

F9 Performance Management June 2009

- 1 Yam Co is involved in the processing of sheet metal into products A, B and C using three processes, pressing, stretching and rolling. Like many businesses Yam faces tough price competition in what is a mature world market.

The factory has 50 production lines each of which contain the three processes: Raw material for the sheet metal is first pressed then stretched and finally rolled. The processing capacity varies for each process and the factory manager has provided the following data:

	Processing time per metre in hours		
	Product A	Product B	Product C
Pressing	0.50	0.50	0.40
Stretching	0.25	0.40	0.25
Rolling	0.40	0.25	0.25

The factory operates for 18 hours each day for five days per week. It is closed for only two weeks of the year for holidays when maintenance is carried out. On average one hour of labour is needed for each of the 225,000 hours of factory time. Labour is paid \$10 per hour.

The raw materials cost per metre is \$3.00 for product A, \$2.50 for product B and \$1.80 for product C. Other factory costs (excluding labour and raw materials) are \$18,000,000 per year. Selling prices per metre are \$70 for product A, \$60 for product B and \$27 for product C.

Yam carries very little inventory.

Required:

- (a) Identify the bottleneck process and briefly explain why this process is described as a 'bottleneck'. (3 marks)
- (b) Calculate the throughput accounting ratio (TPAR) for each product assuming that the bottleneck process is fully utilised. (8 marks)
- (c) Assuming that the TPAR of product C is less than 1:
- (i) Explain how Yam could improve the TPAR of product C. (4 marks)
 - (ii) Briefly discuss whether this supports the suggestion to cease the production of product C and briefly outline three other factors that Yam should consider before a cessation decision is taken. (5 marks)

(20 marks)

1 Yam Co

- (a) The output capacity for each process is as follows:

The total processing hours of the factory is given but can be proven as follows:
 $18 \text{ hours} \times 5 \text{ days} \times 50 \text{ weeks} \times 50 \text{ production lines} = 225,000 \text{ hours}$.

Given this, the production capacity for pressing must be $225,000 \text{ hours} / 0.5 \text{ hours per metre} = 450,000 \text{ metres}$. Using this method the production capacity for all processes is as follows:

	Product A	Product B	Product C
Pressing	450,000	450,000	562,500
Stretching	900,000	562,500	900,000
Rolling	562,500	900,000	900,000

The bottleneck is clearly the pressing process which has a lower capacity for each product. The other processes will probably be slowed to ensure smooth processing.

Clearly an alternative approach is simply to look at the original table for processing speed and pick out the slowest process. This is pressing. (full marks available for that **explained** observation)

- (b) TPAR for each product

	Product A	Product B	Product C
Selling price	70.0	60.0	27.0
Raw materials	3.0	2.5	1.8
Throughput	67.0	57.5	25.2
Throughput per bottleneck hour*	134.0	115.0	63.0
Fixed costs per hour (W1)	90.0	90.0	90.0
TPAR	1.49	1.28	0.7
Working*	$67/0.5 = 134$	$57.5/0.5 = 115$	$25.2/0.4 = 63$

- W1 The fixed cost per bottleneck hour can be calculated as follows:

Total fixed costs are \$18,000,000 plus the labour cost. Labour costs \$10 per hour for each of the 225,000 processing hours, a cost of \$2,250,000.

Total fixed cost is therefore $\$18,000,000 + \$2,250,000 = \$20,250,000$

Fixed cost per bottleneck hours is $\$20,250,000 / 225,000 = \$90 \text{ per hour}$

- (c) (i) Yam could improve the TPAR of product C in various ways:

Speed up the bottleneck process. By increasing the speed of the bottleneck process the rate of throughput will also increase, generating a greater rate of income for Yam if the extra production can be sold. Automation might be used or a change in the detailed processes. Investment in new machinery can also help here but the cost of that would need to be taken into account.

Increase the selling prices. It can be difficult to increase selling prices in what we are told is a competitive market. Volume of sales could be lost leaving Yam with unsold stock or idle equipment. On the other hand, given the business appears to be selling all it can produce, then a price increase may be possible.

Reduce the material prices. Reducing material prices will increase the net throughput rate. Metal is available from many sources being far from a unique product. Given the industry is mature the suppliers of the raw material could be willing to negotiate on price; this could have volume or quality based conditions attached. Yam will have to be careful to protect its quality levels. Bulk buying increases stock levels and the cost of that would need to be considered.

Reduce the level of fixed costs. The fixed costs should be listed and targets for cost reduction be selected. ABC techniques can help to identify the cost drivers and with management these could be used to reduce activity levels and hence cost. Outsourcing, de-skilling or using alternative suppliers (for stationery for example) are all possible cost reduction methods.

- (ii) A TPAR of less than one indicates that the rate at which product C generates throughput (sales revenue less material cost) is less than the rate at which Yam incurs fixed cost. So on a simple level, producing a product which incurs fixed cost faster than it generates throughput does not seem to make commercial sense. Clearly the TPAR could be improved (using the methods above) before cessation is considered any further.

However, cessation decisions involve consideration of many wider issues (only three required).

- Long-term expected net cash flows from the product allowing for the timing of those cash flows (NPV) are an important factor in cessation decisions
- Customer perception could be negative in that they will see a reduction in choice
- Lost related sales: If product C is lost will Yam lose customers that bought it along with another product?
- What use could be made of the excess capacity that is created
- Throughput assumes that all costs except raw materials are fixed; this may not necessarily be the case and only avoidable fixed costs need to be taken into account for a cessation decision. If few fixed costs can be avoided then product C is making a contribution that will be lost if the product ceased.

		Marks	Marks
1	(a) Identification of bottleneck	1	
	Explanation	2	
			3
	(b) Sales prices (per product)	0.5	
	Raw material cost (per product)	0.5	
	Throughput per bottleneck hour (per product)	0.5	
	Fixed costs	1.5	
	Fixed cost per hour	0.5	
	TPAR (per product)	0.5	
			8
	(c) (i) Increase speed of bottleneck	1	
	Increase selling prices – difficult to do	1	
	Reduce material prices	1	
	Reduce level of fixed costs	1	
			4
	(ii) Explain a TPAR	2	
	Long-term cash flows	1	
	Lost related sales	1	
	Use of spare capacity	1	
	Fixed costs	1	
	Any other reasonable factor e.g. lost contribution	1	
			5
	Maximum		
	Total		
			20

