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|  | **Decision Making and Relevant**  **Information** |
|  |  |

**Transition Notes**

This chapter continues the emphasis on the five-step decision process, applying it to relevant cost decisions relating to special order, outsourcing, capacity constraints, and equipment-replacement scenarios. The managerial emphasis is applied throughout the chapter with emphasis on problem solving for decision making through these example problems. There is expanded material on decisions and performance material.

|  |
| --- |
| **Problem Material**  **Correlation Chart** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **15th**  **Edition** | **14th**  **Edition** |  | **15th**  **Edition** | **14th**  **Edition** |
|  | 16 | 16 Revised |  | 30 | 30 Revised |
|  | 17 | 17 |  | 31 | 31 Revised |
|  | 18 | 18 Revised |  | 32 | 32 Revised |
|  | 19 | 19 Revised |  | 33 | 33 Revised |
|  | 20 | 20 |  | 34 | 34 Revised |
|  | 21 | 21 Revised |  | 35 | 35 Revised |
|  | 22 | 22 Revised |  | 36 | 36 Revised |
|  | 23 | 23 Revised |  | 37 | 37 Revised |
|  | 24 | 24 Revised |  | 38 | 38 Revised |
|  | 25 | 25 |  | 39 | 39 Revised |
|  | 26 | 26 Revised |  | 40 | 40 Revised |
|  | 27 | 27 Revised |  | 41 | 41 Revised |
|  | 28 | 28 |  | 42 | 42 Revised |
|  | 29 | 29 Revised |  | 43 New |  |
|  |  |  |  | 44 New |  |
|  |  |  |  | 45 New |  |

**I. LEARNING OBJECTIVES**

1. Use the five-step decision-making process to make decisions.
2. Distinguish relevant from irrelevant information in decision situations.
3. Explain the opportunity-cost concept and why it is used in decision making.
4. Know how to choose which products to produce when there are capacity constraints.
5. Explain how to manage bottlenecks.
6. Discuss factors managers must consider when adding or dropping customers or segments.
7. Explain why book value of equipment is irrelevant in equipment-replacement decisions.
8. Explain how conflicts can arise between the decision model used by a manager and the performance-evaluation model used to evaluate the manager.
9. **CHAPTER SYNOPSIS**

Chapter 11 discusses the decision-making process and the concept of relevant information. Beginning with the five-step decision model presented in Chapter 1, the concepts of relevant revenues and relevant costs are discussed. The terms *sunk cost* and *opportunity cost* are introduced.

A number of types of relevant decision analysis problems are presented: one-time special order, outsourcing, or make-or-buy, bottlenecks, dropping or adding a customer, product, segment, or branch office. Choice guidelines for operating with capacity constraints are covered. The irrelevance of book value is presented, along with a discussion of conflicts that arise between the decision model used by the manager and the performance evaluation model used to evaluate that manager.

**III. Points of Emphasis**

Critical to student success in this chapter is their ability to correctly analyze the decision situation. It is helpful to take three approaches in this regard:

1. Walk through a completed example in the text.

2. Work out a problem in class with students contributing their thoughts.

3. Assign an in-class problem for the students to work, either in groups or individually. Be available to assist when they hit a snag.

Be certain students have grasped the concept of relevance. Students who do not grasp this concept will have difficulty in analyzing data and making the correct decision.

Students sometimes have difficulty shifting from contribution margin per unit of product to contribution margin per unit of the constrained resource.

Although students grasp that products, individual stores, business segments, and so on, should be dropped when they are no longer profitable, they sometimes have trouble accepting that same logic when applied to customer segments.

**IV. CHAPTER OUTLINE**

|  |  |
| --- | --- |
| **LEARNING**  **OBJECTIVE** | 1 |
| Use the five-step decision-making process to make decisions  … the five steps are identify the problem and uncertainties, obtain information, make predictions about the future, make decisions by choosing among alternatives, and implement the decision, evaluate performance, and learn. | |
|  | |
|  | |

1.1 Managers usually follow a *decision model* for choosing among different courses of action. A **decision model** is a formal method of making a choice, and can include quantitative as well as qualitative analysis.

1.2 Regardless of the type of decision being considered, a good decision model will utilize the five-step decision process introduced in Chapter 1.

