Cost Accounting For Decision Making

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Relevance

Relevant costs/revenues have two characteristics:

- They occur in the **future**
- They differ among the alternative courses of action



Sunk Cost • Past cost or cost of past action which cannot be recovered



Incremental Cost

 Additional cost resulting from taking a particular action (e.g., additional production)



Opportunity Cost

 Benefit forgone when one action is taken over another (i.e., the best-rejected course of action)



Avoidable Cost

 Cost that can be eliminated when an action is taken (e.g., stop production)



Unavoidable Cost

• Cost that will continue even an action is taken (e.g., stop production)



How to Make Decision

Five-Step Decision-Making Process



Decision Scenario

- One-Time-Only Special Orders
- Make or Buy
- Product Mix with Capacity Constraint
- Sell or Process-Further
- Add or Drop Customer/Segment
- Equipment Replacement

One-Time-Only Special Orders

 One type of decision that affects output levels and is related to accept or reject special orders when there is idle production capacity. The special orders have no long-run implications

 Surf Gear manufactures quality beach towels. The plant has a production capacity of 48,000 towels each month. Current monthly production is 30,000 towels. Retail department stores account for all existing sales. Expected results for the coming month (August) are shown in exhibit. We assume all costs can be classified as either fixed or variable with respect to a single cost driver (unit of output).

:B)	<u>File E</u> dit <u>V</u> iew Insert F <u>o</u> rmat <u>T</u> ools	<u>D</u> ata <u>W</u> ind	ow <u>H</u> elp	
	А	В	C	D
1		Total	Per Unit	
2	Units sold			
3				
4	Revenues	\$600,000	<u>\$20.00</u>	
5	Cost of goods sold (manufacturing costs)			
6	Variable manufacturing costs	225,000	7.50 ^b	
7	Fixed manufacturing costs	135,000	4.50 ^c	
8	Total cost of goods sold	360,000		
9	Marketing costs			
10	Variable marketing costs	150,000	5.00	
11	Fixed marketing costs	60,000	2.00	
12	Total marketing costs	210,000		
13	Full costs of the product	570,000		
14	Operating income	\$ 30,000	<u>\$ 1.00</u>	
15				
16	^a Surf Gear incurs no R&D, product-design,	distribution	or customer-s	service costs
17	^b Variable manufacturing _ Direct material	_ Direct m	anufacturing	Variable manufacturing
18	cost per unit cost per unit	labor of	cost per unit	overhead cost per unit
19	= \$6.00 + \$0.50 +	\$1.00 = \$7.	50	
20	^c Fixed manufacturing _ Fixed direct ma	nufacturing	Fixed m	anufacturing
21	cost per unit labor cost per	er unit	overhe	ad cost per unit
22	= \$1.50 + \$3.00 =	\$4.50		

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• As a result of a strike at its existing towel supplier, a luxury hotel chain has offered to buy 5,000 towels from Surf Gear in August at \$11 per towel. No **Relevance of** fixed cost? subsequent sales to this hotel chain are anticip Fixed manufacturing costs are tied to the 48,000towel production capacity. No marketing costs will be necessary for the 5,000-unit one-time-only special order. Accepting this special order is not expected to affect the selling price or the quantity of towels sold to regular customers.



