Examples of Constrained Resources in Product Mix Decisions

When determining the optimal product mix, businesses often face resource constraints that limit the quantity of products they can produce. Here are some examples of constrained resources and their application in determining the product mix:

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1. Machine Hours

Scenario:
A manufacturing company produces two products, A and B. The production of each product requires machine time, but the factory has only 10,000 machine hours available each month.

Details:

- Product A requires 5 hours per unit.
- Product B requires 2 hours per unit.
- Profit per unit:
    - Product A: $40.
    - Product B: $30.

Solution Approach:
Calculate the contribution margin per machine hour:

- Product A: $40 ÷ 5 = $8 per hour.
- Product B: $30 ÷ 2 = $15 per hour.

Prioritize producing Product B because it provides a higher return per constrained machine hour. After meeting demand for B, allocate remaining machine hours to Product A.

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2. Labor Hours

Scenario:
A furniture company makes chairs and tables. Workers are available for only 5,000 labor hours per month.

Details:

- Chair production requires 2 hours per unit.
- Table production requires 4 hours per unit.
- Profit per unit:
    - Chair: $25.
    - Table: $60.

Solution Approach:
Calculate contribution margin per labor hour:

- Chair: $25 ÷ 2 = $12.50 per hour.
- Table: $60 ÷ 4 = $15 per hour.

Prioritize producing tables first to maximize profit per constrained labor hour, then use remaining labor hours for chairs.

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3. Raw Materials

Scenario:
A bakery produces cookies and cakes. Both require flour, but the bakery has only 1,000 kg of flour available per week.

Details:

- Cookies require 0.5 kg of flour per dozen.
- Cakes require 2 kg of flour per unit.
- Profit per unit:
    - Cookies: $10 per dozen.
    - Cakes: $25 per unit.

Solution Approach:
Calculate contribution margin per kg of flour:

- Cookies: $10 ÷ 0.5 = $20 per kg.
- Cakes: $25 ÷ 2 = $12.50 per kg.

Prioritize producing cookies, as they yield a higher profit per kg of flour, then use remaining flour for cakes.

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4. Storage Space

Scenario:
A retail store sells TVs and refrigerators, but its storage area can hold only 1,000 cubic feet of inventory.

Details:

- TVs take up 5 cubic feet each.
- Refrigerators take up 20 cubic feet each.

- Profit per unit:
  - TV: $200.
  - Refrigerator: $500.

Solution Approach:
Calculate contribution margin per cubic foot:

- TV: $200 ÷ 5 = $40 per cubic foot.
- Refrigerator: $500 ÷ 20 = $25 per cubic foot.

Focus on selling TVs first to maximize the use of limited storage space, then allocate the remaining space for refrigerators.