Foundations of Accounting & Finance

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Lecture – 35

Decision Making using Cost Accounting Information - Examples - Part IV

Example four (Incremental decision-making)

Austin Wool Products purchases raw wool and processes it into yarn. The spindles of yarn can then be sold directly to stores or they can be used by Austin Wool Products to make afghans. Each afghan requires one spindle of yarn. Current cost and revenue data for the spindles of yarn and for the afghans are as follows:

Data for one spindle of yarn	
Selling price	$ 12
Variable production cost	$ 8
Fixed production cost (based on 4000 spindles of yarn produced)	$ 2
Data for one afghan:	
Selling price	$ 32
Production cost per spindle of yarn	$ 10
Variable production cost to process the yarn into an afghan	$ 9
Avoidable fixed production cost to process the yarn into an afghan (based on 4000 afghans produced)	$ 5

Each month 4,000 spindles of yarn are produced that can either be sold outright or processed into afghans. If Austin chooses to produce 4,000 afghans each month, the change in monthly net operating income as compared to selling 4,000 spindles of yarn is:

Solution:

What we are conducting here is incremental analysis. Let us examine the number of units sold for afghans. We are looking at selling about 4,000 units. The selling price per afghan is $32, resulting in a total sales value of $128,000 for the 4,000 units.

Now, for the spindles of yarn, if we sell them outright, the selling price is $12 per spindle. Multiplying $12 by the 4,000 units, we get a total sales value of $48,000.

Let us assess the situation further.

Incremental revenue

What would be my incremental revenue if I choose to sell afghans? Selling afghans would yield an incremental revenue totaling $80,000 ($128,000 – $48,000)

Incremental cost

First, let us consider the variable cost of production, which amounts to $9 per afghan. Multiplying this by the 4,000 units yields a total incremental variable cost of producing afghans ($36,000). Additionally, the incremental fixed cost of production stands at $5 per afghan. Thus, the total incremental fixed cost amounts to $5 per unit ($20,000).

Incremental profit

The incremental revenue amounts to $80,000, considering the sale of afghans. Deducting the incremental cost of $56,000 (variable cost of $9 per unit and fixed cost of $5 per unit), we arrive at an incremental profit of $24,000 from manufacturing afghans. Therefore, the decision is to proceed with manufacturing afghans, as it yields an incremental profit of $24,000.

Regarding the omitted cost of manufacturing spindles, I agree. However, the focus here is on relevant costing for decision-making purposes. Since the decision revolves around whether to sell spindles or manufacture and sell afghans, only the costs and revenues associated with these options are considered.

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INCREMENTAL ANALYSIS			
Units sold for Afghans		4000	
Sale price and value of afghans	**32.00**	**128000**	
Sale price and value of spindles	**12.00**	**48000**	
Incremental revenue if I sell as Afghans		80000	
Incremental cost			
variable cost of prodn	9.00	36000	
fixed cost of prodn	5.00	20000	
INCREMENTAL PROFIT		**24000**	
Decision is to go ahead and manufacture afghans as it results in an incremental profit of $ 24000			

What is the relevance?

The relevance lies in determining the specific costs incurred and revenues generated by each potential decision. By focusing solely on the costs associated with manufacturing afghans and the incremental revenue from selling them, we can accurately assess the financial implications of this choice. This comparison forms the basis of our decision-making process, ensuring that we consider only the relevant factors influencing our decision.

Example five (Product mix decisions)

Glunn Company makes three products in a single facility. These products have the following unit product costs:

	Products		
	A	B	C
Direct materials	$ 12.80	$ 9.30	$ 4.70
Direct labor	14.1	14.9	10
Variable manufacturing overhead	1.2	0.9	0.5
Fixed manufacturing overhead	18.5	17.2	23.7
Unit product cost	$ 46.60	$ 42.30	$ 38.90
Additional data concerning these products are listed below			
Mixing minutes per unit	3.7	3.4	3.9
Selling price per unit	$ 59.20	$ 60.10	$ 55.30
Variable selling cost per unit	$ 2.90	$ 2.70	$ 3.70
Monthly demand in units	2000	4000	2000

The mixing machines are potentially the constraint in the production facility. A total of 24,200 minutes are available per month on these machines.

Direct labor is a variable cost in this company.

Required:

a. How many minutes of mixing machine time would be required to satisfy demand for all three products?
b. How much of each product should be produced to maximize net operating income? (Round off to the nearest whole unit.)
c. Up to how much should the company be willing to pay for one additional hour of mixing machine time if the company has made the best use of the existing mixing machine capacity? (Round off to the nearest whole cent.)

