Finance: Cash Flow Analysis

Given and Introduction

A beauty product company is developing a new fragrance named **Happy Forever**. The following probabilities are associated with the annual sales:

- Probability $P_1 = 0.48$ for 1.04 million bottles
- Probability $P_2 = 0.38$ for 211,000 bottles
- Probability $P_3 = 0.14$ for 48,000 bottles

The selling price per bottle is $36, and the variable cost per bottle is $9. Fixed production costs are $1.04 million per year, and depreciation is $1.17 million. The marginal tax rate is 27 percent.

Objective: Find the expected annual incremental after-tax free cash flows from the new fragrance.

Step-by-Step Solution

Step 1: Calculate the Revenue

Formula: Revenue = Selling Price per Bottle × Annual Sales

Case 1 (P1):
$\text{Revenue}_1 = 36 \times 1{,}040{,}000 = 37{,}440{,}000$

Case 2 (P2):
$\text{Revenue}_2 = 36 \times 211{,}000 = 7{,}596{,}000$

Case 3 (P3):
$\text{Revenue}_3 = 36 \times 48{,}000 = 1{,}728{,}000$

Explanation: Revenue is calculated by multiplying the selling price per bottle by the number of annual sales for each probability case.

Supporting Statement: Revenue needs to be calculated to determine total sales income based on different scenarios.

Step 2: Calculate the Variable Costs

Formula: Variable Costs = Variable Cost per Bottle × Annual Sales

Case 1 (P1):
$\text{Variable Cost}_1 = 9 \times 1{,}040{,}000 = 9{,}360{,}000$

Case 2 (P2):
$\text{Variable Cost}_2 = 9 \times 211{,}000 = 1{,}899{,}000$

Case 3 (P3):
$\text{Variable Cost}_3 = 9 \times 48{,}000 = 432{,}000$

Explanation: Variable costs are calculated by multiplying the variable cost per bottle by annual sales for each probability case.

Supporting Statement: Variable costs reflect the direct costs associated with producing each bottle.

Step 3: Calculate Gross Profit

Formula: Gross Profit = Revenue - Variable Costs

Case 1 (P1):
$\text{Gross Profit}_1 = 37{,}440{,}000 - 9{,}360{,}000 = 28{,}080{,}000$

Case 2 (P2):
$\text{Gross Profit}_2 = 7{,}596{,}000 - 1{,}899{,}000 = 5{,}697{,}000$

Case 3 (P3):
$\text{Gross Profit}_3 = 1{,}728{,}000 - 432{,}000 = 1{,}296{,}000$

Explanation: Gross profit is calculated by subtracting variable costs from revenue for each probability case.

Supporting Statement: Gross profit measures the income from sales before accounting for fixed costs and other expenses.

Step 4: Subtract Fixed Costs and Depreciation to Obtain Operating Profit

Formula: Operating Profit = Gross Profit - Fixed Costs - Depreciation

Given:
Fixed Costs = $1,040,000
Depreciation = $1,170,000

Case 1 (P1):
Operating Profit_1 = 28,080,000 - 1,040,000 - 1,170,000 = 25,870,000

Case 2 (P2):
Operating Profit_2 = 5,697,000 - 1,040,000 - 1,170,000 = 3,487,000

Case 3 (P3):
Operating Profit_3 = 1,296,000 - 1,040,000 - 1,170,000 = -914,000

Explanation: Operating profit is found by subtracting fixed costs and depreciation from gross profit for each probability case.

Supporting Statement: Operating profit reflects earnings before tax.

Step 5: Calculate After-Tax Operating Profit

Formula: After-Tax Operating Profit = Operating Profit × (1 - Tax Rate)

Given:
Tax Rate = 27%

Case 1 (P1):
After-Tax Operating Profit_1 = 25,870,000 × (1 - 0.27) = 25,870,000 × 0.73 = 18,885,100

Case 2 (P2):
After-Tax Operating Profit_2 = 3,487,000 × (1 - 0.27) = 3,487,000 × 0.73 = 2,545,510

Case 3 (P3):
After-Tax Operating Profit_3 = -914,000 × (1 - 0.27) = -914,000 × 0.73 = -667,220

Explanation: After-tax operating profit is computed by applying the tax to the operating profit for each probability case.

Supporting Statement: Incorporating taxes gives a more realistic measure of profitability.

Step 6: Calculate Expected Incremental After-Tax Free Cash Flows

Formula: Expected Cash Flows = P_1 × After-Tax Operating Profit_1 + P_2 × After-Tax Operating Profit_2 + P_3 × After-Tax Operating Profit_3

Calculation:
Expected Cash Flows = (0.48 × 18,885,100) + (0.38 × 2,545,510) + (0.14 × -667,220)
= 9,064,848 + 967,294 + -93,411
= 9,938,731

Explanation: The expected cash flow is calculated as the weighted average of the after-tax operating profits for the given probabilities.

Final Answer: The expected annual incremental after-tax free cash flows from the new fragrance "Happy Forever" is $9,938,731.