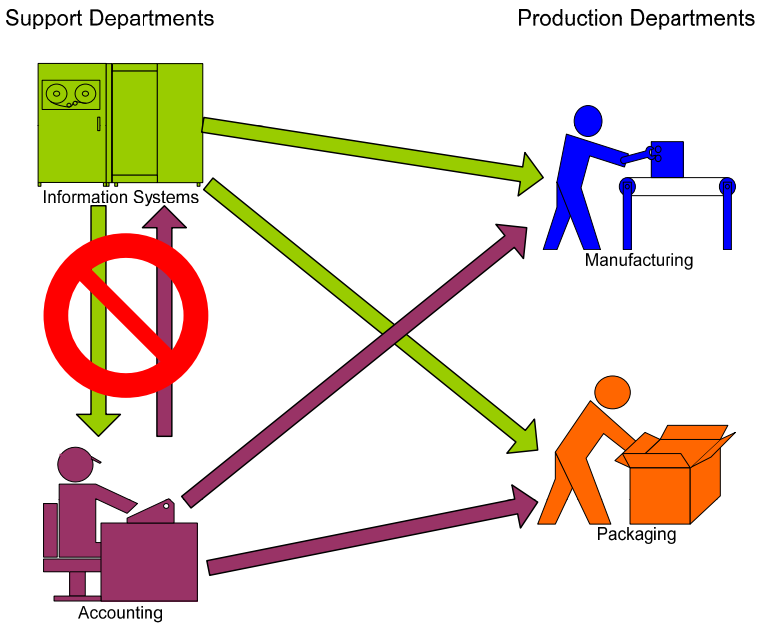
COST ALLOCATION

Direct Method

- Allocates support costs only to Operating Departments
- No Interaction between Support Departments prior to allocation

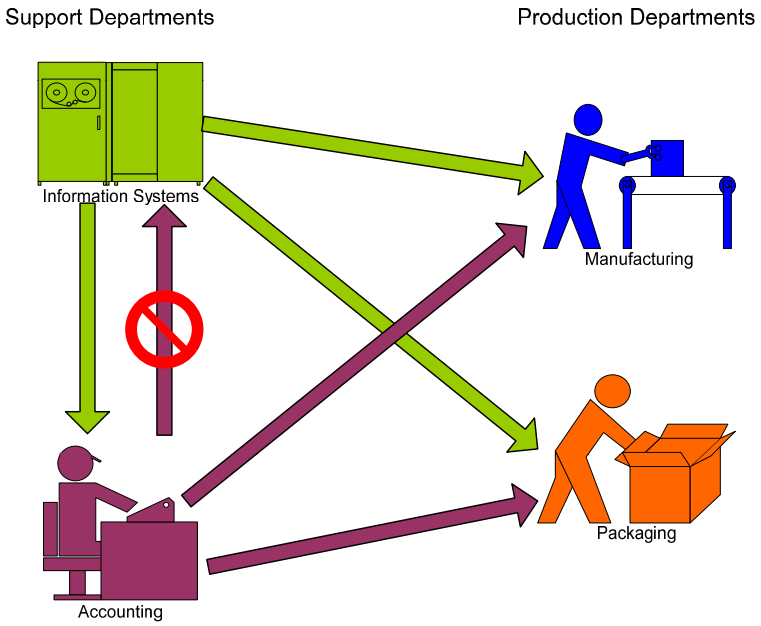
Direct Method



Step-Down Method

- Allocates support costs to other support departments and to operating departments that partially recognizes the mutual services provided among all support departments
- One-Way Interaction between Support Departments prior to allocation

