Chapter 15
Service Department Costing:
An Activity Approach

Solutions to Questions

15-1 Operating departments are the units in an organization within which the central purposes of the organization are carried out; these departments usually generate revenue. By contrast, service departments provide support or assistance to the operating departments. Examples of service departments include laundry services, internal auditing, airport maintenance services (ground crews), cafeteria, personnel, cost accounting, and so on.

15-2 Service department costs are allocated to products and services in two stages. Service department costs are first allocated to the operating departments. These allocated costs are then included in the operating departments' overhead rates, which are used to cost products and services.

15-3 Interdepartmental service costs exist whenever two service departments perform services for each other. Under the step method, the costs of the service department performing the greatest amount of service for the other service departments are allocated first, the costs of the service department performing the next greatest amount of service are allocated next, and so forth through all the service departments. Once a service department's costs have been allocated, costs are not reallocated back to it under the step method.

15-4 Under the direct method, costs are not allocated from one service department to another. Rather, all service department costs are allocated directly to operating departments.

15-5 If a service department generates revenues, these revenues should be offset against the department's costs and only the net amount of cost remaining after this offset should be allocated to other departments.

15-6 Two general guidelines govern the allocation of fixed service department costs to other departments: (1) allocate only budgeted costs, and (2) allocate fixed costs in predetermined, lump-sum amounts, according to how much of the service department's capacity is acquired to serve each of the other departments.

 Two general guidelines also govern the allocation of variable service department costs to other departments: (1) allocate at budgeted rates, and (2) allocate the costs according to whatever activity (direct labor-hours, pounds of laundry, etc.) causes their incurrence.

15-7 If a variable base is used to allocate fixed costs, the costs allocated to one department will depend in large part on what is happening in other departments. As a consequence, the amount of service department cost allocated to a department will increase or decrease depending on the activity in other departments.

Exercise 15-1 (15 minutes)

	Service Departments		Operating Departments		
	Admini-stration	Facility Services	Undergraduate Programs	Graduate Programs	Total
Departmental costs before allocations	$2,400,000	$1,600,000	$26,800,000	$5,700,000	$36,500,000
Allocations:					
Administration costs (20/25, 5/25).............	(2,400,000)		1,920,000	480,000	
Facility Services costs (70/100, 30/100)*		(1,600,000)	1,120,000	480,000	
Total costs after allocation .	$ 0	$ 0	$29,840,000	$6,660,000	$36,500,000

*Based on the space occupied by the two operating departments, which is 100,000 square feet.

Exercise 15-2 (15 minutes)

	Service Departments		Operating Departments		
	Admini- stration	*Janitorial*	*Groceries*	*Gifts*	*Total*
Departmental costs before allocations	$150,000	$40,000	$2,320,000	$950,000	$3,460,000
Allocations:					
Administration costs (160/4,000, 3,100/4,000, 740/4,000)*	(150,000)	6,000	116,250	27,750	
Janitorial costs (4,000/5,000, 1,000/5,000)†		(46,000)	36,800	9,200	
Total costs after allocation	$ 0	$ 0	$2,473,050	$986,950	$3,460,000

*Based on employee hours in the other three departments, 160 + 3,100 + 740 = 4,000.

†Based on space occupied by the two operating departments, 4,000 + 1,000 = 5,000.
  Both the Janitorial Department costs of $40,000 and the Administration costs of $6,000 that have been allocated to the Janitorial Department are allocated to the two operating departments.

Exercise 15-3 (10 minutes)

	Northern Plant	Southern Plant
Variable costs:		
$0.25 per ton × 120,000 tons............	$ 30,000	
$0.25 per ton × 60,000 tons.............		$ 15,000
Fixed costs:		
70% × $300,000	210,000	
30% × $300,000		90,000
Total allocated costs	$240,000	$105,000

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Exercise 15-4 (20 minutes)

1. and 2.

End-of-year allocations of variable costs should be based on the *actual* level of activity multiplied by the *budgeted* rate. End-of-year allocations of fixed costs should be based on the same predetermined lump-sum amounts as at the beginning of the year. Actual costs in excess of (or less than) the budgeted rate for variable costs or the budgeted total fixed costs should not be allocated to the plants. Therefore, the allocations of transport services cost at the end of the year would be:

	Northern Plant	Southern Plant	Total
Variable costs:			
$0.25 per ton × 130,000 tons...	$ 32,500		
$0.25 per ton × 50,000 tons		$ 12,500	$ 45,000
Fixed costs:			
70% × $300,000	210,000		
30% × $300,000		90,000	300,000
Total cost	$242,500	$102,500	$345,000

3. Part of the $364,000 in total cost will not be allocated to the plants, as follows:

	Variable Cost	Fixed Cost	Total
Total cost incurred......................	$54,000	$310,000	$364,000
Total cost allocated (above)	45,000	300,000	345,000
Amount of cost not allocated.......	$ 9,000	$ 10,000	$ 19,000

The cost not allocated represents cost incurred in excess of the budgeted $0.25 per ton variable cost and budgeted $300,000 in fixed costs. This $19,000 in unallocated cost is the responsibility of the Transport Services Department and is a cost variance for the year.

