Throughput Accounting

Agenda

• What is Throughput Accounting?
• Why Throughput Accounting?
• Variable Margin vs. Throughput
• How it affects the decisions we make
• Sustaining improvements
• An Exercise
What is Throughput Accounting?

• A management accounting approach supporting enterprise optimization –
• Pure Throughput Accounting is Cash focused - $ in / $ out
• Provides metrics to measure enterprise improvement
• Primary metrics based on totally variable costs
• Inventory value at raw material cost only
What is Throughput Accounting?

• Improvement hierarchy for decisions
  • Throughput (T)  Sales – Totally Variable Costs
  • Inventory/Investment (I)
  • Operating Expenses (OE)

• Primary Measurements
  • Net Profit  \( T - OE \)
  • Return on Investment  \( \frac{T - OE}{I} \)
## Variable Margin vs. Throughput

<table>
<thead>
<tr>
<th></th>
<th>Company XYZ P &amp; L</th>
<th>Throughput Acctg P &amp; L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typical P &amp; L</strong></td>
<td>$ in 000</td>
<td>$ in 000</td>
</tr>
<tr>
<td>Revenue</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>Material</td>
<td>$1,536</td>
<td>$1,536</td>
</tr>
<tr>
<td>Labor (Variable)</td>
<td>$176</td>
<td>$0</td>
</tr>
<tr>
<td>Overhead (Variable)</td>
<td>$656</td>
<td>$0</td>
</tr>
<tr>
<td><strong>COGS</strong></td>
<td><strong>$2,368</strong></td>
<td><strong>$1,536</strong></td>
</tr>
<tr>
<td><strong>Gross Profit (Variable Margin)</strong></td>
<td><strong>$2,632</strong></td>
<td><strong>$3,464</strong></td>
</tr>
<tr>
<td>Other Mfg Costs</td>
<td>$832</td>
<td>$1,664</td>
</tr>
<tr>
<td>Engineering</td>
<td>$500</td>
<td>$500</td>
</tr>
<tr>
<td>S, G &amp; A</td>
<td>$900</td>
<td>$900</td>
</tr>
<tr>
<td><strong>Total Operating Expenses</strong></td>
<td><strong>$2,232</strong></td>
<td><strong>$3,064</strong></td>
</tr>
<tr>
<td>Operating Profit</td>
<td>$400</td>
<td>$400</td>
</tr>
<tr>
<td>Non Operating Expenses</td>
<td>$25</td>
<td>$25</td>
</tr>
<tr>
<td><strong>PreTax Profit</strong></td>
<td><strong>$375</strong></td>
<td><strong>$375</strong></td>
</tr>
</tbody>
</table>

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What is Throughput Accounting?

• In its purest form designed for cash basis accounting
  • T recognized when invoices paid

• Cash basis accounting or accrual accounting
  • A tool to make decisions based on T, I & OE
    • Sales bonuses/commissions
    • Capital expenditures
    • Inventory purchases & timing

• Supported by Throughput $ Days and Inventory $ Days
  • A means to measure the cost of non availability of cash for
    • Late shipments
    • Holding inventory in the system
Enterprise Optimization

• The enterprise
  • Complex? Chaotic?
  • Interdependencies?
  • Constraints or bottlenecks?
  • Waste?
  • Variability?
• Improvement – where do we begin?
  • Low hanging fruit?
  • Most bang for the “buck”?
Why Throughput Accounting

“Show me how you measure me and I’ll show you how I behave”

Eli Goldratt – 2 broad observations

Creative Output

Avraham Y. Goldratt Institute

A new process is necessary but not sufficient

New metrics, supporting the new process brings sufficiency
Background

“Show me how you measure me and I’ll show you how I behave”

• 1988 Oklahoma City
  • “Get them used to change”
  • The Goal – and an epiphany

• Putting The Goal to work
  • Make to stock manufacturing company
  • Ship 24 hours from order receipt (same day if order received before noon)
    • Inventory reduced from $4.5MM to $2.3MM in 12 months
  • TOC or TQM – doing nothing is a valid decision
  • From looking for a change to having it thrust upon me
The Goal – And An Epiphany

“Show me how you measure me and I’ll show you how I behave”

“Why do you think your company was formed, to show off its efficiencies?”