Solutions

5A - How many minutes of mixing machine time would be required to satisfy demand for all three products?

To calculate the total minutes of mixing machine time required to satisfy the demand for all three products, we first need to consider the monthly demand for each product and the mixing minutes per unit for each product.

Product A has a monthly demand of 2000 units, with a mixing minute requirement of 3.7 minutes per unit. Product B has a monthly demand of 4000 units, with a mixing minute requirement of 3.4 minutes per unit. Product C has a monthly demand of 2000 units, with a mixing minute requirement of 3.9 minutes per unit.

To find the total mixing minutes required, we multiply the monthly demand for each product by its respective mixing minute requirement, and then sum up the results:

For Product A: 2000 units * 3.7 minutes/unit = 7400 mixing minutes

For Product B: 4000 units * 3.4 minutes/unit = 13600 mixing minutes

For Product C: 2000 units * 3.9 minutes/unit = 7800 mixing minutes

Total mixing minutes required = 7400 + 13600 + 7800 = 28800 mixing minutes.

Therefore, to satisfy the demand for all three products, the company would need a total of 28800 mixing minutes per month.

5a	A	B	C	
Monthly demand in units	2,000	4,000	2,000	
mixing min per unit	3.70	3.40	3.90	
total mixing min reuqired for demand	**7,400**	**13,600**	**7,800**	**28,800**

5B - How much of each product should be produced to maximize net operating income? (Round off to the nearest whole unit.)

Contribution analysis

To determine how much of each product should be produced to maximize net operating income, we will conduct a contribution analysis. The objective is to maximize revenue for every utilized mixing minute.

Given that the available mixing minutes are only 24,200, there's a shortfall of 4,600 minutes.

First, let us calculate the selling price for each product. The selling prices provided in the data are $59.20 for Product A, $60.10 for Product B, and $55.30 for Product C.

Next, we will consider the various costs associated with production: direct material, direct labour, variable manufacturing overhead, and variable selling overhead. These costs are different for each product.

For Product A, the total variable cost is the sum of the material, labour, manufacturing overhead, and selling overhead costs, which are $12.80 + $14.10 + $1.20 + $2.90 = $31.00.

For Product B, the total variable cost is $9.30 + $14.90 + $0.90 + $2.70 = $27.80.

And for Product C, the total variable cost is $4.70 + $10.00 + $0.50 + $3.70 = $18.90.

With these calculations, we can then determine the contribution per unit for each product by subtracting the total variable cost from the selling price.

Once we have the contribution per unit for each product, we can decide how many units of each product to produce to maximize net operating income, considering the available mixing minutes.

5b				
available mixing minutes				24200
shortfall				4,600
Selling price	59.20	60.10	55.30	
Direct material	12.80	9.30	4.70	
Direct labor	**14.10**	**14.90**	**10.00**	
Variable manuf overhead	1.20	0.90	0.50	
Variable selling overhead	2.90	2.70	3.70	
Total Variable cost	31.00	27.80	18.90	
CONTRIBUTION	28.20	32.30	36.40	

Ideal ranking

Based on the ideal circumstances without any constraints, we can rank the products based on their contribution per unit. Product C has the highest contribution, followed by Product B, and then Product A.

CONTRIBUTION	28.20	32.30	36.40
ideal case without constraint	3	2	1

Ranking with constraints

However, with the constraint of limited mixing minutes, our objective changes. Now, we aim to maximize the contribution for every unit of mixing minute used.

For Product A, we spend 3.7 mixing minutes and earn a contribution of $28.20, resulting in a contribution per mixing minute of $7.62.

For Product B, we spend 3.4 mixing minutes and earn a contribution of $32.20, resulting in a contribution per mixing minute of $9.50.

For Product C, we spend 3.9 mixing minutes and earn a contribution of $23.30, resulting in a contribution per mixing minute of $5.97.

CONTRIBUTION	28.20	32.30	36.40
ideal case without constraint	3	2	1
Contribution per mixing minute	7.62	9.50	9.33
ranking based on key factor	**3**	**1**	**2**

In this scenario, Product B yields the highest contribution per mixing minute, followed by Product C and then Product A. Therefore, to maximize net operating income within the constraint of limited mixing minutes, we should prioritize the production of Product B, followed by Product C and then Product A.

Based on the key factor changes, the ranking of the products shifts. Product B now takes the top position, followed by Product C and then Product A. This ranking is determined by maximizing the contribution per unit of the key factor, which in this case is the available mixing minutes.

Product mix

To decide the product mix, we consider the total available mixing minutes, which is 24,200. We prioritize manufacturing Product B to its full capacity, as it has the highest contribution per unit of mixing minute. This results in 4,000 units of Product B, consuming 13,600 mixing minutes.