1	A	B	C D the Special Order	E	F With the Special Order	G	H Difference: Relevant Amounts	
2			30,000		35,000		for the	
3		Unit	ts to be Sold		Units to be Sold		5,000	Differentia
4		Per Unit	Total		Total		Units Special Order	revenues
5		(1)	(2) = (1) x 30,000		(3)		(4) = (3) - (2)	
6	Revenues	\$20.00	\$600,000		\$655,000		<u>\$55,000</u> ^a	
7	Variable costs:							
8	Manufacturing	7.50	225,000		262,500		37,500 ^b	Differentie
9	Marketing	5.00	150,000		150,000		0°	Differentia
10	Total variable costs	12.50	375,000		412,500		37,500	COSIS
11	Contribution margin		_225,000		_242,500		17,500	
12	Fixed costs:				315 342 - 342 - 3			
13	Manufacturing	4.50	135,000		135,000		0 ^d	
14	Marketing		60,000		60,000		0 ^d	
15	Total fixed costs	6.50	195,000		195,000		0	
16	Operating income	<u>\$ 1.00</u>	\$ 30,000		<u>\$ 47,500</u>		<u>\$17,500</u>	
17								
18	^a 5,000 units x \$11.00 per	unit = \$55,0	00.					
19	^b 5,000 units x \$7.50 per u	init = \$37,50	0.				Accept the s	pecial
20	^c No variable marketing co	sts would be	e incurred for the 5,00	00-	unit one-time-only	sp	ecial states	
21	^d Fixed manufacturing cos	ts and fixed	marketing costs woul	ld ł	be unaffected by th	ne s	special order.	

Potential Problems with Relevant-Cost Analysis

- Managers should avoid two potential problems in relevant-cost analysis:
 - They must watch for incorrect general assumptions, such as all variable costs are relevant and all fixed costs are irrelevant.
 - Unit-cost data can potentially mislead decision makers in two ways:
 - 1. When irrelevant costs are included
 - 2. When the same unit costs are used at different output levels

The best way to avoid theses two potential problems is to keep focusing on 1) total revenues and total costs and 2) the relevance concept.

Make-or-Buy

- Decisions about whether a producer of goods or services will insource or outsource.
- Surveys of companies indicate that managers consider quality, dependability of suppliers, and costs as the most important factors in the make-orbuy decision.

- The Soho Company manufactures a two-in-one video system consisting of a DVD player and a digital media receiver.
- Soho plans to manufacture 250,000 units of DVD-player of the video system in 2,000 batches of 125 units each.
- An outsider Broadfield, Inc., a manufacturer of DVD players, offers to sell Soho 250,000 DVD players next year for \$64 per unit on Soho's preferred delivery schedule. Assume that the capacity currently used to make DVD players will remain idle if Soho purchases the parts from Broadfield. Also financial factors will be the basis of this make-or-buy decision. Should Soho make or buy the DVD player?

	Total Relevant Costs			
Relevant Items	Make	Buy		
Outside purchase of parts		\$16,000,000		
Direct materials	\$ 9,000,000			
Direct manufacturing labor	2,400,000			
Variable manufacturing overhead	1,600,000			
Mixed (variable and fixed) materials-				
handling and setup overhead	2,000,000			
Total relevant costs ^a	\$15,000,000	\$16,000,000		
Difference in favor of making CD players	erential Costs	0,000 Should Make !!		

^aThe \$3,000,000 of plant-lease, plant-insurance, and plant-administration costs could be included under both alternatives. Conceptually, they do not belong in a listing of relevant costs because these costs are irrelevant to the decision. Practically, some managers may want to include them in order to list all costs that will be incurred under each alternative.

 Suppose that if Soho decides to buy DVD players for its video systems from the Broadfield, then Soho's best use of the capacity that becomes available is to produce 100,000 Digiteks, a portable, stand-alone DVD player. The incremental future operating income of Digiteks is \$2,500,000.

There is opportunity costs for "make" decision!!

Alternatives for Soho

Relevant Items	1. Make Video-System DVD Players and Do Not Make Digitek	2. Buy Video-System DVD Players and Make Digitek
PANEL A Total-Alternatives Approach to Make-or-Buy	Decisions	
Total incremental future costs of making/buying video-system DVD players (from Exhibit 11-6) Deduct excess of future revenues over future costs from Digitek Total relevant costs under total-alternatives approach	\$15,000,000 0 \$15,000,000	\$16,000,000 <u>(2,500,000)</u> <u>\$13,500,000</u>
	1. Make Video-System DVD Players	2. Buy Video-System DVD Players
PANEL B Opportunity-Cost Approach to Make-or-Buy I	Decisions	
Total incremental future costs of making/buying video-system DVD players (from Exhibit 11-6) Opportunity cost: Profit contribution forgone because capacity will not be used to make	\$15,000,000	\$16,000,000
Digitek, the next-best alternative Total relevant costs under opportunity-cost approach	2,500,000 \$17,500,000	0 \$16,000,000

Note that the differences in costs across the columns in Panels A and B are the same: The cost of alternative 3 is \$1,500,000 less than the cost of alternative 1, and \$2,500,000 less than the cost of alternative 2.