Exercise 15-5 (20 minutes)

| | Service Departments | | | Operating Departments | | |
	Admini-stration	Janitorial	Mainte-nance	Binding	Printing	Total
Overhead costs	$140,000	$105,000	$ 48,000	$275,000	$430,000	$998,000
Allocations:						
Administration costs:						
(5%, 20%, 45%, 30%)*................	(140,000)	7,000	28,000	63,000	42,000	
Janitorial costs: (1/8, 2/8, 5/8)		(112,000)	14,000	28,000	70,000	
Maintenance costs: (1/3, 2/3)			(90,000)	30,000	60,000	
Total overhead costs after allocations...	$ 0	$ 0	$ 0	$396,000	$602,000	$998,000

 * Allocations can be shown in percentages, in fractions, or as a rate per unit of activity. For example,
   Administration allocations have been shown as percentages, but they could have been shown as 1/20;
   4/20; 9/20; and 6/20 or they could have been shown as $200 per employee. Fractions should be used
   if percentages result in rounding errors.

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Exercise 15-5 (continued)

Supporting computations:

Administration costs allocated on the basis of:

Janitorial..................	35 employees	5 %
Maintenance	140 employees	20
Binding....................	315 employees	45
Printing	210 employees	30
Total........................	700 employees	100 %

Janitorial costs allocated on the basis of:

Maintenance	20,000 square feet	1/8
Binding....................	40,000 square feet	2/8
Printing	100,000 square feet	5/8
Total........................	160,000 square feet	8/8

Maintenance costs allocated on the basis of:

Binding....................	30,000 hours	1/3
Printing	60,000 hours	2/3
Total........................	90,000 hours	3/3

Exercise 15-6 (20 minutes)

	Service Departments			Operating Departments		
	Admini-stration	Janitorial	Mainte-nance	Binding	Printing	Total
Overhead costs	$140,000	$105,000	$ 48,000	$275,000	$430,000	$998,000
Allocation:						
Administration costs: (3/5, 2/5) .	(140,000)			84,000	56,000	
Janitorial costs: (2/7, 5/7)		(105,000)		30,000	75,000	
Maintenance costs: (1/3, 2/3)....			(48,000)	16,000	32,000	
Total overhead costs after alloca-tions	$ 0	$ 0	$ 0	$405,000	$593,000	$998,000

Supporting computations:

	Administration		Janitorial		Maintenance	
Binding..	315 employees	3/5	40,000 square feet	2/7	30,000 hours	1/3
Printing .	210 employees	2/5	100,000 square feet	5/7	60,000 hours	2/3
Total......	525 employees	5/5	140,000 square feet	7/7	90,000 hours	3/3

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Exercise 15-7 (20 minutes)

1.

	Rick's Harborside	Imperial Garden	Ginger Wok	Total
Percentage of 2005 sales....................	32%	50%	18%	100%
Allocation of 2005 fixed administrative expenses (based on the above percentages).....................................	$640,000	$1,000,000	$360,000	$2,000,000

2.

	Rick's Harborside	Imperial Garden	Ginger Wok	Total
2005 allocation (above)	$640,000	$1,000,000	$360,000	$2,000,000
2004 allocation	800,000	750,000	450,000	2,000,000
Increase (decrease) in allocation..........	$(160,000)	$ 250,000	$(90,000)	$ 0

The manager of the Imperial Garden undoubtedly will be upset about the increased allocation of fixed administrative expense. Such an increased allocation may be viewed as a penalty for an outstanding performance.

3. Sales dollars is not ordinarily a good base for allocating fixed costs. The departments with the greatest sales will be allocated the greatest amount of cost and the costs allocated to a department will be affected by the sales in *other* departments. In our illustration above, the sales in two restaurants remained static and the sales in the third increased. As a result, less cost was allocated to the restaurants with static sales and more cost was allocated to the one restaurant that showed improvement during the period.

Exercise 15-8 (15 minutes)

The budgeted rate of $18 per X-ray should be multiplied by the actual number of X-rays provided for each operating department for the end-of-year allocations.

	(1) Budgeted Rate	(2) Actual Number of X-rays	(1) × (2) Total Allocation
Pediatrics......................	$18	6,000	$108,000
OB Care	$18	3,000	54,000
General Hospital............	$18	15,000	270,000
Total		24,000	$432,000

The difference between the budgeted and actual cost per X-ray is the responsibility of the Radiology Department and is not allocated to the operating departments. This variance totals $48,000 for the year.

24,000 X-rays × ($20 − $18 = $2 per X-ray) = $48,000.

Exercise 15-9 (15 minutes)

1.

