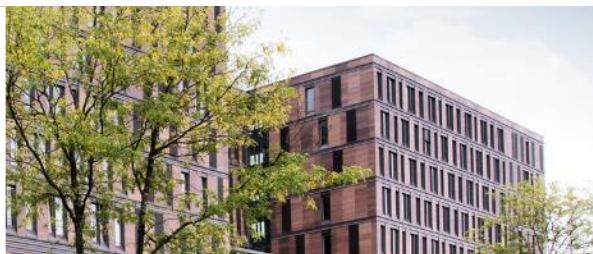


Timo Vogelsang

MANAGERIAL ACCOUNTING (WINTER 2023)



SESSION 4

P14-58

- Oceana Co. sells 3 products, manufactured in 4 departments.
- Machine and labor skills are specialized, hence cannot be switched from one department to another.
- Inventory remains constant, price and cost data as follows:

	Product		
	M50	T79	B81
Unit costs:			
Direct material	\$ 28	\$ 52	\$ 68
Direct labor:			
Department 1	48	24	48
Department 2	84	56	56
Department 3	\$ 96	—	\$ 64
Department 4	36	\$ 72	36
Variable overhead	108	80	100
Fixed overhead	60	40	128
Variable selling expenses	12	8	16
Unit selling price	784	492	668

P14-58

EXPECTED SALES DEMAND

Product	Monthly Unit Sales
M50	500
T79	400
B81	1,000

EXPECTED CAPACITY

Monthly Capacity Availability	Department			
	1	2	3	4
Normal machine capacity in machine hours	3,500	3,500	3,000	3,500
Capacity of machines being repaired in machine hours	(500)	(400)	(300)	(200)
Available machine capacity in machine hours	<u>3,000</u>	<u>3,100</u>	<u>2,700</u>	<u>3,300</u>
Available labor in direct-labor hours	3,700	4,500	2,750	2,600

P14-58

- Requirements per product:

Labor and Machine Specifications per Unit of Product					
Product	Labor and Machine Time				
M50	Direct-labor hours	2	3	3	1
	Machine hours	1	1	2	2
T79	Direct-labor hours	1	2	—	2
	Machine hours	1	1	—	2
B81	Direct-labor hours	2	2	2	1
	Machine hours	2	2	1	1

1. Calculate monthly requirement for MH and DLH to determine bottleneck
2. Determine the monthly production schedule that maximizes profit
3. Identify alternatives management might consider to meet the entire demand

P14-58

- Determine bottleneck
 - Machine hour

	<i>Department</i>			
<i>Product</i>	1	2	3	4
M50	500	500	1,000	1,000
T79	400	400	—	800
B81	<u>2,000</u>	<u>2,000</u>	<u>1,000</u>	<u>1,000</u>
Total required	2,900	2,900	2,000	2,800
Total available	<u>3,000</u>	<u>3,100</u>	<u>2,700</u>	<u>3,300</u>
Excess (deficiency)	<u>100</u>	<u>200</u>	<u>700</u>	<u>500</u>

P14-58

- Determine bottleneck
 - DL hour

	<i>Department</i>			
<i>Product</i>	1	2	3	4
M50	1,000	1,500	1,500	500
T79	400	800	—	800
B81	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>	<u>1,000</u>
Total required	3,400	4,300	3,500	2,300
Total available	<u>3,700</u>	<u>4,500</u>	<u>2,750</u>	<u>2,600</u>
Excess (deficiency)	<u>300</u>	<u>200</u>	<u>(750)</u>	<u>300</u>

- The scarce resource is direct-labor hours (DLH) in Department 3

P14-58

2. Production schedule

- Oceana should first produce the product that maximizes contribution margin per unit of the scarce resource (DLH in Dep 3). **M50 and B81 require DLH in Department 3.**

	<i>Product</i>		
	M50	T79	B81
Sales price	<u>\$784</u>	<u>\$492</u>	<u>\$668</u>
Variable costs			
Direct material	\$ 28	\$ 52	\$ 68
Direct labor	264	152	204
Variable overhead	108	80	100
Variable selling	<u>12</u>	<u>8</u>	<u>16</u>
Total variable costs	<u>\$412</u>	<u>\$292</u>	<u>\$388</u>
Contribution margin	<u>\$372</u>	<u>\$200</u>	<u>\$280</u>

P14-58

2. Production schedule

– Contribution Margin per DLH in Department 3.