Strategic and Qualitative Factors for Outsourcing Decision

- Non-quantitative factors may be extremely important in an evaluation process, yet do not show up directly in calculations:
 - Quality requirements
 - Reputation of suppliers
 - Employee morale
 - Logistical considerations distance from plant, and etc
 - Control over the design and technology

Example: Kodak prefers to manufacture its own film (insourcing) but has IBM do its data processing (outsourcing).

Product-Mix Decisions with Capacity Constraints

- The decisions made by a company about which products to sell and in what quantities.
- These decisions usually have only a short-run focus because the level of capacity can be expanded in the long run.
- Decision Rule (with a constraint): focus on the product that produces the highest contribution margin per unit of the constraining resource.

Product-Mix Decisions with Capacity Constraints Illustration

 Pandleton engineering makes cutting tools for metalworking operations. It makes two types of tools: R3, a regular cutting tool, and HP6, a highprecision cutting tool. R3 is manufactured on a regular machine, but HP6 must be manufactured on both the regular machine and a high-precision machine.

Product-Mix Decisions with Capacity Constraints Illustration

	R3	HP6
Selling Price	\$100	\$150
Variable Manufacturing Cost per Unit	\$60	\$100
Variable Marketing Cost per Unit	\$15	\$35
Budgeted Total Fixed Overhead Cost	\$350,000	\$550,000
Hours Required to Produce One Unit on the Regular Machine	1.0	0.5

The following information is available:

Additional Information

- Pendleton faces a capacity constraint on the regular machine of 50,000 hours per year.
- The capacity of the high precision machine is not a constraint.
- Of the 550,000 budgeted fixed overhead cost of HP6, \$300,000 are lease payments for the high precision machine. This cost is charged entirely to HP6 because Pendleton uses the machine exclusively to produce HP6. The lease agreement for the high precision machine can be cancelled at any time without penalties.
- All other overhead costs are fixed and will not change.

Requirement: What product mix – that is, how many units of R3 and HP6 – will maximize Pendleton's operating income.

	R3	HP6
Selling price First notice the contribution	\$100	\$150
Variable manufacturing c margin for product: R3 is	60	100
Variable marketing cost p	<u> 15</u>	<u> </u>
Total variable costs per un	<u> </u>	<u> 135</u>
Contribution margin per unit	<u>\$ 25</u>	<u>\$ 15</u>
Contributi on margin per hour of the	\$25 _ mas	\$15 _ #20
constraine d resource (the regular machine)	$\frac{1}{1} = \varphi_{22}$	$\frac{1}{0.5} = 0.50$
Total contribution morgin from colling		
only R3 or only H Next notice the CM per unit of		
R3: \$25 × 50,000; 11-0. 000 × 00,000	-1,250,000	\$1,500,000
Less Lease costs of high-precision machine		
to produce and sell HP6	_	300,000
Net relevant benefit	\$1,250,000	\$1,200,000
inally, notice that R3 should be manufactured when all costs are considered		

Sell or Process-Further



Decision rule: when incremental revenues exceed incremental costs (may also need to consider opportunity costs), the company should further process the products. Do not assume all separable costs in joint-cost allocations are always incremental costs.

Sell or Process-Further Illustration

- DG Ltd is a souvenir supplier which makes and sells gold coins. The gold coins are finished either rough or further polished.
- Rough gold coin can be sold for \$800 each and the polished gold coin can be sold for \$1,000 each.
- Platinum, the direct material, costs \$120 per pound.
- Processing costs are \$16,000 to convert 40 pounds of platinum into 80 rough gold coins.
- Fixed manufacturing cost amounted to \$120 per gold coin.
- For polished gold coin, it needs an additional processing cost of \$250 each. However, it does not need additional platinum and fixed manufacturing overheads.