	Janitorial Services	*Radiology*	*Pediatrics*	*OB Care*	*General Hospital*
Cost to be allocated	$375,000	$590,000			
Allocations:					
Janitorial Services:					
(4%, 20%, 16%, 60%)	(375,000)	15,000	$ 75,000	$ 60,000	$225,000
Radiology: (3/10, 2/10, 5/10)		(605,000)	181,500	121,000	302,500
Total overhead costs after allocations ...	$ 0	$ 0	$256,500	$181,000	$527,500

Supporting computations:

Janitorial Services:			Radiology:		
Radiology.............	6,000 sq. ft.	4 %	Pediatrics	9,000 X-rays	3/10
Pediatrics.............	30,000 sq. ft.	20	OB Care	6,000 X-rays	2/10
OB Care...............	24,000 sq. ft.	16	General Hospital ..	15,000 X-rays	5/10
General Hospital ...	90,000 sq. ft.	60		30,000 X-rays	10/10
	150,000 sq. ft.	100 %			

2. The allocations would be the same as in Part 1, since budgeted fixed costs are always allocated to consuming departments. Thus, $6,000 of the actual fixed costs in Janitorial Services ($381,000 – $375,000) and $10,000 of the actual fixed costs in Radiology ($600,000 – $590,000) would not be allocated to other departments.

Problem 15-10 (60 minutes)

1.

	(Thousands of ¥)					
	Factory Admini- stration	Custodial Services	Personnel	Mainte- nance	Machining	Assembly
Step method						
Operating department costs......					¥376,300	¥175,900
Costs to be allocated................	¥270,000	¥ 68,760	¥ 28,840	¥ 45,200		
Allocations:						
Factory Administration						
@ ¥1,800 per labor-hour	(270,000)	5,400	9,000	39,600	54,000	162,000
Custodial Services						
@ ¥720 per square foot.......		(74,160)	2,160	7,200	50,400	14,400
Personnel						
@ ¥320,000 per employee...			(40,000)	8,000	12,800	19,200
Maintenance						
@ ¥1,250 per machine- hour				(100,000)	87,500	12,500
Total overhead after allocations	¥ 0	¥ 0	¥ 0	¥ 0	¥581,000	¥384,000
Divide by machine-hours (thousands)					÷ 70	
Divide by direct labor-hours (thousands)						÷ 80
Overhead rate					¥ 8,300	¥ 4,800

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Problem 15-10 (continued)

2.

	(Thousands of ¥)					
	Factory Admini- stration	Custodial Services	Personnel	Mainte- nance	Machining	Assembly
Direct method						
Operating department costs......					¥376,300	¥175,900
Costs to be allocated................	¥270,000	¥68,760	¥28,840	¥45,200		
Allocations:						
Factory Administration (1/4, 3/4)...........................	(270,000)				67,500	202,500
Custodial Services (7/9, 2/9) ..		(68,760)			53,480	15,280
Personnel (2/5, 3/5)			(28,840)		11,536	17,304
Maintenance (7/8, 1/8)				(45,200)	39,550	5,650
Total overhead after alloca- tions....................................	¥ 0	¥ 0	¥ 0	¥ 0	¥548,366	¥416,634
Divide by machine-hours (thousands)					÷ 70	
Divide by direct labor-hours (thousands)						÷ 80
Overhead rate.........................					¥ 7,834	¥ 5,208

Problem 15-10 (continued)

3. *Plantwide rate*

$$\text{Overhead rate} = \frac{\text{Total overhead cost}}{\text{Total direct labor-hours}}$$

$$= \frac{¥965,000,000}{100,000 \text{ DLHs}} = ¥9,650 \text{ per DLH}$$

4. The amount of overhead cost assigned to the job would be:

Step method:
Machining Department: ¥8,300 per machine-hour × 190 machine-hours	¥1,577,000
Assembly Department: ¥4,800 per direct labor-hour × 75 direct labor-hours......................................	360,000
Total overhead cost	¥1,937,000

Direct method:
Machining Department: ¥7,834 per machine-hour × 190 machine-hours	¥1,488,460
Assembly department: ¥5,208 per direct labor-hour × 75 direct labor-hours	390,600
Total overhead cost	¥1,879,060

Plantwide method:
¥9,650 per direct labor-hour × 100 direct labor-hours .	¥ 965,000

The plantwide method, which is based on direct-labor hours, assigns very little overhead cost to the job since it requires little labor time. Assuming that Factory Administrative costs really do vary in proportion to labor-hours, Custodial Services with square feet occupied, and so on, the company will tend to undercost such jobs if a plantwide overhead rate is used (and it will tend to overcost jobs requiring large amounts of labor time). The direct method is better than the plantwide method, but the step method will generally provide the most accurate overhead rates of the three methods.

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Problem 15-11 (45 minutes)

1.