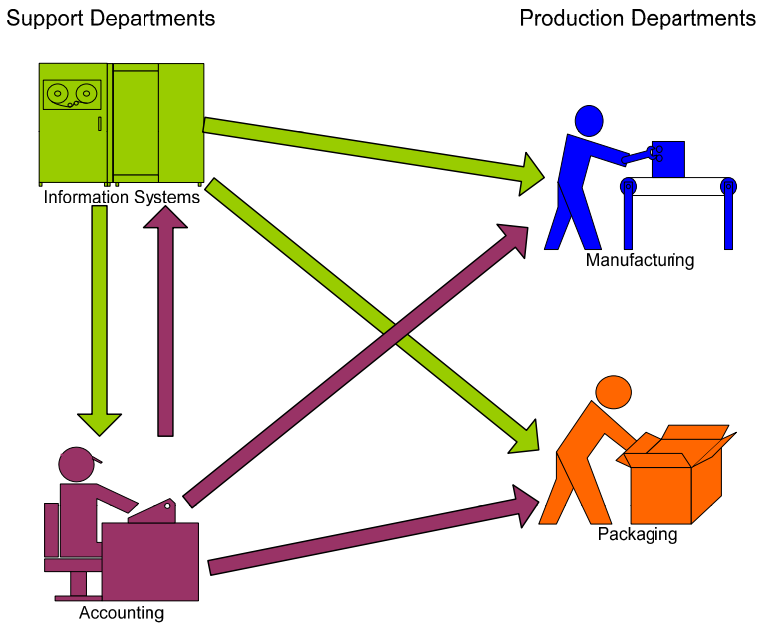
Step-Down Method



Reciprocal Method

- Allocates support department costs to operating departments by fully recognizing the mutual services provided among all support departments
- Full Two-Way Interaction between Support Departments prior to allocation

Reciprocal Method



Choosing Between Methods

- Reciprocal is the most precise
- Direct and Step-Down are simple to compute and understand
- Direct Method is widely used

COST ALLOCATION PROBLEM (Direct, Step-Down, & Reciprocal Methods)

This problem illustrates how costs of two corporate support departments are allocated to operating divisions using the dual-rate method. Fixed costs are allocated using budgeted costs and budgeted hours used by other departments. Variable costs are allocated using actual costs and actual hours used by other departments.

Computer Horizons budgets the following amounts for its two central corporate support departments (legal and personnel) in supporting each other and the two manufacturing divisions, the Laptop Division (LTD) and the Work Station Division (WSD):

File Edit View Insert Format Tools Data Window Help

	A	B	C	D	E	F	G
1		SUPPORT			OPERATING		
2		Legal Department	Personnel Department		LTD	WSD	Total
3	**BUDGETED USAGE**						
4	Legal (hours)	—	250		1,500	750	2,500
5	(Percentages)	—	10%		60%	30%	100%
6	Personnel (hours)	2,500	—		22,500	25,000	50,000
7	(Percentages)	5%	—		45%	50%	100%
8							
9	**ACTUAL USAGE**						
10	Legal (hours)	—	400		400	1,200	2,000
11	(Percentages)	—	20%		20%	60%	100%
12	Personnel (hours)	2,000	—		26,600	11,400	40,000
13	(Percentages)	5%	—		66.50%	28.5%	100%
14	Budgeted fixed overhead costs before any						
15	interdepartment cost allocations	$360,000	$475,000		—	—	$835,000
16	Actual variable overhead costs before any						
17	interdepartment cost allocations	$200,000	$600,000		—	—	$800,000

Required

What amount of support-department costs for legal and personnel will be allocated to LTD and WSD using (a) the direct method, (b) the step-down method (allocating the Legal Department costs first), and (c) the reciprocal method using linear equations?

COST ALLOCATION PROBLEM (Direct, Step-Down, & Reciprocal Methods)

A summary of the fixed and variable support-department costs follows:

	Laptop Division (LTD)	Work Station Division (WSD)
(a) Direct Method		
Fixed costs	$465,000	$370,000
Variable costs	470,000	330,000
	$935,000	$700,000
(b) Step-Down Method		
Fixed costs	$458,053	$376,947
Variable costs	488,000	312,000
	$946,053	$688,947
(c) Reciprocal Method		
Fixed costs	$462,513	$372,487
Variable costs	476,364	323,636
	$938,877	$696,123

DIRECT METHOD DATA

A. DIRECT METHOD	SUPPORT		OPERATING		
	Legal Department	Personnel Department	LTD	WSD	Total
BUDGETED USAGE					
Legal (hours)			1,500	750	2,250
(Percentages)			67%	33%	100%
Personnel (hours)			22,500	25,000	47,500
(Percentages)			47%	53%	100%
ACTUAL USAGE					
Legal (hours)			400	1,200	1,600
(Percentages)			25%	75%	100%
Personnel (hours)			26,600	11,400	38,000
(Percentages)			70%	30%	100%
Budgeted fixed overhead costs before any interdepartment cost allocations	$360,000	$475,000	—	—	$835,000
Actual variable overhead costs before any interdepartment cost allocations	$200,000	$600,000	—	—	$800,000

