720	\$672	\$240	\$1,920
Budgeted fixed overhead*	320	320	320	320	1,280
Total overhead	<u>\$608</u>	<u>\$1,040</u>	<u>\$992</u>	<u>\$560</u>	<u>\$3,200</u>

*Includes \$200,000 of depreciation in each quarter.

Goes to Cost of Goods Sold Budget



Preparing the Operating Budget

Schedule 6 (in thousands)

Ending Finished Goods Inventory Budget For the Year Ended December 31, 2010

Unit cost computation:

Direct materials (26 lbs. @ \$0.01) ^a	\$0.26
Direct labor (0.015 hr. @ \$8) ^b	0.12
Overhead:	
Variable (0.015 hr. @ \$8) ^c	0.12
Fixed (0.015 hr. @ \$5.33) ^d	<u>0.08</u>
Total unit cost	<u>\$0.58</u>

	<i>Units</i>	<i>Unit Cost</i>	<i>Total</i>
Finished goods: Concrete blocks	100	\$0.58	\$58

^aAmounts taken from Schedule 3.

^bAmounts taken from Schedule 4.

^cAmounts taken from Schedule 5.

^dBudgeted fixed overhead (Schedule 5)/Budgeted direct labor hours (Schedule 4) = \$1,280/240 = \$5.33.

Goes to Cost of Goods Sold Budget ←

Preparing the Operating Budget

Schedule 7 (in thousands)

Cost of Goods Sold Budget For the Year Ended December 31, 2010

Direct materials used (Schedule 3)*	\$4,160
Direct labor used (Schedule 4)	1,920
Overhead (Schedule 5)	<u>3,200</u>
Budgeted manufacturing costs	\$9,280
Beginning finished goods	<u>55</u>
Goods available for sale	\$9,335
Less: Ending finished goods (Schedule 6)	<u>58</u>
Budgeted cost of goods sold	<u><u>\$9,277</u></u>

*Production needs × \$0.01 = 416,000 × \$0.01.

Goes to Budgeted Income Statement ←

Preparing the Operating Budget

Schedule 8 (in thousands)

Marketing Expense Budget For the Year Ended December 31, 2010

	<i>Quarter</i>				<i>Year</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
Planned sales in units (Schedule 1)	2,000	6,000	6,000	2,000	16,000
Variable marketing expense per unit	<u>×\$0.05</u>	<u>×\$0.05</u>	<u>×\$0.05</u>	<u>×\$0.05</u>	<u>×\$0.05</u>
Total variable expenses	<u>\$ 100</u>	<u>\$ 300</u>	<u>\$ 300</u>	<u>\$ 100</u>	<u>\$ 800</u>
Fixed marketing expense:					
Salaries	\$ 10	\$ 10	\$ 10	\$ 10	\$ 40
Advertising	10	10	10	10	40
Depreciation	5	5	5	5	20
Travel	3	3	3	3	12
Total fixed expenses	<u>\$ 28</u>	<u>\$ 28</u>	<u>\$ 28</u>	<u>\$ 28</u>	<u>\$ 112</u>
Total marketing expenses	<u>\$ 128</u>	<u>\$ 328</u>	<u>\$ 328</u>	<u>\$ 128</u>	<u>\$ 912</u>

Goes to Budgeted Income Statement ←

Preparing the Operating Budget

Schedule 9 (in thousands)

Research and Development Expense Budget For the Year Ended December 31, 2010

	<i>Quarter</i>				<i>Year</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
Salaries	\$18	\$18	\$18	\$18	\$ 72
Prototype design and development	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>40</u>
Total R&D expenses	<u>\$28</u>	<u>\$28</u>	<u>\$28</u>	<u>\$28</u>	<u>\$112</u>

Goes to Budgeted Income Statement ←

Preparing the Operating Budget

Schedule 10 (in thousands)

Administrative Expense Budget For the Year Ended December 31, 2010

	<i>Quarter</i>				<i>Year</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
Salaries	\$25	\$25	\$25	\$25	\$100
Insurance	—	—	15	—	15
Depreciation	10	10	10	10	40
Travel	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>8</u>
Total administrative expenses	<u>\$37</u>	<u>\$37</u>	<u>\$52</u>	<u>\$37</u>	<u>\$163</u>

Goes to Budgeted Income Statement ←

Preparing the Operating Budget

Schedule 11 (in thousands)

Budgeted Income Statement For the Year Ended December 31, 2010

Sales (Schedule 1)	\$12,000
Less: Cost of goods sold (Schedule 7)	<u>9,277</u>
Gross margin	\$ 2,723
Less: Marketing expenses (Schedule 8)	912
Research and development expenses (Schedule 9)	112
Administrative expenses (Schedule 10)	<u>163</u>
Operating income	\$ 1,536
Less: Interest expense (Schedule 12)	<u>42</u>
Income before income taxes	\$ 1,494
Less: Income taxes	<u>600</u>
Net income	<u><u>\$ 894</u></u>

Flexible Budgets for Planning and Control

Static budgets are master budgets that are developed around a single level of activity.