	Auto Division	Truck Division
Variable costs:		
$3 per meal × 35,000 meals	$105,000	
$3 per meal × 20,000 meals		$60,000
Fixed costs:		
65% × $40,000......................	26,000	
35% × $40,000......................		14,000
Total cost allocated	$131,000	$74,000

The variable costs are allocated by multiplying the budgeted rate per meal by the budgeted number of meals that will be served in each division during the month. The fixed costs are allocated in predetermined, lump-sum amounts based on the peak-period need for meals in each division.

2.

	Auto Division	Truck Division
Variable costs:		
$3 per meal × 20,000 meals	$60,000	
$3 per meal × 20,000 meals		$60,000
Fixed costs:		
65% × $40,000......................	26,000	
35% × $40,000......................		14,000
Total cost allocated	$86,000	$74,000

The variable costs are allocated according to the budgeted rate per meal and not according to the actual rate. The fixed costs are again allocated in predetermined, lump-sum amounts, based on budgeted fixed costs. Any difference between budgeted and actual costs is not allocated, but rather is treated as a spending variance of the cafeteria:

	Variable	Fixed
Total actual costs for the month	$128,000	$42,000
Total cost allocated above.......................	120,000	40,000
Spending variance—not allocated	$ 8,000	$ 2,000

Problem 15-11 (continued)

3. | Actual variable costs.............. | $128,000 |
    | Actual fixed costs................. | 42,000 |
    | Total actual costs .... | $170,000 |

One-half of the cost, or $85,000, would be allocated to each division, since an equal number of meals were served in each division during the month.

4. This method has two major problems. First, the spending variances should not be allocated, since this forces the inefficiencies of the service department onto the using departments. Second, the fixed costs should *not* be allocated according to month-by-month usage of services, since this causes the allocation to one division to be affected by what happens in another division.

5. Their strategy probably will be to underestimate their peak period requirements in order to force a greater proportion of any allocation onto other departments. Top management can control ploys of this type by careful follow-up, with rewards being given to those managers who estimate accurately, and severe penalties assessed against those managers who underestimate their peak period requirements. For example, departments whose managers underestimate their peak period requirements may be denied access to the cafeteria once their estimates have been exceeded.

Problem 15-12 (30 minutes)

1. Yes, there is merit to the complaint. The company is using a variable base (hours of hangar use) to allocate costs that are largely fixed. Thus, the amount of cost that is charged to a division during a given month will depend to a large extent on usage in other divisions. A reduction in usage in one division can result in shifts of costs from it onto the other divisions, even though the other divisions receive no more service.

2.

	Hours of Use	*Total Cost*
1st quarter activity	3,000	$172,000
2nd quarter activity	2,000	168,000
Difference	1,000	$ 4,000

$$\text{Variable cost element} = \frac{\text{Change in cost}}{\text{Change in activity}}$$

$$= \frac{\$4,000}{1,000 \text{ hours}} = \$4 \text{ per hour}$$

Fixed cost per quarter:

Total cost, 1st quarter..	$172,000
Less variable cost ($4 per hour × 3,000 hours)............	12,000
Fixed cost...	$160,000

Thus, the cost formula is $160,000 fixed cost plus $4 per hour variable cost.

Problem 15-12 (continued)

3. Even though the peak-period level of activity will not be reached until the fourth quarter, it should still be used to allocate the fixed costs of the hangar. The reason is that peak-period requirements determine the present level of fixed costs. The fact that the divisions do not need a peak-period level of servicing every quarter is immaterial. If the divisions require such servicing at certain times, then the capacity to deliver it must be available, and it is the responsibility of the divisions to bear the cost of that capacity.

	Freight	Domestic Passenger	Overseas Passenger
1st quarter allocation:			
Variable cost:			
$4 per hour × 900 hours	$ 3,600		
$4 per hour × 1,800 hours		$ 7,200	
$4 per hour × 300 hours			$ 1,200
Fixed cost:			
30% × $160,000	48,000		
50% × $160,000		80,000	
20% × $160,000			32,000
Total cost allocation	$51,600	$87,200	$33,200
2nd quarter allocation:			
Variable cost:			
$4 per hour × 800 hours	$ 3,200		
$4 per hour × 700 hours		$ 2,800	
$4 per hour × 500 hours			$ 2,000
Fixed cost:			
30% × $160,000	48,000		
50% × $160,000		80,000	
20% × $160,000			32,000
Total cost allocation	$51,200	$82,800	$34,000

Problem 15-13 (45 minutes)

	House-keeping Services	Food Services	Admini-strative Services	Laboratory	Radiology	General Hospital
Variable costs..............................	$ 0	$193,860	$158,840	$243,600	$304,800	$ 74,500
Food Services allocation:						
$2.70 per meal × 800 meals......		(2,160)	2,160			
$2.70 per meal × 2,000 meals ...		(5,400)		5,400		
$2.70 per meal × 1,000 meals ...		(2,700)			2,700	
$2.70 per meal × 68,000 meals .		(183,600)				183,600
Admin. Services allocation:						
$3.50 per file × 14,000 files			(49,000)	49,000		
$3.50 per file × 7,000 files			(24,500)		24,500	
$3.50 per file × 25,000 files			(87,500)			87,500
Total variable costs.....................	$ 0	$ 0	$ 0	$298,000	$332,000	$345,600