Cost allocation computations:

	CORPORATE SUPPORT DEPARTMENTS		OPERATING DIVISIONS		
Allocation Method	Legal Department	Personnel Department	LTD	WSD	Total
A. DIRECT METHOD					
Fixed Costs	$360,000	$475,000			
Legal (1,500 ÷ 2,250; 750 ÷ 2,250)	(360,000)		$ 240,000	$ 120,000	
Personnel (22,500 ÷ 47,500; 25,000 ÷ 47,500)		(475,000)	225,000	250,000	
Fixed support dept. cost allocated to operating divisions	$ 0	$ 0	$ 465,000	$ 370,000	$ 835,000
Variable Costs	200,000	600,000			
Legal (400 ÷ 1,600; 1,200 ÷ 1,600)	(200,000)		50,000	150,000	
Personnel (26,600 ÷ 38,000; 11,400 ÷ 38,000)		(600,000)	420,000	180,000	
Variable support dept. cost allocated to operating divisions	$ 0	$ 0	$ 470,000	$ 330,000	$ 800,000

STEP-DOWN METHOD DATA

B. STEP-DOWN METHOD	SUPPORT		OPERATING		
	Legal Department	Personnel Department	LTD	WSD	Total
BUDGETED USAGE					
Legal (hours)		250	1,500	750	2,500
(Percentages)		10%	60%	30%	100%
Personnel (hours)		—	22,500	25,000	47,500
(Percentages)		—	47%	53%	100%
ACTUAL USAGE					
Legal (hours)		400	400	1,200	2,000
(Percentages)		20%	20%	60%	100%
Personnel (hours)		—	26,600	11,400	38,000
(Percentages)		—	70%	30%	100%
Budgeted fixed overhead costs before any interdepartment cost allocations	$360,000	$475,000	—	—	$835,000
Actual variable overhead costs before any interdepartment cost allocations	$200,000	$600,000	—	—	$800,000

Cost allocation computations:

	CORPORATE SUPPORT DEPARTMENTS		OPERATING DIVISIONS		
Allocation Method	Legal Department	Personnel Department	LTD	WSD	Total
B. STEP-DOWN METHOD					
(Legal Department First)					
Fixed Costs	$360,000	$475,000			
Legal (250 ÷ 2,500; 1,500 ÷ 2,500; 750 ÷ 2,500)	($360,000)	36,000	216,000	108,000	
Personnel (22,500 ÷ 47,500; 25,000 ÷ 47,500)		(511,000)	242,053	268,947	
Fixed support dept. cost allocated to operating divisions	$ 0	$ 0	$ 458,053	$ 376,947	$ 835,000
Variable Costs	$ 200,000	$ 600,000			
Legal (400 ÷ 2,000; 400 ÷ 2,000; 1,200 ÷ 2,000)	(200,000)	40,000	40,000	120,000	
Personnel (26,600 ÷ 38,000; 11,400 ÷ 38,000)		(640,000)	448,000	192,000	
Variable support dept. cost allocated to operating divisions	$ 0	$ 0	$ 488,000	$ 312,000	$ 800,000

RECIPROCAL METHOD DATA

C. RECIPROCAL METHOD	SUPPORT		OPERATING		
	Legal Department	Personnel Department	LTD	WSD	Total
BUDGETED USAGE					
Legal (hours)	—	250	1,500	750	2,500
(Percentages)	—	10%	60%	30%	100%
Personnel (hours)	2,500	—	22,500	25,000	50,000
(Percentages)	5%	—	45%	50%	100%
ACTUAL USAGE					
Legal (hours)	—	400	400	1,200	2,000
(Percentages)	—	20%	20%	60%	100%
Personnel (hours)	2,000	—	26,600	11,400	40,000
(Percentages)	5%	—	66.50%	29%	100%
Budgeted fixed overhead costs before any interdepartment cost allocations	$360,000	$475,000	—	—	$835,000
Actual variable overhead costs before any interdepartment cost allocations	$200,000	$600,000	—	—	$800,000
Fixed costs	$ 385,678	$ 513,568			
Variable costs	$ 232,323	$ 646,465			