(Exhibit 11-1 displays the five-step decision process for Precision Sporting Goods.)

|  |  |
| --- | --- |
| **LEARNING**  **OBJECTIVE** | 2 |
| Distinguish relevant from irrelevant information in decision situations  … only costs and revenues that are expected to occur in the future and differ among alternative courses of action are relevant. | |
|  | |

* 1. The decision-making process will be facilitated if the relevant costs and revenues are distinguished from the irrelevant costs and revenues. This enables the decision maker to focus on what is relevant.
  2. **Relevant costs** are expected future costs, **relevant revenues** are expected future revenues that **differ** among the alternative courses of action being considered.
  3. Relevant costs and revenues must:
* Occur in the future
* Differ among the alternative courses of action.

Teaching point. Be certain students have a grasp of the concept of relevance. Students who do not grasp this concept will have difficulty in analyzing data and making the correct decision. Use an example such as a night out. Give a couple of possible activities for the evening and ask what the costs of each are, making certain that the selections contain some common items. Then evaluate which costs are relevant and which are irrelevant. (Your great examples throughout this chapter make accounting concepts relevant to students!)

* 1. **Sunk costs** are costs that have been incurred. They are past costs and cannot be changed regardless of what action is taken. Sunk costs, then, are irrelevant.

Teaching point. Use several examples of sunk costs that students can relate to. For example, they have paid their tuition for the semester. At this point, none of it is refundable. The tuition cost is a sunk cost—even if they drop the course, or if they fail the course.

(Exhibit 11-2 illustrates relevant revenues and costs for Precision Sporting Goods.)

2.5Any decision will involve *quantitative* as well as *qualitative* factors.

2.6 **Quantitative factors** are outcomes measured in numerical terms. Note that this includes financial as well as nonfinancial measures. A quantitative factor may be direct material cost, direct labor dollars, or number of units produced.

2.7 **Qualitative factors** are outcomes that are difficult to measure in numerical terms. Employee morale and prestige are two qualitative factors.

Teaching point. As accountants, we deal in numbers, so we have a high comfort level with the quantitative factors. We are less comfortable with the qualitative factors. However, the qualitative must not be ignored. They are often at least as important as the quantitative.

A number of years ago, a family-run meat processor ran a series of ads in which the “bright young accountant” came to top management with suggestions for reducing the cost of the product. He was served a taste of one of the products, and found it good. The old man responded, “Yes, we know we could save some costs. But then our product wouldn’t be what you just tasted. We stand for quality here.”

(Exhibit 11-3 lists key features of relevant information.)

2.8 The concept of relevance applies to any decision that a company (or individual) faces. This chapter presents some common types of problems that a business will often encounter.

2.9 A **one-time-only special order** decision is one faced by a company having excess capacity, along with a one-time opportunity to sell a number of units at less than full cost.

Teaching point. Work with the students in going over a special order problem, such as Exercise 11-19.

(Exhibit 11-4 displays a budgeted income statement for Surf Gear.)

(Exhibit 11-5 displays a one-time-only special order decision for Surf Gear.)

2.10 There are two potential problems frequently encountered in relevant-cost analysis:

* Incorrect general assumptions, such as “all variable costs are relevant and all fixed costs are irrelevant.”
* Unit cost data can be misleading if irrelevant costs are included in the analysis or if the same unit costs are used at different output levels.

**Refer to Quiz Questions 1, 2, and 3 Exercises 11-17, 11-18, 11-19, and 11-20**

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| **LEARNING**  **OBJECTIVE** | 3 |
| Explain the opportunity-cost concept and why it is used in decision making  … in all decisions, it is important to consider the contribution to income forgone by choosing a particular alternative and rejecting others. | |
|  | |

3.1 A second type of frequently-encountered relevant analysis is an *outsourcing decision,* or a **make-or-buy decision.**

3.2 **Outsourcing** is purchasing goods or services from outside vendors rather than **insourcing,** or producing the same goods or services within the organization.

Teaching point. Illustrate an outsourcing problem. Example 2 in the text is a good problem to walk the students through.

3.3 An **incremental cost** is defined as the additional total cost incurred for an activity (i.e., it is the additional cost incurred in producing one more unit).