Product	Contribution Margin	Department 3 DLH	CM per DLH
M50	\$372	3	\$124
B81	280	2	140

– How many product can be produced

	Units	Dep. 3 DLH Required	Balance (DLH)
Maximum DLH available in Dep 3			2,750
Product B81 first	1,000	2,000	750
Product M50 second	250	750	-0-

P14-58

2. Production schedule

Product	Contribution Margin per Unit	Units Produced	Contribution to Profit
M50	\$372	250	\$ 93,000
T79	200	400	80,000
B81	280	1,000	<u>280,000</u>
Total contribution margin			<u><u>\$453,000</u></u>

P14-58

3. To supply the additional quantities of M50 that are required, Oceana should consider:
- subcontracting the additional units.
 - operating on an overtime basis.
 - acquiring labor from outside the community.

P14-50

Handy Dandy Tools makes electronic tools. They have met all production requirements and still have capacity. Assume endless demand.

- Variable overhead is applied on the basis of direct labor hours
- Fixed overhead is applied on the basis of machine hours.
- If they have excess machine capacity and can add labor as needed how should they devote their excess capacity to maximize profits?

P14-50

	Basic	Deluxe	Pro
Selling price	\$116	\$130	\$160
Direct material	32	40	38
Labor at \$20/hour	20	30	40
Variable overhead	16	24	32
Fixed overhead	32	10	30

Facts we can see from above:

- Labor hours are 1 for basic, 1.5 for deluxe and 2 for pro models, respectively
- Variable overhead is 80% of labor costs
- It takes 3.2 times the machine hours to make a basic as it does a deluxe
- It takes 3 times the machine hours to make a pro as it does a deluxe (application of fixed overhead)

P14-50

When there is no limit on production capacity the Pro model should be manufactured since it has the *highest contribution margin per unit*.

	Basic Model	Deluxe Model	Pro Model
Selling price	<u>\$116</u>	<u>\$130</u>	<u>\$160</u>
Direct material	32	40	38
Direct labor	20	30	40
Variable overhead	<u>16</u>	<u>24</u>	<u>32</u>
Total variable cost	<u>\$ 68</u>	<u>\$ 94</u>	<u>\$110</u>
Contribution margin	<u>\$ 48</u>	<u>\$ 36</u>	<u>\$ 50</u>

P14-50

- What should they do if labor time is a limiting factor?

When labor is in short supply the Basic model should be manufactured, since it has the *highest contribution margin per direct-labor hour*.

	Basic Model	Deluxe Model	Pro Model
Contribution margin per unit	\$48	\$36	\$50
Direct-labor hours required	1	1.5	2
Contribution margin per direct-labor hour	\$48	\$24	\$25

P14-50

- What if the limiting factor is machine hours?
- → We have to first find a common “denominator” to make the assessment.

	Basic	Deluxe	Pro
CM per unit from above	\$48	\$36	\$50
Relative machine hours	3.2	1.0	3.0
CM per machine hour	\$15	\$36	\$16.67

As Deluxe models generate highest CM per machine hour, produce that model.

E12-28

WHAT TYPE OF RESPONSIBILITY CENTER IS MOST APPROPRIATE?

- Orange juice factory operated by a large orange grower
- College of engineering at a university
- European division of a multinational manufacturing company
- Outpatient clinic in a profit-oriented hospital
- Mayor's office of a city
- Movie theater in a movie chain company
- Radio station owned by a large broadcasting network
- Claims department in an insurance company
- Ticket sales division of an airline company
- Bottling plant of a soft drink company

E12-28

WHAT TYPE OF RESPONSIBILITY CENTER IS MOST APPROPRIATE?

- Orange juice factory operated by a large orange grower: Cost center or profit center.
- College of engineering at a university: Profit center.
- European division of a multinational manufacturing company: Investment center.
- Outpatient clinic in a profit-oriented hospital: Profit center.
- Mayor's office of a city: Cost center.
- Movie theater in a movie chain company: Cost center or profit center.
- Radio station owned by a large broadcasting network: Cost center or profit center.
- Claims department in an insurance company: Cost center.
- Ticket sales division of an airline company: Revenue center.
- Bottling plant of a soft drink company: Cost center.