Cost allocation computations:

Allocation Method	CORPORATE SUPPORT DEPARTMENTS		OPERATING DIVISIONS		
	Legal Department	Personnel Department	LTD	WSD	Total
C. RECIPROCAL METHOD					
Fixed Costs	$360,000	$475,000			
Legal (250 ÷ 2,500; 1,500 ÷ 2,500; 750 ÷ 2,500)	(385,678)[a]	38,568	231,407	115,704	
Personnel (2,500 ÷ 50,000; 22,500 ÷ 50,000; 25,000 ÷ 50,000)	25,678	$ (513,568)[a]	231,106	256,784	
Fixed support dept. cost allocated to operating divisions	$ 0	$ 0	$ 462,513	$ 372,487	$ 835,000
Variable Costs	$ 200,000	$ 600,000			
Legal (400 ÷ 2,000; 400 ÷ 2,000; 1,200 ÷ 2,000)	(232,323)[b]	46,465	46,465	139,394	
Personnel (2,000 ÷ 40,000; 26,600 ÷ 40,000; 11,400 ÷ 40,000)	32,323	(646,465)[b]	429,899	184,242	
Variable support dept. cost allocated to operating divisions	$ 0	$ 0	$ 476,364	$ 323,636	$ 800,000

Allocation Method	CORPORATE SUPPORT DEPARTMENTS		OPERATING DIVISIONS		
	Legal Department	Personnel Department	LTD	WSD	Total
C. RECIPROCAL METHOD					
Fixed Costs	$360,000	$475,000			
Legal (250 ÷ 2,500; 1,500 ÷ 2,500; 750 ÷ 2,500)	(385,678)[a]	38,568	231,407	115,704	
Personnel (2,500 ÷ 50,000; 22,500 ÷ 50,000; 25,000 ÷ 50,000)	25,678	$ (513,568)[a]	231,106	256,784	
Fixed support dept. cost allocated to operating divisions	$ 0	$ 0	$ 462,513	$ 372,487	$ 835,000
Variable Costs	$ 200,000	$ 600,000			
Legal (400 ÷ 2,000; 400 ÷ 2,000; 1,200 ÷ 2,000)	(232,323)[b]	46,465	46,465	139,394	
Personnel (2,000 ÷ 40,000; 26,600 ÷ 40,000; 11,400 ÷ 40,000)	32,323	(646,465)[b]	429,899	184,242	
Variable support dept. cost allocated to operating divisions	$ 0	$ 0	$ 476,364	$ 323,636	$ 800,000

Footnotes:

[a] FIXED COSTS	[b] VARIABLE COSTS
Letting *LF* = Legal Department Fixed Costs, and *PF* = Personnel Department Fixed Costs, the simultaneous equations for the reciprocal methid for fixed costs are	Letting *LF* = Legal Department Fixed Costs, and *PF* = Personnel Department Fixed Costs, the simultaneous equations for the reciprocal method for fixed costs are
LF = $360,000 + 0.05 PF	LV = $200,000 + 0.05 PV
PF = $475,000 + 0.10 LF	PV = $600,000 + 0.20 LV
LF = $360,000 + 0.05 ($475,000 + 0.10LF)	LV = $200,000 + 0.05 ($600,000 + 0.20 LV)
LF = $385,678	LV = $232,323
PF = $475,000 + 0.10 ($385,678) = $513,568	PV = $600,000 + 0.20 ($232,323) = $646,465

Dual-Rate Method, Budgeted vs. Actual Costs, & Practical Capacity vs. Actual Quantities

Chocolat Inc. is a producer of premium chocolate based in Palo Alto. The company has a separate division for each of its two products: dark chocolate and milk chocolate. Chocolat purchases ingredients from Wisconsin for its Dark Chocolate division and from Louisiana for its Milk Chocolate division. Both locations are the same distance from Chocolat's Palo Alto plant.