(Exhibit 11-6 displays incremental analysis of a make-or-buy decision.)

3.4 **Incremental revenue** is the additional revenue gained from the sale of an additional unit or from the activity. A project should not be undertaken if the incremental costs exceed the incremental revenues.

3.5 The terms *incremental costs* and *incremental revenues* are sometimes used interchangeably with **differential costs** and **differential revenues.** This book makes a distinction between incremental and differential. When using these terms in practice, be sure of the intended meaning.

3.6 Strategic and qualitative factors play an important role in relevant cost analysis. Some factors include:

* Control over design, quality, reliability, and delivery schedules
* Becoming a leaner organization through outsourcing, focusing on core competencies
* Dependence on suppliers
* Price increases
* Length of contracts

Teaching point. Outsourcing problems in particular present a good opportunity to discuss strategic and qualitative factors—long-term goals, quality, reliability of the supplier, future price increases, among others.

3.7International outsourcing adds another factor to relevant cost analysis in the form of exchange rate risk. This risk can be reduced with the use of forward contracts.

3.8 Deciding to use a resource in a particular way means that a manager loses the opportunity to use the resource in alternative ways. This lost opportunity is a cost that the manager must consider in making decisions.

3.9 **Opportunity cost** is the contribution to operating income that is forgone by not using a limited resource in its next-best alternative use.

Teaching point. To illustrate opportunity costs, tell the students they have two potential job offers at salaries that vary by $5,000. Both jobs are equally attractive, and in the same city. The opportunity cost is the salary of the job not taken—in this case, the one with the lower salary. Change the scenario, where the lower-paying job is local and the other is in New York City (or some other high-cost area). Students will usually opt for the local job and the opportunity cost becomes the salary of the NYC job. As a final twist, add a third job at a lower salary than the others. This does not change the opportunity cost, as the definition specifies that opportunity cost is the forgone revenue from the best alternative not taken.

3.10 In an outsourcing decision, there is often an opportunity cost associated with the use of the resources currently consumed by the operation being considered for outsourcing. These revenues must be considered.

3.11 Remind the students that opportunity costs are not incorporated into the formal accounting records as those records are historical records and only consider alternatives that were actually selected.

(Exhibit 11-7 displays total alternatives and opportunity-cost analysis to a make-or-buy decision for Soho Company.)

3.12 *Carrying costs of inventory* are another example of opportunity costs. The money that is invested in inventory could be put to some other purpose if a smaller amount of inventory were carried.

**Refer to Quiz Questions 4, 5, and 6 Exercises 11-20, 11-21, 11-31, 11-33, and 11-35**

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| **LEARNING**  **OBJECTIVE** | 4 |
| Know how to choose which products to produce when there are capacity constraints  … select the product with the highest contribution margin per unit of the limiting resource. | |
|  | |

4.1 When a company is faced with more demand for its products and services than they can produce, they are faced with **capacity constraints.** These decisions are referred to as **product-mix decisions,** as management is faced with deciding how many of each product they should manufacture to maximize contribution margin.

4.2 As all products are not equally profitable, when faced with capacity constraints, the company must decide which products to sell and in what quantities in order to maximize profits.

Teaching point. This is a short-run decision as the level of capacity can be expanded in the long run. Additionally, demand may be shifting, so the decision is how to maximize revenues now. As the economic landscape changes, this decision can change.

4.3 The focus in these situations is to maximize the contribution margin *per unit of the constrained resource.*

Teaching point. Students sometimes have difficulty shifting from contribution margin per unit of product to contribution margin per unit of the constrained resource. It should be helpful to walk through an example, such as Example 4 in the text.

4.4 Properly identifying the constrained resource, or *bottleneck,* is critical to maximizing profits. The **Theory of Constraints** is covered in Chapter 19 and may be covered at this point, if desired.

**Refer to Quiz Question 7 Exercises 11-22 and 11-23**

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| **LEARNING**  **OBJECTIVE** | 5 |
| Explain how to manage bottlenecks  … keep bottlenecks busy and increase their efficiency and capacity by increasing throughput (contribution) margin | |
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5.1 Properly identifying *bottlenecks* is critical to maximizing profits. The **Theory of Constraints** describes methods to maximize operating income when faced with bottlenecks. The objective of TOC is to increase throughput margin while decreasing investments and operating costs.

