

**Chapter 4—Relevant Costs and Benefits for Decision Making**

1. Mambo Company is considering a new machine for its production plant to replace an old machine that originally cost \$14,000 and has \$11,000 of accumulated depreciation. The new machine can be purchased at a cash cost of \$20,000, but the distributor of the new machine has offered to take the old machine in as a trade-in, thereby reducing the cost of the new machine to \$18,000.

Based only on this information, calculate the total relevant cost of acquiring the new machine.

- a. \$18,000, or the net cash paid to the distributor
- b. \$20,000, or the gross cost of the new machine
- c. \$21,000, or the net cash paid plus the book value (\$3,000) of the old machine
- d. \$19,000, or the gross cost of the new machine minus the \$1,000 loss on disposing of the old machine.

Answer: a

Rationale: The relevant cost of the new machine is the net future outlay cost required to acquire it, which is the gross cost of \$20,000 less the trade-in allowance on the old machine of \$2,000, or \$18,000. The book value of the old machine (which is a sunk cost) is not relevant to the decision to purchase the new machine.

2. Refer to the previous question. Suppose that Mambo had the opportunity to sell the old machine to a friend at another company for \$2,500 but chose instead to trade the machine in on the new machine, to avoid the risk of the friend not being satisfied with the old machine.

Using this additional information, calculate the relevant cost of the new machine.

- a. \$18,000, or the net cash paid to the distributor
- b. \$20,000, or the gross cost of the new machine
- c. \$18,500, or the net cost of the new machine plus the opportunity cost of \$500, which is the difference between the trade-in value of the old machine and the amount offered by the friend for the old machine.
- d. \$19,000, or the gross cost of the new machine minus the \$1,000 loss on disposing of the old machine.

Answer: c

Rationale: The relevant cost of the new machine is now \$18,500. The \$500 opportunity cost of not accepting the best alternative for disposing of the old machine is an additional economic cost of acquiring the new machine.

3. Refer to the previous questions. In addition to the information provided in Questions 1 and 2, now suppose that the product that the new machine makes is expected to be produced for only three more years. The old machine is expected to last for three additional years, but the new machine will save labor cost of \$3,000 per year over the next three years. At the end of the three years, both machines would be obsolete and would have no expected salvage value.

Assuming a differential analysis approach, determine the total cost associated with keeping the old machine, the total cost of buying the new machine, and the differential cost of buying the new machine.

	<u>Total Cost of Keeping Old Machine</u>	<u>Total Cost of Buying New Machine</u>	<u>Differential Cost of New Machine</u>
a.	\$14,000	\$20,000	\$(6,000)
b.	\$14,000	\$18,000	\$(4,000)
c.	\$ 3,000	\$11,500	\$(8,500)
d.	\$ -0-	\$ 9,500	\$(9,500)

Answer: *d*

Rationale: The total relevant cost of keeping the old machine is zero, because its cost is a sunk cost and is not relevant. The relevant cost of acquiring the new machine is the acquisition cost of \$18,000 plus the opportunity cost of \$500, less the \$9,000 of savings over the next three years in labor cost, for a total cost of \$9,500.

4. In a relevant cost analysis situation, which of the following costs are never relevant?
- Future outlay costs
  - Opportunity costs
  - Sunk costs
  - All of the above are always relevant

Answer: *c*

Rationale: In a relevant cost analysis situation, future outlay costs and opportunity costs are always relevant; however, sunk costs are never relevant.

5. Baker Company, an Ohio company that sells a branded product regionally to retail customers in Midwest. It normally sells its product for \$40 per unit; however, it has received a one-time offer from a private-brand company on the West Coast to buy 1,000 units at \$25 per unit. Even though the company has excess capacity to produce the units, the president of the company immediately rejected the offer; however, the chief accountant stated that it might be a profitable opportunity for the company, even though \$25 is below its unit cost of \$28, calculated as follows:

Direct materials	\$12.00
Direct labor	4.00
Variable overhead	7.00
Depreciation & other fixed overhead	<u>5.00</u>
Total unit cost	\$28.00

Also, the special order will save \$2 per unit in packaging costs since the product will be bulk packaged instead of being individually packaged.

Calculate the amount of profit or loss per unit if Baker accepts the special order.

- a. \$4 loss
- b. \$2 loss
- c. \$4 profit
- d. \$2 profit

Answer: c

Rationale: The relevant costs are:

Direct materials (\$12.00 – \$2.00)	\$10.00
Direct labor	4.00
Variable overhead	<u>7.00</u>
	\$21.00

At a sales price of \$25, Baker is earning \$4 per unit profit.