Chocolat Inc. operates a fleet of trucks as a cost center that charges the divisions for variable costs (drivers and fuel) and fixed costs (vehicle depreciation, insurance, and registration fees) of operating the fleet. Each division is evaluated on the basis of its operating income. Last year, the trucking fleet had a practical capacity of 50 round-trips between the Palo Alto plant and the two suppliers. It recorded the following information:

File Edit View Insert Format Tools Data Window Help

	A	B	C
1		**Budgeted**	**Actual**
2	Costs of truck fleet	$115,000	$96,750
3	Number of round-trips for Dark Chocolate Division (Palo Alto plant -- Wisconsin)	30	30
4	Number of round-trips for Milk Chocolate Division (Palo Alto plant -- Louisiana)	20	15

Dual-Rate Method, Budgeted vs. Actual Costs, & Practical Capacity vs. Actual Quantities

Chocolat, Inc. decides to examine the effect of using the dual-rate method for allocating truck costs to each round-trip.

At the start of the year, the budgeted costs were:

Variable cost per round-trip	$ 1,500
Fixed costs	$40,000

The actual results at year-end for the 45 round-trips made were:

Variable costs	$60,750
Fixed costs	$36,000
Total	$96,750

Required

1. Using the dual-rate method, what are the costs allocated to the Dark Chocolate Division and the Milk Chocolate Division when (a) variable costs are allocated using the budgeted rate per round-trip and actual round-trips used by each division and when (b) fixed costs are allocated based on the budgeted rate per round-trip and round-trips budgeted for each division?
2. From the viewpoint of the Dark Chocolate Division, what are the effects of using the dual-rate method rather than the single-rate methods?

1. Using the dual-rate method, what are the costs allocated to the Dark Chocolate Division and the Milk Chocolate Division when (a) variable costs are allocated using the budgeted rate per round-trip and actual round-trips used by each division and when (b) fixed costs are allocated based on the budgeted rate per round-trip and round-trips budgeted for each division?

Variable indirect cost rate	=	$1,500 per trip
Fixed indirect cost rate	=	$40,000 budgeted costs/ 50 round trips budgeted
	=	$800 per trip

Dark Chocolate Division	
Variable indirect costs, $1,500 × 30	$45,000
Fixed indirect costs, $800 × 30	24,000
	$69,000
Milk Chocolate Division	
Variable indirect costs, $1,500 × 15	$22,500
Fixed indirect costs, $800 × 20	16,000
	$38,500

2. From the viewpoint of the Dark Chocolate Division, what are the effects of using the dual-rate method rather than the single-rate methods?

The *dual rate* changes how the fixed indirect cost component is treated. By using budgeted trips made, the Dark Chocolate Division is unaffected by changes from its own budgeted usage or that of other divisions.

When *budgeted rates* and *actual trips* are used for allocation (see requirement 1.b. of problem 15-17), the Dark Chocolate Division is assigned the same $24,000 for fixed costs as under the dual-rate method because it made the same number of trips as budgeted.

However, note that the Milk Chocolate Division is allocated $16,000 in fixed trucking costs under the *dual-rate system*, compared to $800 × 15 actual trips = $12,000 when *actual trips* are used for allocation.

As such, the Dark Chocolate Division is not made to appear disproportionately more expensive than the Milk Chocolate Division simply because the latter did not make the number of trips it budgeted at the start of the year.

Reciprocal Cost Allocation

E - books, an online book retailer, has two operating departments-Corporate Sales and Consumer Sales-and two support departments - Human Resources and Information Systems. Each sales department conducts merchandising and marketing operations independently. E - books uses number of employees to allocate Human Resources costs and processing time to allocate Information Systems costs. The following data are available for the year:

File Edit View Insert Format Tools Data Window Help

	A	B	C	D	E	F
1		SUPPORT DEPARTMENTS			OPERATING DEPARTMENTS	
2		Human Resources	Information Systems		Corporate Sales	Consumer Sales
3	Budgeted costs incurred before any					
4	interdepartment cost allocations	$72,700	$234,400		$998,270	$489,860
5	Support work supplied by Human Resources Department					
6	Budgeted number of employees	—	21		42	28
7	Support work supplied by Information Systems Department					
8	Budgeted processing time (in minutes)	320	—		1,920	1,600

Reciprocal Cost Allocation

Consider E-books again. The controller of E-books reads a widely used textbook that states that "the reciprocal method is conceptually the most defensible." He seeks your assistance.