5.2 TOC defines three measures; 1) **Throughput margin**—revenues less direct material cost of goods sold; 2) *Investments*—sum of material costs in direct material, work-in-process, and finished goods, R&D cost, and capital costs of equipment and buildings; 3) *Operating costs*—include costs such as salaries and wages, rent, utilities, and depreciation.

5.3 TOC focuses on managing bottleneck operations by:

1. Recognizing that the bottleneck determines the contribution margin of the entire system.

2. Identifying the bottleneck operation by identifying operations with large quantities of inventory waiting to be worked on.

3. Keep bottleneck operation busy and subordinate all nonbottleneck operations to the bottleneck operation.

4. Take action to increase efficiency and capacity of all bottleneck operations.

**Exercises 11-24 and 11-39**

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| **LEARNING**  **OBJECTIVE** | 6 |
| Discuss factors managers must consider when adding or dropping customers and segments  … managers should focus on how total costs differ among alternatives and ignore allocated overhead costs | |
|  | |

6.1 Companies are often faced with the problem of adding or dropping product lines, business segments, branch offices, or customers. Relevant-revenue and relevant-cost analysis can contribute to the decision-making process.

(Exhibits 11-8 through 11-10 illustrate profitability analysis for Allied West.)

Teaching point. Students have very little difficulty accepting the fact that products, individual stores, business segments, and the like should be dropped when they are no longer profitable. However, they sometimes are reluctant to accept that same logic when applied to customer segments.

An example can illustrate this concept. Most are familiar with companies that have a *minimum order requiremen*t, such as $50 (i.e., below that amount, they will sell to you, but for an extra charge of $5 or some such amount). These companies have performed analyses that tell them that a customer who does not order $50 or more actually costs them money, so they take the stance that if you want to buy from them, you will have to pay for the privilege.

Sometimes the answer may not be to totally drop the customer, but to give a reduced level of service. At a small college, for example, the number of books sold may not be as significant as at a large, state university. Some book publishers have made the decision to not have sales representatives make personal calls on faculty at small schools, but rely on phone calls and e-mail to keep in touch with faculty. These can be accomplished at a lower cost, but lack the element of personal service.

6.2 At times the decision to drop products or customers may be due to capacity constraints. If the company does not have the capacity to meet all demand, certain products may have to be discontinued or customers may have to be dropped.

6.3 The other side of this coin is adding product lines, customers, branch offices, or other items. This can occur when there is excess capacity or when the gains from the addition will also cover the added capacity costs.

Teaching point. Students will have an easier time grasping these concepts if they see them illustrated. Cover the Allied West example in the text or have the class work through the suggested exercises for this learning objective.

**Refer to Quiz Question 8 Exercises 11-25 and 11-26, Problem 11-41**

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| **LEARNING**  **OBJECTIVE** | 7 |
| Explain why book value of equipment is irrelevant in equipment-replacement decisions  … it is a past cost. | |
|  | |

7.1 As discussed earlier in the chapter, sunk costs are irrelevant when making decisions about future actions.

7.2 **Book value** of an asset is a past cost that is irrelevant. It is a cost that has been incurred and nothing can change it.

Teaching point. Students will sometimes observe that an asset can be sold so the book value should be relevant. Help the student distinguish between the book value of the asset (a sunk cost) and the revenue received if this asset is sold. These are two different issues that deal with the same object.

Exercise 11-27 is an excellent problem to illustrate this point. However, this problem can be used to contrast the answer given by analyzing the numbers, and the path taken by the company. Due to short-term performance evaluations, political pressures within the company, and other factors, the manager would frequently opt to stay with the old equipment regardless of what the numbers say.

(Exhibits 11-11 and 11-12 depict cost-comparison analysis of the equipment**-**replacement decision for Toledo Company.)

**Refer to Quiz Question 9 Exercises 11-27 and 11-28**

|  |  |
| --- | --- |
| **LEARNING**  **OBJECTIVE** | 8 |
| Explain how conflicts can arise between the decision model used by a manager and the performance-evaluation model used to evaluate the manager  … tell managers to take a multiple-year view in decision making but judge their performance only on the basis of the current year’s operating income. | |
|  | |

8.1 Managers may make decisions that are suboptimal when viewed from the company as a whole. One reason for this is that managers tend to act in their own self-interest and the performance-evaluation system does not reward the behaviors indicated by the decision model the company employs.