	Actual	Budgeted	Variance	
Units produced	3,000,000	2,400,000	600,000	F ^a
Direct materials cost	\$ 927,300	\$ 624,000 ^b	\$303,300	U ^c
Direct labor cost	630,000	504,000 ^d	126,000	U
Overhead: ^e				
Variable:				
Supplies	80,000	72,000	8,000	U
Indirect labor	220,000	168,000	52,000	U
Power	40,000	48,000	(8,000)	F
Fixed:				
Supervision	90,000	100,000	(10,000)	F
Depreciation	200,000	200,000	0	
Rent	30,000	20,000	10,000	U
Total	<u>\$2,217,300</u>	<u>\$1,736,000</u>	<u>\$481,300</u>	U

Flexible Budgets for Planning and Control

Flexible Production Budget (in thousands except for per unit cost)

	Variable Cost per Unit	Range of Production (units)		
		2,400	3,000	3,600
Production costs:				
Variable:				
Direct materials	\$0.26	\$ 624	\$ 780	\$ 936
Direct labor	0.12	288	360	432
Variable overhead:				
Supplies	0.03	72	90	108
Indirect labor	0.07	168	210	252
Power	0.02	48	60	72
Total variable costs	<u>\$0.50</u>	<u>\$1,200</u>	<u>\$1,500</u>	<u>\$1,800</u>
Fixed overhead:				
Supervision		\$ 100	\$ 100	\$ 100
Depreciation		200	200	200
Rent		20	20	20
Total fixed costs		<u>\$ 320</u>	<u>\$ 320</u>	<u>\$ 320</u>
Total production costs		<u>\$1,520</u>	<u>\$1,820</u>	<u>\$2,120</u>

Flexible Budgets for Planning and Control

Flexible budgets provide expected costs for a range of activity or the actual level of activity. Managers can locate possible problem areas by examining variances revealed on a performance report that compares budgeted costs for the actual level of activity to the actual costs for the same level.

	Actual Results	Flexible Budget	Flexible Budget Variances		Static Budget	Volume Variances	
	(1)	(2)	(3) = (1) – (2)		(4)	(5) = (2) – (4)	
Units produced	3,000,000	3,000,000	0		2,400,000	600,000	F
Direct materials cost	\$ 927,300	\$ 780,000	\$147,300	U	\$ 624,000	\$156,000	U
Direct labor cost	630,000	630,000	0		504,000	126,000	U
Overhead:							
Variable:							
Supplies	80,000	90,000	(10,000)	F	72,000	18,000	U
Indirect labor	220,000	210,000	10,000	U	168,000	42,000	U
Power	40,000	60,000	(20,000)	F	48,000	12,000	U
Fixed:							
Supervision	90,000	100,000	(10,000)	F	100,000	0	
Depreciation	200,000	200,000	0		200,000	0	
Rent	30,000	20,000	10,000	U	20,000	0	
Total	<u>\$2,217,300</u>	<u>\$2,090,000</u>	<u>\$127,300</u>	U	<u>\$1,736,000</u>	<u>\$354,000</u>	U

Efficiency and Effectiveness in Budgeting

Efficiency: achieved when the business process is performed the best possible way, with little or no waste. Efficiency examines how well the work is done—“Doing the job right.”

Effectiveness: means that a manager achieves or exceeds the goals described by the static budget. Effectiveness examines whether or not the right work is being done—“Doing the right job”

Activity Based Budgets

- Flexible budgeting allows creation of budgets for varying levels of activity.
 - The activity based budget begins with output and then determines the resources necessary to create that output

Activity Based Budgets

(EXHIBIT 8.9)

Traditional Budget for the Secure-Care Department

Expense Category		Budgeted Amounts
Salaries and benefits:		
Brad.....	\$110,000	
Administrative assistants.....	70,000	
Receptionist	<u>30,000</u>	\$210,000
Rent.....		36,000
Supplies.....		10,000
PCs and Internet		4,000
Travel.....		3,000
Investigative services		6,000
Telephone		<u>4,800</u>
Total.....		<u>\$273,800</u>

Activity Based Budgets

EXHIBIT 8.10

Flexible Budget for the Secure-Care Department

Expense Category		Budgeted Amounts for 60 Clients
Variable expenses:		
Supplies.....	\$ 10,000	
Telephone	<u>3,600</u>	
Total variable expenses.....		\$ 13,600
Fixed expenses:		
Salaries and benefits.....	\$210,000	
Rent.....	36,000	
PCs and Internet.....	4,000	
Travel.....	3,000	
Investigative services	6,000	
Telephone	<u>1,200</u>	
Total fixed expenses.....		260,200
Total expenses.....		<u>\$273,800</u>

Activity Based Budgets

(EXHIBIT 8.11)

Activity-Based Budget for the Secure-Care Department

Activity Description	Activity Driver	Cost per Unit of Driver	Amount of Driver	Activity Cost
Processing mail	Number of clients	\$125.00	60	\$ 7,500
Paying bills	Number of bills	1.75	12,000	21,000
Reconciling accounts	Number of accounts	114.00	350	39,900
Advertising/interviewing	Number of new hires	120.00	60	7,200
Investigating	Number of new hires	100.00	60	6,000
Visiting homes	Number of clients	650.00	60	39,000
Writing reports	Number of clients	175.00	60	10,500
Managing department				142,700
Total				<u>\$273,800</u>

Activity Based Budgets

Feature Costing: assigns costs to activities and products or services based on the product's or service's feature

The Behavioral Dimension of Budgeting

Characteristics of a Good Budgetary System

- Frequent Feedback on Performance
- Monetary and Nonmonetary Incentives
- Participative Budgeting
- Realistic Standards
- Controllability of Costs
- Multiple Measures of Performance