After allocating the mixing minutes for Product B, we proceed to manufacture Product C next, utilizing 7,800 mixing minutes to produce 2,000 units.

Finally, with the remaining mixing minutes (2,800), we manufacture Product A, which requires 3.7 mixing minutes per unit. This allows us to produce approximately 757 units of Product A.

The total contribution is calculated by multiplying the contribution per unit by the number of units produced for each product and summing them up. However, it is important to note the allocated fixed cost, which is incurred regardless of the production mix. This allocated fixed cost is calculated based on the ideal number of units produced for each product.

Ultimately, the goal is to maximize profit, considering both variable contribution and allocated fixed costs. In this case, the maximum profit or loss is determined to be $70,641. This product mix represents the optimal solution within the given constraint of available mixing minutes.

product mix	757	4,000	2000	
mixing min consumed	2800	13,600	7,800	2,800
total contribution	21341	129200	72800	223341
fixed cost	36,500	68,800	47,400	152700
PROFIT OR LOSS				70641

Now, let us move on to discussing question 5C.

5C - Up to how much should the company be willing to pay for one additional hour of mixing machine time if the company has made the best use of the existing mixing machine capacity? (Round off to the nearest whole cent.)

To determine how much the company should be willing to pay for one additional hour of mixing machine time, we first need to assess the shortfall in units that still need to be manufactured. The shortfall is calculated by subtracting the total units produced from the ideal number of units. In this case, the shortfall is 1,243 units.

Next, we calculate the total mixing minutes required for this shortfall. Given that the number of mixing minutes per unit is provided, we multiply this value by the number of units needed to obtain the total mixing minutes required. In this scenario, 4,600 mixing minutes are needed to produce the remaining units.

Unfortunately, the cost per mixing minute is not explicitly given. However, we can determine the maximum amount the company should be willing to pay for one additional hour of mixing machine time to break even.

Given that the total profit at the current production level is $70,641 and the total mixing minutes required for the shortfall is 4,600, we can calculate the maximum amount the company can pay. Dividing the profit by the total mixing minutes required yields approximately $15.36 per mixing minute.

Therefore, the company should be willing to pay up to $15.36 for one additional hour of mixing machine time if they wish to break even. Any additional cost beyond this threshold would result in a loss.

5C	
short fall in units	1,243
mixing min required for this shortfall	4,600
in case u want to break even by paying additional cost for mixing min	15.36

Sixth Question

Sinclair Company's single product has a selling price of $25 per unit. Last year the company reported a profit of $20,000 and variable expenses totaling $180,000. The product has a 40%

contribution margin ratio. Because of competition, Sinclair Company will be forced in the current year to reduce its selling price by $2 per unit. How many units must be sold in the current year to earn the same profit as was earned last year?

Contribution margin

To calculate how many units must be sold in the current year to earn the same profit as last year, we first need to understand the contribution margin and the changes in selling price.

The contribution margin represents the portion of each sale that contributes to covering fixed costs and generating profit. In this case, the contribution margin is 40% of the selling price per unit. This means that 40% of the selling price minus the variable cost per unit equals the contribution margin.

Last year, the company reported a profit of $20,000, with variable expenses totalling $180,000. To maintain the same profit level despite a reduction in selling price, we need to determine the number of units that must be sold.

Given that the variable cost per unit is $15 and the contribution margin per unit is $10 ($25 selling price - $15 variable cost), we know that each unit contributes $10 towards covering fixed costs and generating profit.

To earn the same profit as last year, which was $20,000, the total contribution from sales needs to be $20,000. Dividing the total contribution required by the contribution margin per unit ($10) gives us the total number of units needed to achieve the desired profit.

Now, let us consider the reduction in selling price by $2 per unit due to competition. This means the new selling price per unit is $25 - $2 = $23.

The new contribution margin per unit is $23 - $15 = $8.

To calculate the number of units required to earn the same profit, we divide the fixed cost ($ 100,000) plus desired profit ($20,000) by the contribution margin per unit with the new selling price ($8).

Therefore, the company must sell 15,000 units in the current year to earn the same profit as last year, despite the reduction in selling price.

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cost	60%
FC + profit	40%
VC	180000
FC + Profit	120000
profit	20000
Fixed cost	100000
Sale value	300000
SP per unit	25
Number of units I sell	12000
VC per unit	15
current contribution	10
Proposal	
NEW selling price	23.00
VC per unit	15.00
new contribution	8.00
desired profit	20000
number of units to sold to earn the desired profit	15000