THROUGHPUT ACCOUNTING - F5-PM

First of all, we have to understand TQM and JIT concepts before starting Throughput Accounting.

Total Quality Management TQM

Continuous improvement in quality, productivity, effectiveness.

Fundamental features include:

- prevention of errors before they occur
- importance of total quality in the design of systems and products
- real participation of all employees
- commitment of senior management to the cause
- recognition of the vital role of customers and suppliers
- recognition of the need for continual improvement.

Just-In-Time (JIT)

Pull-based system of production

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Goods are only produced when they are needed ⇒ minimize the inventory level

Key characteristics for successfully operating such a system are:

High quality:	possibly through deploying TQM systems.
Speed:	rapid throughput to meet customers' needs.
Reliability:	computer-aided manufacturing technology will assist.
Flexibility:	small batch sizes and automated techniques are used.
Low costs:	through all of the above.

JIT+TQM

Standard product costs are associated with traditional manufacturing systems producing large quantities of standard items. Key features of companies operating in a JIT and TQM environment are:

- high level of automation
- high levels of overheads and low levels of direct labour costs
- customised products produced in small batches
- low stocks
- emphasis on high quality and continuous improvement.

Machine ↑ Off
Lab ↓

Throughput Accounting

Aims to make the best use of scarce resource (bottleneck) in a JIT environment.

S-VC = cont

Throughput is a measure of profitability and is defined by

Throughput = Sales Revenue − Direct Material cost

→ Throughput wants more profitability and least money to be tied in inventory.

Assumption

→ In short term, only material cost is variable cost.

→ Labour is fixed in short term, as they are salaried OR guaranteed min. wage.

→ Its like contribution.

inventory.

→ It's like contribution.

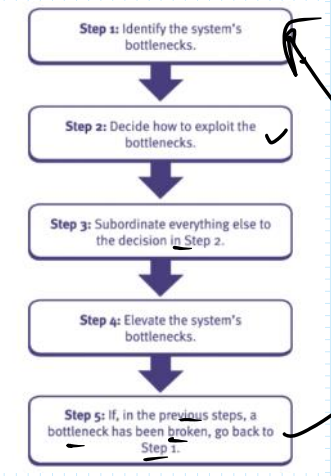
- And this goal is achieved by determining what factor prevents the throughput from being higher
  ⇓
  Bottleneck
  (Limiting factor ⇒ e.g. Machine hrs)

- In short term, the best use of this bottleneck should be made. This will result in less idle time in non-bottleneck resources so small amount of inventory will be held.

- In the long term, the bottleneck should be eliminated. But will result in another bottleneck.

1000 → Assembly ⇒ Cleaning ⇒ Machining → F/G
1000 1000 900

The process of identifying and taking steps to remove the constraints that restrict output as the Theory of Constraint. It has 5 steps.



Cont = FC + Profit = 300000 + 120000 = 420000
Cont = S − VC

Hard Tiles recorded a profit of $120,000 in the accounting period just ended, using marginal costing. The contribution/sales ratio was 75%.

Material costs were 10% of sales value and there were no other variable production overhead costs. Fixed costs in the period were $300,000.

Required:

What was the value of throughput in the period?

$\frac{420000}{\text{Sales}} = 75\%$ $\quad \frac{420000}{75} \times 100 = 560000$

Sol

Throughput = Sales − Material cost.

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= 56000 − 5600 = 50400 $

Throughput Accounting Ratio (TPAR).

$$\text{TPAR\#} = \frac{\text{Throughput per factory hr (*)}}{\text{Cost per factory hr (*)}}$$

↑ / ↓ ≠ ↑

(*) Throughput per factory hr # $\frac{\text{Throughput/unit}}{\text{Product's time on Bottleneck resources}}$

(*) Cost per factory hr # $\frac{\text{Total factory cost (lab + other than mat.)}}{\text{Total Bottleneck resource time available}}$

- If TPAR > 1, means business is in profit. Otherwise loss.
- Total factory cost is basically fix prod cost (ind. labour).
- Ranking in a same factory: then Return per factory hour is enough. But if ranking products or division across company then TPAR must be seen.

Criticisms of TPAR

- It concentrates on the short-term when a business has a fixed supply of resources (i.e. a bottleneck) and operating expenses are largely fixed. However, most businesses can't produce products based on the short term only.
- It is more difficult to apply throughput accounting concepts to the longer-term when all costs are variable, and vary with the volume of production and sales or another cost driver. The business should consider this long-term view before rejecting products with a TPAR < 1
- In the longer-term an ABC approach might be more appropriate for measuring and controlling performance.