“The only way you can have excess inventory is with excess capacity!”

“You can call something productive if, and only if, it brings you closer to reaching your goal.”
Providing the Background

“If you continue to do what you’ve always done, you’ll continue to get what you always got.”

TOC’s Five Focusing Steps

1. Identify the system’s constraint
2. Exploit the system’s constraint
3. Subordinate/Synchronize everything else to the above decisions
4. Elevate the system constraint
5. If, in the first 4 steps the constraint is broken, Go back to Step 1, but don’t let inertia become the system constraint.

Eliminates systemic chaos!

Creates a need for other changes

Common sense, but not common practice
Why Throughput Accounting

“Show me how you measure me and I’ll show you how I behave”

Organizations hold basic beliefs about reality therefore…

Organizations put policies and procedures in place to guide operations consistent with these beliefs therefore…

Metrics are established to ensure these policies and procedures are followed therefore…

Individuals behave in a manner consistent with the way they believe they are measured
Why Throughput Accounting

“A controller’s job is not to report profits, it is to guarantee them.”

- We provide the “score card” for the organization
- Are we reactive or proactive?
- Financial statements
  - Provide the organization’s health at a point in time
  - Provide trends over time

Throughput Accounting is primarily a decision making tool.

Throughput Accounting does not require a separate set of books!
Why Throughput Accounting

“Happiness is all about meeting expectations.”

• The only meaningful measure of an organization’s performance is how well it is performing relative to its Goal!

• In For-Profit organizations the Goal is to Make More Money!

• Throughput Accounting is about making decisions and measuring our performance against our expectations!
Making Spending Decisions

“Happiness is all about meeting expectations.”

- Historically – my observations based on personal experience and recent clients
  - Capital improvements
    - Gain more productivity or greater efficiencies
    - Reduce variability
  - Financial justification
    - Present value of money / discounted cash flow
    - Payback in years
    - Must meet corporate thresholds
  - “Make Good” Report?
Making Spending Decisions

“Happiness is all about meeting expectations.”

• Every logistical system in the world is impacted by three phenomena …
  • Interdependencies
  • Variability
  • Constraints

• Even service organizations are logistical systems.
How We Affect Decision Making

“If I have enough cash it doesn’t matter. If I don’t have enough, nothing else matters.”

• If you are seeking to “buy” business – the variable cost you must cover is much less than it was before.
• If you are seeking to “buy” business just remember –
  • This is not sustainable in the long term
  • You must be able to move in and out of markets easily or risk angering these customers
How We Affect Decision Making

“If I have enough cash it doesn’t matter. If I don’t have enough, nothing else matters.”

- How do you currently make spending decisions?
  - Does it bring value?
  - How do you measure the value?
  - Do I have enough cash?
  - Is it in the budget?

- T, I, & OE
  - Any spending decision can be evaluated based on its impact on T, I, & OE
Generating Throughput

“Happiness is all about meeting expectations.”

10 Resources
Each resource’s output provides input for the next resource. Each resource can produce 10 units per hour, on average. How many units can the system produce per hour?
Generating Throughput

“Happiness is all about meeting expectations.”

In this line, resources can reliably produce the values under the respective resources. How many units can this system produce per hour? Where should you invest to improve Throughput?
Sustaining Improvement

Before you can change what you do, you have to change how you think.

Before you can change how you think, you have to change what you believe.

But this is not an easy process, for the “space” is already filled with a “program”, a set of beliefs already developed from experiences that have proved successful in the past.

Thus the learning process has to provide for an unlearning process as part of work, that forces questioning of (current) assumptions and their present consequences.

