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1.0 MOST PROFITABLE PRODUCTION PLAN

Merrion Products Ltd. has their budgeted sales as well as production and net profit for the first quarter of year 20x7. Taking that as basic and applying over the additional criteria that imposed by the board of members in the meeting encourages the new figures to be planned out. Among the useful criteria that applied in the meeting are; raw material available up to 72000 Euros only; definite limit over the sales; and minimum production of 1000 units for each product.

To draw out the new plan, we start first by identifying profitable production and their priority as well.

Product	A	B	C	D
Sales Price	20	40	30	20
Direct material (imported)	7	16	13	10
Direct labour and packaging	3	4	6	4
Production overhead	4	5	6	5
Budget sales (units)	1500	2000	2000	1500
Budget sales revenue	30000	80000	60000	30000
Contribution over each euro of sales	0.300	0.375	0.167	0.050
Profit generated over each euro of imported raw material	0.857	0.938	0.385	0.100
Priority of utilization contribution and imported raw materials	2	1	3	4

It is clearly stated in the text that Merrion Products' production overhead includes both fixed and variable expense. The fixed production overhead is estimated to be 20000 euros and been apportioned to each product based on total anticipated sales revenue for each product. This concludes that the firm has been using "Absorption Costing" whereas they had included the fixed production overhead into each individual product itself. This is a setback for us whereas we cannot apportion this fixed production overhead cost into each product because we have not decide on how many quantity to produce for each product

line. Further, adding any assumption will lead us to additional puzzle of clearing the over or under absorption accounting cleanup some more. Overall, we know that absorption costing is ideal for seasonal product and this Merrion Products' aren't seasonal. This statement was concluded by adopting from the text itself whereas 'output for both products was sold by end of the year and demand outstripped production.' This applies to all products as they are all successful products.

Therefore using absorption costing for these products aren't favorable and merely misleading and adding additional complexity to design new most profitable production plan. As result of it, we stop using the absorption costing and impose marginal costing method. For that purpose, we identify and reverse apportion the fixed production costing as below.

Product	A	B	C	D
Budget sales (units)	1500	2000	2000	1500
Budget sales revenue	30000	80000	60000	30000
Production overhead (absorption)	4	5	6	5
Total production overhead	6000	10000	12000	7500
Fixed production overhead	3000	8000	6000	3000
Production overhead (marginal)	2	1	3	3

Now, we take the new production overhead cost into count and reconstruct the most profitable product table once again. This will increase the level of contribution and utilization of raw material for each of the product line but still sticking to the same priority of most profitable product.

Product	A	B	C	D
Sales Price	20	40	30	20
Direct material (imported)	7	16	13	10
Direct labour and packaging	3	4	6	4
Production overhead	2	1	3	3

Budget sales (units)	1500	2000	2000	1500
Budget sales revenue	30000	80000	60000	30000
Contribution over each euro of sales	0.400	0.475	0.267	0.150
Profit generated over each euro of imported raw material	1.143	1.188	0.615	0.300
Priority of utilization contribution and imported raw materials	2	1	3	4

Now we construct the new plan. But start with the condition applied by the board of members whereas we must produce at least 1000 units for each product line.

Product	A	B	C	D	Total
Sales Price	20	40	30	20	110
Direct material (imported)	7	16	13	10	46
Direct labour and packaging	3	4	6	4	17
Production overhead	2	1	3	3	9
Sales (units)	1000	1000	1000	1000	4000
Sales revenue	20000	40000	30000	20000	110000
Consumed raw material	7000	16000	13000	10000	46000

* We revise the sales of product B to maximum sales value as it is the first most profitable product. ($88000/40 = 2200$ units maximum sales)

Sales (units)	1000	2200	1000	1000	5200
Sales revenue	20000	88000	30000	20000	158000
Consumed raw material	7000	35200	13000	10000	65200

* We revise the sales of product A to the maximum of available raw material resources and it is the second most. ($\text{Floor}((72000-65200)/7)=971$ units additional sales)

Sales (units)	1971	2200	1000	1000	6171
Sales revenue	39420	88000	30000	20000	177420
Consumed raw material	13797	35200	13000	10000	71997

Finally, we conclude our findings as in this quarter; buy and consume imported raw material up to 71,997 Euros, we will need to sell 6171 units of products, and over the sales we will make 177,420 Euros. Now we present the final statement together the profit and loss account.