P13-40

- Megatronics Corporation retails electronic products, is organized into 4 divisions. Divisional managers are evaluated on ROI. Last year's company ROI was 13%.
- The Western division of Megatronics Co. receives an option to buy a competitor, needs \$187,500 additional investment to upgrade competitor to Megatronics standards.
- Following info on competitor:

	Western Division	Competitor
Sales	\$ 4,200,000	\$ 2,600,000
Variable Costs	\$ 2,940,000	\$ 1,690,000
Fixed Costs	\$ 1,075,000	\$ 835,000
Invested Capital	\$ 925,000	\$ 312,500

P13-40

- Compute ROI of Western Division with and without the acquisition of the competitor.
- What does the Western division's manager think about acquiring?
- What does the HQ think about acquiring?
- Would the division be better off without upgrading to Megatronics standards? Show the calculation.
- (Assume Megatronics uses residual income for performance evaluation and requires a 12% return. Computer the Western division's RI with and without the acquisition. How does this impact (2)?)

PERFORMANCE MEASUREMENT

P13-40 • Current ROI of the Western Division:

Sales revenue.....		\$4,200,000
Less: Variable costs	\$2,940,000	
Fixed costs.....	<u>1,075,000</u>	<u>4,015,000</u>
Income.....		<u>\$ 185,000</u>

$$\text{ROI} = \text{Income} \div \text{invested capital} = \$185,000 \div \$925,000 = 20\%$$

• Western Division's ROI if competitor is acquired:

Sales revenue		\$6,800,000
(\$4,200,000 + \$2,600,000).....		
Less: Variable costs		
(\$2,940,000 + \$ 1,690,000).....	\$4,630,000	
Fixed costs (\$1,075,000 + \$835,000)...	<u>1,910,000</u>	<u>6,540,000</u>
Income.....		<u>\$ 260,000</u>

$$\text{ROI} = \text{Income} \div \text{invested capital} = \$260,000 \div (\$925,000 + \$312,500 + \$187,500) = 18.25\%$$

P13-40

- What does the division's manager think about acquiring?
 - Divisional management will likely be against the acquisition because ROI will be lowered from 20% to 18.25% (the acquisition will result in lower compensation).
- What does HQ think about acquiring?

- **An examination of the competitor's financial statistics reveals the following:**

Sales revenue.....		\$2,600,000
Less: Variable costs (\$1,690,000).....	\$1,690,000	
Fixed costs	<u>835,000</u>	<u>2,525,000</u>
Income.....		<u>\$ 75,000</u>
ROI = Income ÷ invested capital = \$75,000 ÷ (\$312,500 + 187,500) = 15%		

- HQ would probably favor the acquisition.

P13-40

- Would the division be better off without upgrading to Megatronics standards? Show calculations

Sales revenue (\$4,200,000 + \$2,600,000).....		\$6,800,000
Less: Variable costs (\$2,940,000 + \$ 1,690,000).....	\$4,630,000	
Fixed costs (\$1,075,000 + \$835,000)...	<u>1,910,000</u>	<u>6,540,000</u>
Income.....		<u>\$ 260,000</u>
ROI = Income ÷ invested capital = \$260,000 ÷ (\$925,000 + \$312,500) = 21.01%		

- Yes, the divisional ROI would increase to 21.01%. However, the absence of the upgrade could lead to long-run problems (Customers confused / turned-off by two different retail environments)

P13-40

- Assume Megatronics uses residual income for performance evaluation and requires 12% return. Compute the western division's RI with and without the acquisition. How does this impact (2)?

- Current residual income of the Western Division:**

Divisional profit.....	\$185,000
Less: Imputed interest charge ($\$925,000 \times 12\%$).....	<u>111,000</u>
Residual income.....	<u>\$ 74,000</u>

- Residual income if competitor is acquired:**

Divisional profit ($\$185,000 + \$75,000$).....	\$260,000
Less: Imputed interest charge ($\$925,000 + \$312,500 + \$187,500 \times 12\%$).....	<u>171,000</u>
Residual income.....	<u>\$ 89,000</u>

Management most likely will change its attitude. Residual income will increase by \$15,000 ($\$89,000 - \$74,000$) as a result of the acquisition.