From Thinking About Quality
Lloyd Dobyns and Claire Crawford-Mason
Sustaining Improvement

“Show me how you measure me and I’ll show you how I behave”

• What is the employee paradigm?
  • Program of the week? Month? Year?
  • New project or now philosophy?
• Change the paradigm!
  • Changing the paradigm means changing the policy
  • Changing the policy means enforcing the new policy
• The only reason a Policy exists is to cause a particular behavior!
  therefore:
• Changing a policy means enforcement!
Sustaining Improvement

“Show me how you measure me and I’ll show you how I behave”

• If we’re in business to make money, what should our financial systems tell us?
• **When** should they tell us?
  • When it is too late to do anything?
  • While we’re in decision making process?
  • While there is still time to take corrective action?
AN EXERCISE
2 opportunities have been presented to management to improve efficiencies in the organization’s processes.

Each opportunity requires a $5,000 investment. You have been tasked with analyzing the opportunities and making a recommendation.
How should we improve this business?

Available resources: 1A, 1B, 1C, 1D
Each resource is available 5 days/week, 8 hours/day (2400 minutes)
Operating Expenses - $6,000 per week
First...

...we need to understand the system and how it is measured.

It is measured by its ability to make money, so ..... Please determine what this system can do in terms of its Goal to make money, i.e. Net Profit?
How much money can this business make in a week?

Available resources: 1A, 1B, 1C, 1D
Each resource is available 5 days/week, 8 hours/day (2400 minutes)
Operating Expenses - $6,000 per week
How Much Money Can We Make?
Calculation Sheet
First Attempt to Determine Profit

Throughput from Q: \((\$100 - 40) \times 50 = \$3,000\)

Throughput from P: \((\$90 - 45) \times 100 = \$4,500\)

Total Throughput: \(\$7,500\)

Operating Expenses: \(\$6,000\)

Net Profit: \(\$1,500\)

*But, … is there a conceptual mistake?*
The Five Focusing Steps
Improving Organizational Performance

1. **IDENTIFY** the system’s constraint(s).

2. Decide how to **EXPLOIT** the system’s constraint(s).

3. **SUBORDINATE** everything else to the above decision.

4. **ELEVATE** the system’s constraint(s).

5. If, in a previous step, a constraint has been broken, **GO BACK** to step one. Do not allow INERTIA to become the system’s constraint.
Second Attempt
Looking for an intrinsic constraint.

(Each resource can work
2400 minutes per week)

<table>
<thead>
<tr>
<th>Resource</th>
<th>Load</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
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</tbody>
</table>
Second Attempt
Looking for an intrinsic constraint.

Each resource can work 2400 minutes per week.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Load</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>P = 15 \times 100 = 1500 \quad Q = 10 \times 50 = 500 / 2000</td>
<td>OK</td>
</tr>
<tr>
<td>B</td>
<td>P = 15 \times 100 = 1500 \quad Q = 30 \times 50 = 1500 / 3000</td>
<td><strong>Bottleneck!</strong> B!</td>
</tr>
<tr>
<td>C</td>
<td>P = 15 \times 100 = 1500 \quad Q = 5 \times 50 = 250 / 1750</td>
<td>OK</td>
</tr>
<tr>
<td>D</td>
<td>P = 15 \times 100 = 1500 \quad Q = 5 \times 50 = 250 / 1750</td>
<td>OK</td>
</tr>
</tbody>
</table>
## Second Attempt
Which product should we concentrate on?

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Price</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>Raw Material Cost</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>Labor Investment</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>Product Margin</td>
<td>______</td>
<td>______</td>
</tr>
</tbody>
</table>
Second Attempt
Which product should we concentrate on?

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Price</td>
<td>$90.00</td>
<td>$100.00</td>
</tr>
<tr>
<td>Raw Material Cost</td>
<td>45.00</td>
<td>40.00</td>
</tr>
<tr>
<td>Labor Investment</td>
<td>60 Min.</td>
<td>50 Min.</td>
</tr>
<tr>
<td>([$6,000/(4*2400)]=$0.625/min]</td>
<td>37.50</td>
<td>31.25</td>
</tr>
<tr>
<td>Product Cost</td>
<td>82.50</td>
<td>71.25</td>
</tr>
<tr>
<td>Product Margin</td>
<td>$ 7.50</td>
<td>$28.75</td>
</tr>
</tbody>
</table>

Conclusion: Sell Q!