6. Zortex, Inc. had been making a component for one of its products, but is now considering outsourcing the component to a Japanese company, which has offered to sell an unlimited quantity of components for \$5 per unit. If Zortex outsources, it could shut down a whole department and rent the building for \$1,500 per month. The cost of making the component is \$4.25 per unit, which includes \$2.00 of fixed costs, of which only \$1.50 per unit can be avoided if the department is shut down. Zortex currently produces about 1,000 units per month.

What is the cost advantage or disadvantage of per unit of outsourcing the component?

- a. \$0.75 disadvantage
- b. \$1.50 disadvantage
- c. \$0.50 advantage
- d. \$0.25 advantage

Answer: d

Rationale: The cost to outsource the units is \$5.00 per unit; however, Zortex will realize \$1.50 per unit on income from renting the building, for a net cost of outsourcing of \$3.50. If Zortex continues to make the component, it will incur cost of \$3.75 = \$2.25 in variable costs + \$1.50 in fixed costs (the remaining fixed costs of \$0.50 is not a factor in the analysis since it will be incurred whether Zortex makes or buys the component). Therefore, the net advantage of buying versus making is \$0.25 per unit (\$3.75 – \$3.50).

7. Nordic Company makes a semi-finished machine component for the heavy equipment industry that has a unit contribution margin of \$200 to Nordic. A major customer has been purchasing 100 units per month from Nordic for many years, but has indicated that it would prefer to purchase them already machined to its specifications. It has offered to pay an additional \$25 per unit for the finished units. To meet those specifications, Nordic would have to rent additional equipment at a cost of \$2,000 per month and incur labor and other direct costs of \$15 per unit. Calculate the per-unit advantage or disadvantage of further processing.
- \$10 disadvantage
  - \$35 advantage
  - \$20 advantage
  - \$10 advantage

Answer: a

Rationale: The contribution margin of the unfinished units is \$200. If the units are processed further, the contribution margin will decrease to \$190, because \$25 of additional revenue will be received, however \$35 of additional variable cost will be incurred. The \$35 includes \$20 per unit for the equipment rental, plus \$15 of other direct costs.

8. Delta, LTD makes three products (Alpha, Beta, and Gamma), all of which use a very rare ingredient called Omicron. Delta can purchase only 900 ounces of Omicron per month from its Greek source. Below is data for the three products:

	<u>Alpha</u>	<u>Beta</u>	<u>Gamma</u>
Unit selling price	\$82	\$70	\$100
Unit variable costs	40	43	55
Unit contribution margin	42	27	45
Omicron (ounces per unit)	20	15	15

How should Delta allocate the 900 ounces of Omicron assuming it can sell unlimited quantities of all three produces?

- All 900 ounces should be allocated to Alpha
- All 900 ounces should be allocated to Beta
- All 900 ounces should be allocated to Gamma
- None of the above

Answer: c

Rationale: The limited quantity of Omicron should be allocated based on the amount of contribution margin per ounce for the three products, which is as follows:

	<u>Alpha</u>	<u>Beta</u>	<u>Gamma</u>
Contribution margin per unit finished product	\$42	\$27	\$45
Ounces of Omicron used	20	15	15
Contribution margin per ounce of Omicron	\$2.10	\$1.80	\$3.00

Based on this calculation, Delta will realize maximum profit by allocating the limited resource to the Gamma product. It will be able to make 60 units per month (900 ounces ÷ 15 ounces per unit), and realize a total contribution margin of \$2,700 per month, calculated as 60 units time \$45, or 900 ounces times \$3.00.

9. Refer to Question 8. Assume that the maximum number of units that can be sold is: 25 units of Alpha, 25 units of Beta, and 15 units of Gamma.

How many ounces of Omicron will be allocated to each product?

- a. All 900 ounces will be allocated to Gamma
- b. 225 ounces to Gamma, 500 ounces to Alpha, and 175 ounces to Beta
- c. 225 ounces to Gamma, 175 ounces to Alpha, and 500 ounces to Beta
- d. 115 ounces to Gamma, 510 ounces to Alpha, and 275 ounces to Delta

Answer: *b*

Rationale: Omicron should be allocated first to the product with the highest contribution margin per ounce of Omicron (Gamma) until it has produced its maximum units. Next, Omicron should be allocated to the product with the next highest contribution margin per ounce of Omicron (Alpha) until it has produced its maximum units. Finally, the remaining ounces should be allocated to Beta. Hence, 225 ounces of Omicron should be allocated first to Gamma (15 units times 15 ounces). Next, 500 ounces should be allocated to Alpha (25 units times 20 ounces). The remaining 175 ounces of Omicron should be allocated to Beta.