Most Profitable Production Plan

Product	A	B	C	D	Total
Sales Price	20	40	30	20	110
Direct material (imported)	7	16	13	10	46
Direct labour and packaging	3	4	6	4	17
Production overhead	2	1	3	3	9
Sales (units)	1971	2200	1000	1000	6171
Cost of sales	23652	46200	22000	17000	108852
Sales revenue	39420	88000	30000	20000	177420

Profit and Loss Account Statement

	Euros
Sales	177420
Cost of sales	<u>108852</u>
Gross margin	68568
Less: Fixed production overhead	<u>20000</u>
	48568
Administration expenses	19900
Distribution expenses	5700
Sales commission	17742
Financial expenses	<u>800</u>
Net profit	<u><u>4426</u></u>

2.0 BREAK EVEN POINT

Merrion Products Ltd is having multiple product line. Therefore, before calculating the break even point, we need to assume some criteria such as:

1. The price of the each product is constant. This means the product A should not be sold at price 10 Euros to customer A and 20 Euros to customer B. They should be constant either 10 Euros or 20Euros to both customer A and B.
2. Cost is linear. When production increases, cost should increase in same ratio. For example if the product 1000 unit of product D is 17000 Euro, then the 2000 units of its production should cost 34000 Euro whereas it grow in linear, same ratio.
3. We assume the sales mix price is same and constant and we use average contribution on them. For example, if 10% of Product A sales drop, then 10% of Product B, Product C, as well as Product D sales must also drop – we assume so to generate the break even.
4. The 10% of sales revenue is solid commission and therefore we assume this 10% as our variable cost. This results to variables cost of every product to rise by 10% and contribution reduces.

Product	A	B	C	D	Total
Sales Price	20	40	30	20	110
Cost of sales	12	21	22	17	72
Contribution	8	19	8	3	38
Contribution (after commission)	6	15	5	1	27
Sales (units)	1971	2200	1000	1000	6171
Sales revenue	39420	88000	30000	20000	177420
Sales weight	22.22%	49.60%	16.91%	11.27%	100.00%

$$\begin{aligned} \text{*Fixed cost} &= \text{Expenses - Commission + Fixed production overhead} \\ &= 44142 - 17742 - 20000 \\ &= 46400 \end{aligned}$$

$$\text{Break even point in sales revenue} = \frac{\text{Fixed cost}}{\text{Weighted average P/V ratio}}$$

$$\frac{46400}{27 / 110}$$

$$\underline{\underline{\mathbf{189,037 \text{ Euros sales}}}}$$

$$\text{Break even point in sales unit} = \frac{\text{Fixed cost}}{\text{Weighted average contribution margin per unit}}$$

$$\frac{46400}{27}$$

$$\underline{\underline{\mathbf{1,719 \text{ units of product}}}}$$

3.0 OPPORTUNITY COST

There is an opportunity for the decision of producing 1000 units for each product line.

If we produce minimum of 1000 units for each product line:

Product	A	B	C	D	Total
Sales Price	20	40	30	20	110
Direct material (imported)	7	16	13	10	46
Sales (units)	1971	2200	1000	1000	6171
Consumed raw material	13797	35200	13000	10000	71997
Sales revenue	39420	88000	30000	20000	177420

If we are not restricted to minimum of 1000 units for each product line:

Product	A	B	C	D	Total
Sales Price	20	40	30	20	110
Direct material (imported)	7	16	13	10	46
Sales (units)	3000	2200	1215	0	6415
Consumed raw material	21000	35200	15795	0	71995
Sales revenue	60000	88000	36450	0	184450

$$\begin{aligned}\text{Opportunity cost} &= \text{Sales without minimum 1000} - \text{Sales with minimum 1000} \\ &= 184450 - 177420 \\ &= \underline{\underline{7030 \text{ Euros}}}\end{aligned}$$

Conclusion, Merrion Products Ltd forgoes 7030 Euros due to the decision of producing minimum 1000 units per product line. This is their opportunity cost.

4.0 INFLUENCE OF PRICE

When the price increases by 7 Euro for each product, this will impact the analysis. The reason is, we had designed the plan based on most profitable product whereas Product B is first and followed by Product A, C and D. Most profitable product refers to products that make the firm earn larger piece of profit by optimizing contribution over each Euro of sales and utilizing usage of imported raw material which very limited in our case. Now, when the price is revised, the most profitable product priority changes respectively to be Product A first, and followed by Product B, C, and D. Below is the table to illustrate the situation:

Product	A	B	C	D
Sales Price	27	47	37	27
Direct material (imported)	7	16	13	10
Direct labour and packaging	3	4	6	4
Production overhead	2	1	3	3
Total variable cost	12	21	22	17
Total contribution	15	26	15	10
Contribution over each euro of sales	0.556	0.553	0.405	0.370
Profit generated over each euro of imported raw material	2.143	1.625	1.154	1.000
Priority of utilization contribution and imported raw materials	1	2	3	4

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