8.2 Usually, these differences arise due to differences in the time frame under consideration. Managers are frequently evaluated on annual results, whereas the decision model looks at the entire life of the project under consideration.

Teaching point. This conflict is seen in Exercise 11-27. If the manager opts to buy the new machine, profits in the first year take a big hit, but future profits are greater. If the manager is evaluated on a one-year horizon, he will be reluctant to scrap the existing machine.

This conflict can also set up an ethical dilemma—should the manager act in the company’s interest, or is it ethical for personal interests to prevail as long as the manager does not violate company rules?

**Refer to Quiz Question 10 Problem 11-45**

**APPENDIX**

A.1 **Linear programming** **(LP)** is a technique that can be utilized to determine which products to manufacture when multiple constraints exist.

(Exhibit 11-13 summarizes the relevant data for the Power Recreation example.)

A.2 Solving an LP problem consists of three steps:

* Determine the **objective function.** This is the objective, or goal, to be maximized or minimized.
* **Specify the constraints.** A constraint is a mathematical inequality or equality that must be satisfied by the variables in a mathematical model.
* **Compute the optimal solution.** There are two approaches to determine this—the trial and error approach and the graphic approach.

(Exhibit 11-14 illustrates the Power Recreation constraints in graphical form.)

A.3The **trial-and-error approach** calculates the contribution margin at each corner with the optimal solution the corner producing the highest contribution margin.

A.4 The **graphic approach** draws an optimal line. That is the point farthest from the origin but passing through a point in the area of feasible solutions. This line represents the highest total contribution margin.

A.5 **Sensitivity analysis** can be utilized in this approach to deal with uncertainty in the constraints or variables.

**V. OTHER RESOURCES**

To download these and other resources, visit the Instructor’s Resource Center [*www.pearsonhighered.com*](http://www.pearsonhighered.com/).

The following exhibits were mentioned in this chapter of the Instructor’s Manual, and have been included in the **PowerPoint Lecture presentation** created specifically for this chapter. You may use the PowerPoint Lecture presentations “as is”, or modify them to suit your individual needs.

Exhibit 11-1 displays the five-step decision process for Precision Sporting Goods.

Exhibit 11-2 illustrates relevant revenues and costs for Precision Sporting Goods.

Exhibit 11-3 lists key features of relevant information.

Exhibit 11-4 displays a budgeted income statement for Surf Gear.

Exhibit 11-5 displays a one-time-only special order decision for Surf Gear.

Exhibit 11-6 displays incremental analysis of a make-or-buy decision.

Exhibit 11-7 displays total alternatives and opportunity-cost analysis to a make-or-buy decision for Soho Company.

Exhibits 11-8 through 11-10 illustrate profitability analysis for Allied West.

Exhibits 11-11 and 11-12 depict cost comparison analysis of the equipment**-**replacement decision for Toledo Company.

**CHAPTER 11 QUIZ**

1. Which of the following should *not* be considered for every option in the decision process?
2. Relevant revenues
3. Relevant costs
4. Historical costs
5. Opportunity costs
6. What is always the question to ask to determine if revenues or costs are relevant?
7. What is the time frame for achieving results?
8. What difference will an action make?
9. Who will be responsible?
10. How much will it cost?
11. [CPA Adapted] Mikaelabelle Products sells product A at a selling price of $40 per unit. Mikaelabelle’s cost per unit based on the full capacity of 500,000 units is as follows:

Direct materials $ 6

Direct labor 3

Indirect manufacturing (60% of which is fixed) 10

$19

A one-time-only special order offering to buy 50,000 units was received from an overseas distributor. The only other costs that would be incurred on this order would be $4 per unit for shipping. Mikaelabelle has sufficient existing capacity to manufacture the additional units. In negotiating a price for the special order, Mikaelabelle should consider that the minimum selling price per unit should be

a. $17

b. $19

c. $21

d. $23

1. The concept of outsourcing services to countries with lower labor costs is known as
2. opportunity cost.
3. offshoring.
4. insourcing.
5. international outsourcing.
6. [CMA Adapted] Troy Instruments uses ten units of Part Number S1798 each month in the production of scientific equipment. The unit cost to manufacturing one unit of S1798 is presented below.

