Lean Supply Chain in the Construction Industry using the SCOR Model

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• The SCOR Model
• Lean Supply Chain
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Research idea

• The SCOR model is a useful tool when improving operations in a supply chain (Supply Chain Operations Reference Model)

• Improving operations is today (for some companies) equal with Lean initiatives

• Question?
  - What in the SCOR model can be considered Lean or Agile?
  - How can that information be used?

• Answer:
  - A list of Lean and Agile: Best practices, metrics, and process characteristics
  - A case study from the construction industry
The SCOR Model – Level 1

Supply Chain Operations Reference Model

Level 1

Source: SCOR 8.0
The SCOR Model – Level 2

- **Directive #1**: Focus on the SCOR Model Level 2

Source: SCOR 8.0
## SCOR – Best Practices (M1)

<table>
<thead>
<tr>
<th>Accurate and Approved Work Instructions/Process Plans</th>
<th>Electronic document management that maintains current Standard Operating Procedures (SOP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: SCOR 8.0</td>
<td>Source: SCOR 8.0</td>
</tr>
</tbody>
</table>

### Cellular Manufacturing

- Manufacturing is broken into work cells

### Lean Manufacturing

- Use a team based systematic approach to identifying and eliminating wasteful, or non-value adding activities within your manufacturing organization

### Key Practices of Lean Manufacturing

- Migrate from silos to single to configure to order, build subassemblies to forecast at the highest generic level in the Bill of Material/Recipe/Formula.
- Organize for enhanced flexibility, few job classifications, staff oriented work force.
- Flat Management Structure, Cross-Functional Work Teams.
- Physical Order Tracking and Customer Visibility of Orders.
- Paperless Production Order and Inventory Tracking.
- Performance Results that are Company to Identify/Assess Security, customers, and equipment, Readily Available to Employees.
- Post-Performance Results.
- Postponement.
- Production Lead Times.
- Provide Continuous Formal Training to Employees.

Source: SCOR 8.0
## SCOR – Metrics

<table>
<thead>
<tr>
<th>Performance Attribute</th>
<th>Performance Attribute Definition</th>
<th>Level 1 Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Chain Reliability</td>
<td>The performance of the supply chain in delivering: the correct product, to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation, to the correct customer.</td>
<td>Perfect Order Fulfillment</td>
</tr>
<tr>
<td>Supply Chain Responsiveness</td>
<td>The speed at which a supply chain provides products to the customer.</td>
<td>Order Fulfillment Cycle Time</td>
</tr>
<tr>
<td>Supply Chain Flexibility</td>
<td>The agility of a supply chain in responding to marketplace changes to gain or maintain competitive advantage.</td>
<td>Upside Supply Chain Flexibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upside Supply Chain Adaptability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Downside Supply Chain Adaptability</td>
</tr>
<tr>
<td>Supply Chain Costs</td>
<td>The costs associated with operating the supply chain.</td>
<td>Supply Chain Management Cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost of Goods Sold</td>
</tr>
<tr>
<td>Supply Chain Asset Management</td>
<td>The effectiveness of an organization in managing assets to support demand satisfaction. This includes the management of all assets: fixed and working capital.</td>
<td>Cash-to-Cash Cycle Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Return on Supply Chain Fixed Assets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Return on Working Capital</td>
</tr>
</tbody>
</table>

Source: SCOR 8.0
Lean Supply Chain

- **Lean** Supply Chain is a Supply Chain based on **Lean** principles
  - Eliminating waste
  - Short lead times
  - Small batch size
  - Low inventories, etc.
- **Lean** is production and transportation at low costs
- **Agile** is production and transportation to meet customer demands
- The Customer Order Decoupling Point often separate the two
- **Directive #2**: Focus both on **Lean** and on **Agile** initiatives
Extended SCOR Model

Extended with Lean principles

**Agile**
1. Quality
2. Cost
3. Lead Time

**Lean**
1. Quality
2. Cost
3. Service Level

**Market Qualifiers**

**Market Winners**

Source: Mason-Jones et al. 2000
## Extended SCOR Model

<table>
<thead>
<tr>
<th>Process element</th>
<th>Lean characteristics</th>
<th>Agile characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 Source make-to-stock</td>
<td>- Less time and cost for scheduling.</td>
<td>- Multiple sourcing options.</td>
</tr>
<tr>
<td>S2 Source make-to-order</td>
<td>- Less days for engineering and schedule changes.</td>
<td>- Flexible lead times.</td>
</tr>
<tr>
<td>S3 Source engineer-to-order</td>
<td>- Deliveries according to the project scheduling.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Maximum percentage of orders/lines completed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Direct shipment to project site may reduce costs and time delays.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Maximum orders/lines received in time.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Less cost and time for verifying products.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Maximum percentage of products transferred on time.</td>
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</tr>
<tr>
<td></td>
<td>- Maximum fill rate and maximum inventory days of supply.</td>
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</tr>
<tr>
<td></td>
<td>- Less returns and transaction errors.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Less time for supplier selection.(ETO)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Faster negotiations and selecting good suppliers. (ETO)</td>
<td></td>
</tr>
</tbody>
</table>
Construction Industry

• The Construction Industry in Sweden
  - 60,000 companies
  - EUR 32 Billion turnover
  - 450,000 employees
The Case Study

• The generic supply chain for Peab (AS IS)
## The Case Study

<table>
<thead>
<tr>
<th>Process element</th>
<th>Lean possibility</th>
</tr>
</thead>
</table>
| S1, S2, S3      | – Sourcing should be done according to the sourcing plans of S2, S3.  
|                 | – Maximum orders received in time.  
|                 | – Fewer errors in products received.  
|                 | – Maximum fill rate.  
|                 | – Orders should arrive simultaneously.  
|                 | – Multiple suppliers for emergency requirements. |
| M1, M2, M3      | – Produced depending on Demand for M3 at construction site.  
|                 | – Less defects.  
|                 | – Less Engineering Changes (M2, M3). |
| S1              | – Lot Purchasing is appreciable.  
|                 | – Selected so that can be for multiple projects. |
| M3(at PEAB)     | – Scheduled according to the demand at construction site.  
|                 | – Less defects.  
|                 | – Less engineering changes results in less changes in machinery setups.  
|                 | – Producing at a time for the whole demand for the construction site is appreciable. |
| D1, D2, D3      | – Minimal delivery errors in case of M1.  
|                 | – Less costs for delivery.  
|                 | – Merge in transit is better solution. |
Conclusions

• This paper has introduced the concept of lean principles into the SCOR model.
  - The lean principles are already part of the SCOR model but are here identified and listed.
  - Facilitate the implementation of lean principles in a supply chain.
• The SCOR model contain standardized processes
• To use the SCOR model is to introduce standardized processes in a supply chain for the opportunity of lean supply chain.
Thank you!

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