Problem 15-13 (continued)

	House-keeping Services	Food Services	Admini-strative Services	Laboratory	Radiology	General Hospital
Fixed costs..................................	$87,000	$107,200	$90,180	$162,300	$215,700	$401,300
Housekeeping Services allocation @ $0.60 per square foot:						
$0.60 × 13,000 square feet	(7,800)	7,800				
$0.60 × 6,500 square feet.........	(3,900)		3,900			
$0.60 × 10,000 square feet	(6,000)			6,000		
$0.60 × 7,500 square feet	(4,500)				4,500	
$0.60 × 108,000 square feet	(64,800)					64,800
Food Services allocation:						
0.8% × $115,000...................		(920)	920			
2.4% × $115,000...................		(2,760)		2,760		
1.6% × $115,000...................		(1,840)			1,840	
95.2% × $115,000		(109,480)				109,480
Admin. Services allocation:						
30% × $95,000			(28,500)	28,500		
20% × $95,000			(19,000)		19,000	
50% × $95,000			(47,500)			47,500
Total fixed costs	$ 0	$ 0	$ 0	$199,560	$241,040	$623,080
Total overhead costs..................	$ 0	$ 0	$ 0	$497,560	$573,040	$968,680

Problem 15-13 (continued)

Computation of allocation rates:

Variable Food Services:

$$\text{Allocation rate} = \frac{\text{Variable food services costs}}{\text{Meals served}}$$

$$= \frac{\$193,860}{71,800 \text{ meals}}$$

$$= \$2.70 \text{ per meal}$$

Variable Administrative Services:

$$\text{Allocation rate} = \frac{\text{Variable administrative services costs}}{\text{Files processed}}$$

$$= \frac{\$158,840 + \$2,160}{46,000 \text{ files}}$$

$$= \$3.50 \text{ per file}$$

Fixed Housekeeping Services:

$$\text{Allocation rate} = \frac{\text{Fixed housekeeping services costs}}{\text{Square feet}}$$

$$= \frac{\$87,000}{150,000 \text{ square feet} - 5,000 \text{ square feet}}$$

$$= \$0.60 \text{ per square foot}$$

Problem 15-14 (30 minutes)

1. Beginning-of-year allocations of variable costs are computed by multiplying the budgeted rate by the budgeted level of activity. Fixed costs are allocated in lump-sum amounts based on the peak-period needs of the using departments. The computations are:

	Forming Department	Assembly Department	Total
Variable costs:			
$0.40 per machine-hour × 160,000 machine-hours	$ 64,000		
$0.40 per machine-hour × 80,000 machine-hours.........		$32,000	$ 96,000
Fixed costs:			
70% × $150,000	105,000		
30% × $150,000		45,000	150,000
Total cost allocated..................	$169,000	$77,000	$246,000

2. a. End-of-year allocations of variable costs are computed by multiplying the budgeted rate by the actual level of activity. Fixed costs are again allocated in predetermined lump-sum amounts based on budgeted costs. The computations are:

	Forming Department	Assembly Department	Total
Variable costs:			
$0.40 per machine-hour × 190,000 machine-hours	$ 76,000		
$0.40 per machine-hour × 70,000 machine-hours.........		$28,000	$104,000
Fixed costs:			
70% × $150,000	105,000		
30% × $150,000		45,000	150,000
Total cost allocated..................	$181,000	$73,000	$254,000

Problem 15-14 (continued)

b. Any difference between the budgeted and actual variable cost per machine-hour or between the budgeted and actual total fixed cost would not be allocated to the other departments. The amount not allocated would be:

	Variable Cost	Fixed Cost	Total
Actual cost incurred during the year ...	$110,000	$153,000	$263,000
Cost allocated (above)	104,000	150,000	254,000
Cost not allocated (spending variance)	$ 6,000	$ 3,000	$ 9,000

The costs not allocated are spending variances of the Maintenance Department and are the responsibility of the Maintenance Department's manager.

Problem 15-15 (60 minutes)

1. and 2.