Direct materials $ 4,000

Materials handling (10% of direct materials cost) 400

Direct manufacturing labor 6,000

Indirect manufacturing (200% of direct labor) 12,000

Total manufacturing cost $22,400

Materials handling represents the direct variable costs of the Receiving Department that are applied to direct materials and purchased components on the basis of their cost. This is a separate charge in addition to indirect manufacturing cost. Troy’s annual indirect manufacturing cost budget is one-fourth variable and three-fourths fixed. Duncan Supply, one of Troy’s reliable vendors, has offered to supply Part Number S1798 at a unit price of $17,000.

If Troy purchases the S1798 units from Duncan, the capacity Troy used to manufacture these parts would be idle. Should Troy decide to purchase the parts from Duncan, the unit cost of S1798 would

a. decrease by $3,700.

b. decrease by $5,600.

c. increase by $3,600.

d. increase by $5,300.

1. Which of the following is *not* a correct use of the term *opportunity cost*?
2. Opportunity costs are considered period costs rather than inventoriable costs for accounting purposes.
3. Opportunity costs must be considered by managers when making decisions.
4. Opportunity cost plus the incremental future revenues and costs equal the relevant revenues and costs of any alternative when capacity is constrained.
5. The opportunity cost of holding inventory is the income forgone by tying up money in inventory and not investing it elsewhere.
6. Nicholas, Inc. has provided the following unit data for review:

Simple Product Advanced Product

Selling price $22.75 $55.00

Variable cost 10.00 34.50

Pounds of scarce raw material per unit 3 5

Which product, Simple or Advanced, is most profitable for Nicholas, Inc. to manufacture?

a. Both in ratio of 3:5

b Both in ratio of 5:8

c. Simple

d. Advanced

1. RCG Services is investigating its profitability relationship with each of its customers. What is the key question RCG should ask in deciding whether to keep or drop a particular customer?
2. Will the customer meet a specific designated gross margin percentage?
3. Will the customer be willing to pay a higher price to insure RCG’s profitability?
4. Will enough customers be found to replace any customers dropped for lack of profitability?
5. Will expected total corporate office costs decrease if decision is made to drop the customer?
6. [CPA Adapted] On December 31, 2005, Brown Co. had a machine with an original cost of $90,000, accumulated depreciation of $75,000, and an estimated salvage value of zero. On December 31, 2005, Brown was considering the purchase of a new machine having a five-year life, costing $150,000, and having an estimated salvage value of $30,000 at the end of five years. In its decision concerning the possible purchase of the machine, how much should Brown consider as sunk cost at December 31, 2005?

a. $150,000

b. $120,000

c. $90,000

d. $15,000

1. Which of the following is *not* a reason for the performance evaluation model to differ from the decision model?
2. The use of different time frames: one being an annual basis, the other a period of several years.
3. The accounting systems enable each decision to be tracked separately.
4. The accrual accounting method incorporates irrelevant costs.
5. Top management is rarely aware of particular desirable alternatives that were not chosen by subordinate managers.

**CHAPTER 11 QUIZ SOLUTIONS**

# 1. c

# 2. b

# 3. a

# 4. d

# 5. b

# 6. a

# 7. c

# 8. d

# 9. c

# 10. b

**Quiz Question Calculations**

3. DM $ 6

DL 3

Variable OH 4

Fixed OH 4 ($10 × 40%)

$17

4. Cost to Make Cost to Buy

Direct materials $4,000

Purchase of part $17,000

Material handling 400 1,700

Direct labor 6,000

Indirect manufacturing 3,000\* \*$12,000 × 25%

Total $13,400 $18,700

Difference in favor of making $5,300

7. Simple Advanced

Selling price 22.75 55.00

Variable cost 10.00 34.50

Contribution margin 12.75 20.50

Pounds of material per unit 3 5

Contribution margin per 4.25 4.11

pound of material

Simple provides a higher contribution margin per pound of scarce raw material.