Sell or Process-Further Illustration

Requirement: Should DG Ltd further process rough gold coin into polished gold coin?

Relevant Information	\$
Incremental Revenue (\$1,000 - \$800)	200
Incremental Cost	<u>(250)</u>
Net effect	(50)

should not process further!!

Customer Profitability Analysis

 If the cost object is a customer, companies must make decisions about adding or dropping customers or a branch office.

 Allied West, the West Coast sales office of Allied Furniture, a wholesaler of specialized furniture, supplies furniture to three local retailers: Vogel, Brenner, and Wisk. The exhibit presents expected revenues and costs by customer for the upcoming year using activity-based costing system. Allied West assigns costs to customers based on the activities needed to support each customer.

	Customer			
	Vogel	Brenner	Wisk	Total
Revenues	\$500,000	\$300,000	\$400,000	\$1,200,000
Cost of goods sold	370,000	220,000	330,000	920,000
Furniture-handling labor	41,000	18,000	33,000	92,000
Furniture-handling equipment				
cost written off as depreciation	12,000	4,000	9,000	25,000
Rent	14,000	8,000	14,000	36,000
Marketing support	11,000	9,000	10,000	30,000
Sales-order and delivery processing	13,000	7,000	12,000	32,000
General administration	20,000	12,000	16,000	48,000
Allocated corporate-office costs	10,000	6,000	8,000	24,000
Total costs	491,000	284,000	432,000	1,207,000
Operating income	\$ 9,000	\$ 16,000	\$ (32,000)	\$ (7,000)

- Furniture-handling labor costs vary with the number of units of furniture shipped to customers.
- Furniture-handling equipment in an area and depreciation costs on the equipment are identified with individual customers (customer-level costs).
 Any unused equipment remains idle. The equipment has one-year useful life and zero disposal value.
- Allied West allocates rent to each customer on the basis of the amount of warehouse space reserved for that customer.

- Marketing costs vary with the number of sales visits made to customers.
- Sales-order costs are batch-level costs that vary with the number of sales orders received from customers; delivery-process costs are batch-level costs that vary with the number of shipments made.
- Allied West allocated fixed general-administration costs (facilitylevel costs) to customers on the basis of customer revenues.
- Allied Furniture allocates its fixed corporate-office costs to sales offices on the basis of the square feet area of each sales office. Allied West then allocates these costs to customers on the basis of customer revenues.

	(Loss in Revenues and Savings in Costs from Dropping Wisk Account (1)
Revenues	\$(400,000)
Cost of goods sold	330,000
Furniture-handling labor	33,000
Furniture-handling equipment cost written off as depreciation	0
Rent	0
Marketing support	10,000
Sales-order and delivery processing	12,000
General administration	0
Corporate-office costs	0
Fotal costs	385,000
Effect on operating income (loss)	\$ (15,000)

- Suppose that in addition to Vogel, Brenner, and Wisk, Allied West's managers are evaluating the profitability of adding a customer, Loral.
- Allied West is already incurring annual costs of \$36,000 for warehouse rent and \$48,000 for general-administration costs. These costs together with actual total corporate-office costs will not change if Loral is added as a customer.
- Predicted revenues and costs of doing business with Loral are the same as Wisk except that Allied West would have to acquire furniture-handling equipment for the Loral account costing \$9,000.

Should Allied West add Loral as a customer?

	Incremental Revenues and (Incremental Costs) from Adding Loral Account (2)
Revenues	\$400,000
Cost of goods sold	(330,000)
Furniture-handling labor	(33,000)
Furniture-handling equipment cost written off as depreci	(9,000)
Rent	0
Marketing support	(10,000)
Sales-order and delivery processing	(12,000)
General administration	0
Corporate-office costs	0
Total costs	(394,000)
Effect on operating income (loss)	\$ 6,000

should add the account!!