	Building & Grounds	Admini- stration	Equip- ment Mainte- nance	Fabric- ation	Finishing
Variable costs to be allocated	R 0	R22,200	R16,900		
Administration:					
R20 per employee × 30 employees		(600)	600		
R20 per employee × 450 employees		(9,000)		R 9,000	
R20 per employee × 630 employees		(12,600)			R12,600
Equipment maintenance:					
R0.10 per MH × 70,000 MHs			(7,000)	7,000	
R0.10 per MH × 105,000 MHs.................			(10,500)		10,500
Totals	R 0	R 0	R 0	R16,000	R23,100

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Problem 15-15 (continued)

	Building & Grounds	Admini-stration	Equip-ment Mainte-nance	Fabric-ation	Finishing
Fixed costs to be allocated	R88,200	R60,000	R24,000		
Building & Grounds:					
R3 per sq. ft. × 500 sq. ft...................	(1,500)	1,500			
R3 per sq. ft. × 1,400 sq. ft...............	(4,200)		4,200		
R3 per sq. ft. × 12,000 sq. ft.	(36,000)			R36,000	
R3 per sq. ft. × 15,500 sq. ft.	(46,500)				R46,500
Administration:					
3% × R61,500		(1,845)	1,845		
38% × R61,500.................................		(23,370)		23,370	
59% × R61,500.................................		(36,285)			36,285
Equipment Maintenance:					
40% × R30,045.................................			(12,018)	12,018	
60% × R30,045.................................			(18,027)		18,027
Total fixed costs	R 0	R 0	R 0	R 71,388	R100,812
Total allocated costs	R 0	R 0	R 0	R 87,388	R123,912
Other budgeted costs				566,000	810,000
Total overhead costs (a)........................				R653,388	R933,912
Budgeted machine-hours (b)..................				70,000	105,000
Predetermined overhead rate (a) ÷ (b) ...				R9.33	R8.89

Problem 15-15 (continued)

Computation of allocation rates:

Variable Administration:

$$\text{Allocation rate} = \frac{\text{Variable administrative costs}}{\text{Employees}}$$

$$= \frac{\text{R22,200}}{30 + 450 + 630 = 1{,}110 \text{ employees}}$$

$$= \text{R20 per employee}$$

Variable Equipment Maintenance:

$$\text{Allocation rate} = \frac{\text{Variable equipment maintenance costs}}{\text{Machine-hours}}$$

$$= \frac{\text{R16,900 + R600}}{70{,}000 + 105{,}000 = 175{,}000 \text{ MHs}}$$

$$= \text{R0.10 per MH}$$

Fixed Building & Grounds:

$$\text{Allocation rate} = \frac{\text{Fixed building and grounds costs}}{\text{Square feet}}$$

$$= \frac{\text{R88,200}}{500 + 1{,}400 + 12{,}000 + 15{,}500 = 29{,}400 \text{ square feet}}$$

$$= \text{R3 per square foot}$$

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Problem 15-15 (continued)

Fixed Administration:

Department fixed costs.........................	R60,000	
Allocated from Building & Grounds........	1,500	
Costs to be allocated	R61,500	

Employees at full capacity:

Equipment Maintenance.....................	45	3 %
Fabrication	570	38
Finishing	885	59
Total...	R1,500	100 %

Fixed Equipment Maintenance:

Department fixed costs	R24,000
Allocated from Building & Grounds.....	4,200
Allocated from Administration	1,845
Costs to be allocated.........................	R30,045

Allocation percentages are given in the problem.

3.

	Equip-ment Mainte-nance	Fabric-ation	Finishing	Total
Variable cost allocation:				
R20 per employee ×				
32 employees.....................	R640			R 640
R20 per employee ×				
460 employees..................		R9,200		9,200
R20 per employee ×				
625 employees..................			R12,500	12,500
Total cost allocated..................				R22,340
Actual variable administration				
cost				R23,800
Total cost allocated—above				22,340
Spending variance—not				
allocated				R 1,460

Problem 15-16 (45 minutes)

	General Admini-stration	Cost Accounting	Laundry	Convention Center	Food Services	Guest Lodging
Variable costs........................	$ 0	$70,000	$143,000	$ 0	$52,000	$ 24,000
Cost Accounting allocation:						
$5 per item × 800 items.........		(4,000)	4,000			
$5 per item × 1,200 items......		(6,000)		6,000		
$5 per item × 3,000 items......		(15,000)			15,000	
$5 per item × 9,000 items......		(45,000)				45,000
Laundry allocation:						
$0.60 per pound × 20,000 pounds..............................			(12,000)	12,000		
$0.60 per pound × 15,000 pounds..............................			(9,000)		9,000	
$0.60 per pound × 210,000 pounds..............................			(126,000)			126,000
Total variable costs.................	$ 0	$ 0	$ 0	$18,000	$76,000	$195,000

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Problem 15-16 (continued)

	General Administration	Cost Accounting	Laundry	Convention Center	Food Services	Guest Lodging
Fixed costs................................	$200,000	$110,000	$65,900	$ 95,000	$375,000	$486,000
General Administration allocation:						
10% × $200,000	(20,000)	20,000				
4% × $200,000	(8,000)		8,000			
30% × $200,000	(60,000)			60,000		
16% × $200,000	(32,000)				32,000	
40% × $200,000	(80,000)					80,000
Cost Accounting allocation:						
7% × $130,000		(9,100)	9,100			
13% × $130,000		(16,900)		16,900		
20% × $130,000		(26,000)			26,000	
60% × $130,000		(78,000)				78,000
Laundry allocation:						
10% × $83,000			(8,300)	8,300		
6% × $83,000			(4,980)		4,980	
84% × $83,000			(69,720)			69,720
Total fixed costs	$ 0	$ 0	$ 0	$180,200	$437,980	$713,720
Total overhead costs................	$ 0	$ 0	$ 0	$198,200	$513,980	$908,720