What happens if you disagree?
Second Attempt
Considering the intrinsic constraint.

Throughput from Q

Throughput from P

Total Throughput

Operating Expenses

Net Profit
Second Attempt
Considering the intrinsic constraint.

Throughput from Q (50) $3,000
Throughput from P (60) $2,700

Total Throughput $5,700
Operating Expenses $6,000
Net Profit ($300)

Do we still have a Conceptual mistake?
The Five Focusing Steps
Improving Organizational Performance

1. **IDENTIFY** the system’s constraint(s).

2. Decide how to **EXPLOIT** the system’s constraint(s).

3. **SUBORDINATE** everything else to the above decision.

4. **ELEVATE** the system’s constraint(s).

5. If, in a previous step, a constraint has been broken, **GO BACK** to step one. Do not allow INERTIA to become the system’s constraint.
Third Attempt

**Deciding** how to support the constraint.

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Price</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>Raw Material Cost</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>Constraint Investment</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>T/ Constraint Minute</td>
<td>_____</td>
<td>_____</td>
</tr>
</tbody>
</table>
**Third Attempt**

Deciding how to support the constraint.

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Price</td>
<td>$90.00</td>
<td>$100.00</td>
</tr>
<tr>
<td>Raw Material Cost</td>
<td>45.00</td>
<td>40.00</td>
</tr>
<tr>
<td>Constraint Investment</td>
<td>15 Min.</td>
<td>30 Min.</td>
</tr>
<tr>
<td>T/ Constraint Minute</td>
<td>$3.00</td>
<td>$2.00</td>
</tr>
</tbody>
</table>

**Conclusion:** *Sell P!*
Third Attempt
Deciding how to support the constraint.

Throughput from P  __________
Throughput from Q  __________
Total Throughput   __________
Operating Expenses __________
Net Profit         __________
Third Attempt
Deciding how to support the constraint.

Throughput from P (100)       $4,500
Throughput from Q (30)        $1,800

Total Throughput             $6,300
Operating Expenses           $6,000
Net Profit                   $300

At least it’s a profit!
Improvement Opportunities

One process engineer asked for $5,000 for a new tool. He claimed that it would enable him to cut the process time in one department from 15 minutes, down to seven minutes.

Another process engineer asked for $5,000 for a different tool. This engineer wanted to reduce the processing time on 1 resource and increase the processing time on another resource. Overall this would increase the time to process a high volume part from 20 minutes to 22 minutes.

What should you do?
The process engineer who asked for $5,000 to cut the process time from 15 minutes to 7 minutes was referring to the time it takes D to assemble product P.

Is D a constraint?

What will result from spending the money?
The second process engineer is proposing to increase the time it takes to make the middle part - the part that is used by both P and Q. This would actually REDUCE the number of P’s and Q’s that could be produced…right?

Are you so sure?

What if we are able to off-load 2 minutes from the middle B operation to the middle C operation at a cost of an additional 4 minutes processing on C?

Now what do you think?
Net Profit?

The middle part now takes 2 minutes less B-time to build. (It also requires more time from C … but C has plenty of capacity.)

This means we need 260 fewer B-minutes to build 100 P and 30 Q.

We can use them to build even more Qs!

260 / 28 = about 9 more Q!
# Results

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throughput from P (100)</td>
<td>$4,500</td>
</tr>
<tr>
<td>Throughput from Q (39)</td>
<td>$2,340</td>
</tr>
<tr>
<td>Total Throughput</td>
<td>$6,840</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td>$6,000</td>
</tr>
<tr>
<td>Net Profit</td>
<td>$840</td>
</tr>
</tbody>
</table>

*Profits nearly triple !!!*
Oops ...

we forgot to check the **payback period** on the $5,000 we invested ....

...$5,000 / $540 = 9 weeks!

*Make Sense?*