Adding or Discontinuing Branches or Segments, Illustration

	(Loss in Revenues) and Savings in Costs from Closing Allied West (1)
Revenues	\$(1,200,000)
Cost of goods sold	920,000
Furniture-handling labor	92,000
Furniture-handling equipment cost written off as depreciation	0
Rent	36,000
Marketing support	30,000
Sales-order and delivery processing	32,000
General administration	48,000
Corporate-office costs	0
Total costs	1,158,000
Effect on operating income (loss)	\$ (42,000)
should not close Alli	ied West!!

Now suppose Allied Furniture has the opportunity to open another sales office, Allied South, whose revenues and costs would be identical to Allied West's costs, including a cost of \$25,000 to acquire furniture-handling equipment.

	Incremental Revenues and (Incremental Costs) from Opening Allied South (2)
Revenues	\$1,200,000
Cost of goods sold	(920,000)
Furniture-handling labor	(92,000)
Furniture-handling equipment cost written off as depreciation	(25,000)
Rent	(36,000)
Marketing support	(30,000)
Sales-order and delivery processing	(32,000)
General administration	(48,000)
Corporate-office costs	0
Total costs	(1,183,000)
Effect on operating income (loss)	\$ 17,000

should open Allied South!!

Equipment-Replacement Illustration

 Toledo Company is considering replacing a metal-cutting machine with a newer model. Revenues (\$1.1million per year) will be unaffected by the replacement decision.

	Old Machine	New Machine
Original cost	\$1,000,000	\$600,000
Useful life	5 years	2 years
Current age	3 years	0 year
Remaining useful life	2 years	2 years
Accumulated depreciation	\$600,000	Not acquired yet
Book value	\$400,000	Not acquired yet
Current disposal value (in cash)	\$40,000	Not acquired yet
Terminal disposal value (in cash 2 years from now)	\$O	\$O
Annual operating costs (maintenance, energy, repairs, coolants, and so on)	\$800,000	\$460,000

Should Toledo replace its old machine?

	Two Years Together		
	Кеер (1)	Replace (2)	Difference (3) = (1) – (2)
Revenues	\$2,200,000	\$2,200,000	
Operating costs			
Cash operating costs			
(\$800,000/yr. × 2 years;			
\$460,000/yr. × 2 years)	1,600,000	920,000	\$ 680,000
Book value of old machine			
Periodic write-off as depreciation or	400,000	-)	
Lump-sum write-off		400,000ª ∫	
Current disposal value of old machine		(40,000) ^a (40,000
New machine cost, written off periodically			
as depreciation		600,000	(600,000)
Total operating costs	2,000,000	1,880,000	120,000
Operating income	\$ 200,000	\$ 320,000	\$(120,000)

^aIn a formal income statement, these two items would be combined as "loss on disposal of machine" of \$360,000.

should replace its old machine!!

Equipment-Replacement Illustration (Relevant Costs Only)

	Two Years Together			
	Keep (1)	Replace (2)	Difference (3) = (1) – (2)	
Cash operating costs	\$1,600,000	\$ 920,000	\$680,000	
Current disposal value of old machine	100 100 100 100 100 100 100 100 100 100	(40,000)	40,000	
New machine, written off periodically				
as depreciation	2000 (Augusta	600,000	(600,000)	
Total relevant costs	\$1,600,000	\$1,480,000	\$120,000	

Should replace its old machine!

Behavioral Concern

- If the performance-evaluation model conflicts with the decision model, the performance-evaluation model often prevails in influencing managers' decisions.
- In theory, the way of resolving the conflicts is to design models that are consistent.

Behavioral Concern Illustration

• If the promotion or bonus of the manager at Toledo hinges on his or her first year's operating income performance under accrual accounting, the manager's temptation not to replace will be overwhelming.

First-Year Results: Accrual Accounting					
	Кеер		Replace		
Revenues		\$1,100,000		\$1,100,000	
Operating costs					
Cash-operating costs	\$800,000		\$460,000		
Depreciation	200,000		300,000		
Loss on disposal	-		360,000		
Total operating costs		1,000,000		1,120,000	
Operating income (loss)		\$100,000		\$(20,000)	

Thank You! Q&A



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