Problem 15-16 (continued)

Computations of allocation rates:

Variable Cost Accounting:

$$\text{Allocation rate} = \frac{\text{Variable cost accounting costs}}{\text{Items processed}}$$

$$= \frac{\$70,000}{15,000\text{-}1,000 = 14,000 \text{ items}}$$

$$= \$5 \text{ per item}$$

Variable Laundry:

$$\text{Allocation rate} = \frac{\text{Variable laundry costs}}{\text{Pounds processed}}$$

$$= \frac{\$143,000 + \$4,000}{245,000 \text{ pounds}}$$

$$= \$0.60 \text{ per pound}$$

Case 15-17 (90 minutes)

1. The plantwide rate would include overhead costs for both the service departments and the manufacturing departments. It would be computed as follows:

	Molding	*Component*	*Assembly*	*Total*
	Manufacturing Departments			
Variable overhead.....	$ 210,500	$1,000,000	$1,650,000	$2,860,500
Fixed overhead	1,750,000	620,000	749,500	3,119,500
Total overhead	$1,960,500	$1,620,000	$2,399,500	$5,980,000

Service department overhead costs:
Power department ($500,000 + $140,000 + $1,200,000) ...	1,840,000
Maintenance department ($25,000 + $375,000)................	400,000
Total company overhead costs...	$8,220,000

Estimated direct labor-hours:
Molding..	50,000
Component	200,000
Assembly	150,000
Total hours...	400,000

$$\text{Plantwide overhead rate}=\frac{\text{Estimated overhead cost}}{\text{Estimated direct labor-hours}}$$

$$=\frac{\$8,220,000}{400,000 \text{ DLHs}}$$

$$=\$20.55 \text{ per DLH}$$

Case 15-17 (continued)

2. a. Allocation rates for the service department costs would be as follows:

Variable power costs:

$$\frac{\$500,000 + \$140,000}{80,000\ \text{kwhs}} = \$8\ \text{per kwh}$$

Variable maintenance costs:

$$\frac{\$25,000}{12,500\ \text{hours}} = \$2\ \text{per hour}$$

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Case 15-17 (continued)

Given the above data, the allocations by the direct method would be as follows:

	Power	Maintenance	Molding	Component	Assembly
Variable cost	$ 640,000	$ 25,000			
Power allocation:					
$8 per kwh × 36,000 kwh	(288,000)		$ 288,000		
$8 per kwh × 32,000 kwh	(256,000)			$256,000	
$8 per kwh × 12,000 kwh	(96,000)				$ 96,000
Maintenance allocations:					
$2 per hour × 9,000 hours			(18,000)	18,000	
$2 per hour × 2,500 hours			(5,000)		5,000
$2 per hour × 1,000 hours			(2,000)		2,000
Total variable costs	$ 0	$ 0	306,000	261,000	98,000
Fixed costs...	$1,200,000	$375,000			
Power allocations:					
50% × $1,200,000	(600,000)		600,000		
35% × $1,200,000	(420,000)			420,000	
15% × $1,200,000	(180,000)				180,000
Maintenance allocations:					
70% × $375,000			(262,500)	262,500	
20% × $375,000			(75,000)	75,000	
10% × $375,000			(37,500)		37,500
Total fixed costs	$ 0	$ 0	862,500	495,000	217,500
Total allocated costs			$1,168,500	$756,000	$315,500

Case 15-17 (continued)

2. b.

	Molding	*Component*	*Assembly*
Allocated service department costs (above)	$1,168,500	$ 756,000	$ 315,500
Manufacturing department overhead costs:			
Variable	210,500	1,000,000	1,650,000
Fixed	1,750,000	620,000	749,500
Total overhead costs	$3,129,000	$2,376,000	$2,715,000
Divide by machine-hours	÷ 87,500		
Divide by direct labor-hours		÷ 200,000	÷ 150,000
Predetermined overhead rate..	$ 35.76	$ 11.88	$ 18.10

3. a. Overhead cost allocated under the plantwide rate:
    7,500 direct labor-hours × $20.55 per direct labor-hour = $154,125

   Overhead cost allocated under the departmental rates:

   Molding department:
    $35.76 per machine-hour × 3,000 machine-hours........... $107,280
   Component department:
    $11.88 per direct labor-hour × 2,500 direct labor-hours .. 29,700
   Assembly department:
    $18.10 per direct labor-hour × 4,000 direct labor-hours .. 72,400
   Total cost allocated $209,380

Case 15-17 (continued)

b. The use of a plantwide rate is resulting in too little overhead cost being allocated to products that require a large proportion of machine-hours as compared to direct labor-hours. In part 3a above, for example, the attaché case (which requires a large proportion of machine-hours) is allocated only $154,125 in overhead cost if a plantwide rate is used, whereas it is allocated $209,380 in overhead cost if departmental rates are used. Since Hobart Products is using a plantwide rate, it is not surprising that the company is pricing this attaché case well below the price of competitors.