File Edit View Insert Format Tools Data Window Help

	A	B	C	D	E	F
1		SUPPORT DEPARTMENTS			OPERATING DEPARTMENTS	
2		Human Resources	Information Systems		Corporate Sales	Consumer Sales
3	Budgeted costs incurred before any					
4	interdepartment cost allocations	$72,700	$234,400		$998,270	$489,860
5	Support work supplied by Human Resources Department					
6	Budgeted number of employees	—	21		42	28
7	Support work supplied by Information Systems Department					
8	Budgeted processing time (in minutes)	320	—		1,920	1,600

1. Describe the key features of the reciprocal method.

- The reciprocal allocation method explicitly includes the mutual services provided among all support departments.
- Interdepartmental relationships are fully incorporated into the support department cost allocations.

2. Allocate the support departments' costs (Human Resources and Information Systems) to the two operating departments using the reciprocal method.

$$
\begin{aligned}
HR &= \$72{,}700 + .08333IS \\
IS &= \$234{,}400 + .23077HR \\
HR &= \$72{,}700 + [.08333(\$234{,}400 + .23077HR)] \\
&= \$72{,}700 + [\$19{,}532.55 + 0.01923HR] \\
0.98077HR &= \$92{,}232.55 \\
HR &= \$92{,}232.55 \div 0.98077 \\
&= \$94{,}041 \\
IS &= \$234{,}400 + (0.23077 \times \$94{,}041) \\
&= \$256{,}102
\end{aligned}
$$

	Support Depts.		Operating Depts.		
	HR	Info. Systems	Corporate	Consumer	Total
Costs Incurred	$72,700	$234,400	$ 998,270	$489,860	$1,795,230
Alloc. of HR costs (21/91, 42/91, 28/91)	(94,041)	21,702	43,404	28,935	
Alloc. of Info. Syst. costs (320/3,840, 1,920/3,840, 1,600/3,840)	21,341	(256,102)	128,051	106,710	
	$ 0	$ 0	$1,169,725	$625,505	$1,795,230

Reciprocal method using repeated iterations

	Support Departments		Operating Departments		
	Human Resources	Information Systems	Corporate Sales	Consumer Sales	Total
Budgeted manufacturing overhead costs before any interdepartmental cost allocation	$72,700	$234,400	$ 998,270	$489,860	$1,795,230
1st Allocation of HR (21/91, 42/91, 28/91)[a]	(72,700)	16,777	33,554	22,369	
		251,177			
1st Allocation of Information Systems (320/3,840, 1,920/3,840, 1,600/3,840)[b]	20,931	(251,177)	125,589	104,657	
2nd Allocation of HR (21/91, 42/91, 28/91)[a]	(20,931)	4,830	9,661	6,440	
2nd Allocation of Information Systems (320/3,840, 1,920/3,840, 1,600/3,840)[b]	402	(4,830)	2,415	2,013	
3rd Allocation of HR (21/91, 42/91, 28/91)[a]	(402)	93	185	124	
3rd Allocation of Information Systems (320/3,840, 1,920/3,840, 1,600/3,840)[b]	8	(93)	46	39	
4th Allocation of HR (21/91, 42/91, 28/91)[a]	(8)	2	4	2	
4th Allocation of Information Systems: (320/3,840, 1,920/3,840, 1,600/3,840)[b]	0	(2)	1	1	
Total budgeted manufacturing overhead of operating departments	$ 0	$ 0	$1,169,725	$625,505	$1,795,230

Total accounts allocated and reallocated (the numbers in parentheses in first two columns)
HR $72,700 + $20,931 + $402 + $8 = $94,041
Information Systems $251,177 + $4,830 + $93 + $2 = $256,102

[a]Base is (21 + 42 + 28) or 91 employees
[b]Base is (320 + 1,920 + 1,600) or 3,840 minutes

3. In the case presented in this exercise, which method (direct, step-down, or reciprocal) would you recommend? Why?

A summary of the alternatives:

	Corporate Sales	Consumer Sales
Direct method	$1,169,745	$625,485
Step-down method (HR first)	1,168,830	626,400
Reciprocal method	1,169,725	625,505

- The reciprocal method is more accurate than the direct and step-down methods when there are reciprocal relationships among support departments.
- The reciprocal method is the preferred method, although the numbers for the year do not appear materially different across the alternatives.