X Limited manufactures a product that requires 1.5 hours of machining. Machine time is a bottleneck resource, due to the limited number of machines available. There are 10 machines available, and each machine can be used for up to 40 hours per week (400).

The product is sold for $85 per unit and the direct material cost per unit is $42.50. Total factory costs are $8,000 each week.

Calculate

(a) the return per factory hour = 28.33 $

(b) the TPAR.

Solution Throughput per factory hr = Throughput/unit / Product's time on BN res.

= 85 − 42.5 / (28.33)

$= \frac{85 - 42.5}{1.5} = 28.33$

$TPAR = \frac{TP/F\,hr}{Cost/F\,hr} = \frac{28.33}{20} = 1.42$

$Cost/Factory\,hr = \frac{Total\ cost}{Total\ time\ of\ BN\ res} = \frac{80000}{40 \times 10} = 20\$/hr$

A business manufactures a single product that it sells for $10 per unit. The materials cost for each unit of product sold is $3. Total operating expenses are $50,000 each month.

Labour hours are limited to 20,000 hours each month. Each unit of product takes 2 hours to assemble.

Required:

Calculate the throughput accounting ratio (TPAR)

Solution

$TPAR = \frac{Th/F.hr}{cost/F.hr} = \frac{\$3.5/hr}{\$2.5/hr} = 1.4$

$Th = 7$

$\frac{Thr/unit}{Product\ time} = \frac{\$7}{2hr} = 3.5$

$\frac{T\,cost}{Total\ BN} = \frac{30000}{20000} = 2.5\$/hr$

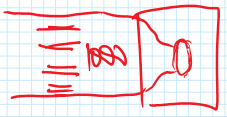
Improvements in TPAR

- Sales price ↑
- Material cost ↓
- Operating cost ↓
- Productivity of Bottleneck ↑

$\frac{Th/factory\,hr}{Cost/F\,hr}$

Multi product decision making

Step 1 : Identify Bottleneck constraint.



Step 2 : Calculate Throughput/unit for each product.

Step 3 : Calculate Throughput/unit of a bottleneck for each product

Step 4 : Ranking

Step 5 : Allocate resources using this ranking.

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Justin Thyme manufactures four products, A, B, C and D. Details of sales prices, costs and resource requirements for each of the products are as follows.

	Product A	Product B	Product C	Product D
	$	$	$	$
Sales price	1.40	0.80	1.20	2.80
Materials cost	0.60	0.30	0.60	1.00
Direct labour cost	0.40	0.20	0.40	1.00
	Minutes	Minutes	Minutes	Minutes
Machine time per unit	5	2	3	6
Labour time per unit	2	1	2	5
	Units	Units	Units	Units
Weekly sales demand	2,000	2,000	2,500	1,500

Machine time is a bottleneck resource and the maximum capacity is 400 machine hours each week. Operating costs, including direct labour costs, are $5,440 each week. Direct labour costs are $12 per hour, and direct labour workers are paid for a 38-hour week, with no overtime.

(a) Determine the quantities of each product that should be manufactured and sold each week to maximise profit and calculate the weekly profit.

(b) Calculate the throughput accounting ratio at this profit-maximising level of output and sales.

Solution

i) Identify Bottleneck resource = Machine hrs

ii) Throughput/unit: A 0.8, B 0.5, C 0.6, D 1.8

iii) Bottleneck res/unit: A 0.0833, B 0.0333, C 0.05, D 0.1

iv) Throughput/Bottleneck (step 2 ÷ 3): A 9.6, B 15, C 12, D 18

v) Ranking: A 4, B 2, C 3, D 1

vi) Allocation of resource.

- D = 1500 units
- B = 2000 units
- C = 2500 units
- A = 696 units

Working

Bottleneck (M hrs) 400 M hrs

D = 1500 × 0.1 (150 Mhrs) — 250 Mhrs

B = 2000 × 0.033 (67 Mhrs) — 183 Mhrs

C = 2500 × 0.05 (125 Mhrs) — 58 Mhrs

A $\frac{58 \text{ Mhrs}}{0.0833} = 696 \times 0.0833$ (58 Mhrs) —

vii) Total Throughput:

D = 1500 × 1.8 = 2700

B = 2000 × 0.5 = 1000

C = 2500 × 0.6 = 1500

A = 696 × 0.8 = 556.8

Throughput 5756.8

viii) Total Max profit:

Throughput − FC

5756.8 − 5440 = 317 $

TPAR = Throughput per Machine hr / Factory cost per M.hr = 14.392 / 13.6 = 1.06

TP/Mhr = Total Throughput / Machine hrs = 5756.8 / 400 = 14.392

Fac. cost/hr = Total Factory cost / Machine hrs = 5440 / 400 = 13.6