On the other hand, use of a plantwide rate is resulting in too much overhead cost being allocated to products that require a large proportion of direct labor time as compared to machine time. This probably accounts for the fact that Hobart's prices for some products are well above the prices of competitors.

4. Hobart Products could take two additional steps to improve its overhead costing. First, it could use the step method to allocate service department overhead costs. And second, it could use activity-based costing (as discussed earlier in the book) to assign overhead costs from operating departments to products.

Case 15-18 (75 minutes)

1. Step method:

	Personnel	Custodial Services	Mainte-nance	Printing	Binding
Total cost before allocations	$360,000	$141,000	$201,000	$525,000	$373,500
Allocations:					
Personnel (@ $1,800 per employee)*	(360,000)	27,000	45,000	72,000	216,000
Custodial services					
(@ $1.20 per square foot)**		(168,000)	24,000	96,000	48,000
Maintenance (5/6, 1/6)			(270,000)	225,000	45,000
Total overhead cost after allocations	$ 0	$ 0	$ 0	$918,000	$682,500
Divide by machine-hours.................................				÷150,000	
Divide by direct labor-hours					÷175,000
Predetermined overhead rate				$ 6.12	$ 3.90

  * Based on 15 + 25 + 40 + 120 = 200 employees.
** Based on 20,000 + 80,000 + 40,000 = 140,000 square feet.

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Case 15-18 (continued)

2. Direct method:

	Personnel	Custodial Services	Mainte-nance	Printing	Binding
Total costs before allocations............................	$360,000	$141,000	$201,000	$525,000	$373,500
Allocations:					
Personnel (1/4, 3/4)*	(360,000)			90,000	270,000
Custodial Services (2/3, 1/3)**		(141,000)		94,000	47,000
Maintenance (5/6, 1/6)			(201,000)	167,500	33,500
Total overhead cost after allocations	$ 0	$ 0	$ 0	$876,500	$724,000
Divide by machine-hours..................................				÷150,000	
Divide by direct labor-hours					÷175,000
Predetermined overhead rate				$ 5.84	$ 4.14

  * Based on 40 + 120 = 160 employees.
 ** Based on 80,000 + 40,000 = 120,000 square feet.

Case 15-18 (continued)

3. a. The amount of overhead cost assigned to the job would be:

Step method:
Printing department:
$6.12 per machine-hour × 15,400 machine-hours ...... $ 94,248
Binding department:
$3.90 per direct labor-hour × 2,000 direct labor-hours ____7,800
Total overhead cost... $102,048

Direct method:
Printing department:
$5.84 per machine-hour × 15,400 machine-hours ...... $ 89,936
Binding department:
$4.14 per direct labor-hour × 2,000 direct labor-hours ____8,280
Total overhead cost... $ 98,216

b. The step method provides a better basis for computing predetermined overhead rates than the direct method because it gives recognition to services provided between service departments. If this interdepartmental service is not recognized, then either too much or too little of a service department's costs may be allocated to a producing department. The result will be an inaccuracy in the producing department's predetermined overhead rate.

For example, using the direct method and ignoring interdepartmental services causes the predetermined overhead rate in the Printing Department to fall to only $5.84 per MH (from $6.12 per MH when the step method is used), and causes the predetermined overhead rate in the Binding Department to rise to $4.14 per DLH (from $3.90 per DLH when the step method is used). These inaccuracies in the predetermined overhead rate can cause corresponding inaccuracies in bids for jobs. Since the direct method in this case understates the rate in the Printing Department and overstates the rate in the Binding Department, it is not surprising that the company tends to bid low on jobs requiring a lot of printing work and tends to bid too high on jobs that require a lot of binding work.

Group Exercise 15-19

1. The answer to this part will depend on the industry the group selects.

2. The answer to this part will depend on the industry the group selects.

3. The answer to this part will depend on the industry the group selects.

4. & 5.
   Generally speaking, the wider the range of products made or services offered, the greater the support costs. More products and services require additional support resources for scheduling, planning, billing, shipping, and so on. As the resources demanded of the support departments increase, their costs increase as well.

6. Service department costs are reduced by decreasing spending on the resources the service departments consume. This can be accomplished by: (1) decreasing the activities the service departments are required to perform—perhaps by reducing the range and complexity of products and services offered by the company; (2) improving the business processes in the service departments so that fewer resources are required to carry out those activities; or (3) spending less on the resources—perhaps by negotiating for better prices from suppliers.