Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

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Mathias Michalicki, M.Eng.*
Prof. Dr. Markus Schneider

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Agenda

1. Introduction

2. Problem statement: enlargement of Lean initiatives in companies

3. Necessity for new simulation game

4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

5. Conclusion

28.03.2017
Landshut University of Applied Sciences
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4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

5. Conclusion
Introduction

Presenter

Mathias Michalicki, M.Eng.

- Research assistant at Technology Centre PULS (Production and Logistics Systems)
- Field of research: Accounting for Lean
- Doctoral candidate at the Otto von Guericke University Magdeburg (Institute of Logistics and Material Handling Systems – Prof. Dr. Schenk)

Stefan Blöchl, M.Eng.

- Research assistant at Technology Centre PULS (Production and Logistics Systems)
- Project member of Diversity.Impuls (16OH21019)
- Doctoral candidate at the Otto von Guericke University Magdeburg (Institute of Logistics and Material Handling Systems – Prof. Dr. Schenk)
Introduction
Technology Centre Production and Logistics Systems
Introduction
Technology Centre Production and Logistics Systems

- Complete production value stream
- Product: logistics trolley
- 1.5 million € equipment
- 900 m² shopfloor

Incoming goods → Assembly → Manufacturing → Intralogistics
1. Introduction

2. Problem statement: enlargement of Lean initiatives in companies

3. Necessity for new simulation game

4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

5. Conclusion
2. Problem statement: enlargement of Lean initiatives in companies

Main elements of a sustainable Lean management system are:

- Corporate Culture
- Organizational Structure
- Leadership System
- Technologies, Processes and Products
- Controlling System
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3. Necessity for new simulation game

Top-down

Accounting for Lean (result indicators)

Lean Leadership

Bottom-up

Shopfloor Management (performance indicators)

production system

organisational structure

controlling system
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- Classification and main learning content

<table>
<thead>
<tr>
<th>academic target group</th>
<th>students, research personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>industrial target group</td>
<td>engineers, planners, controllers, managers</td>
</tr>
<tr>
<td>integrated departments</td>
<td>production, engineering, logistics, accounting &amp; controlling</td>
</tr>
</tbody>
</table>
| main learning content     | • Difference between mass production and Lean production systems  
                            • Lean principles in production / logistics / controlling  
                            • Difference between traditional accounting and Accounting for Lean in a Lean environment  
                            • Necessity of shopfloor management as part of Lean Leadership  
                            • Advantages of Lean Leadership methods  
                            • Necessary unity of production system, organizational structure and accounting system for successful Lean transformations |
| duration                  | 2 days including 6 – 8 h game time + theory units |
| number of participants     | 8 – 12 |
4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

- General structure

**Course of simulation game**

**Part 1:** Result indicators (AfL)

- Theory: Accounting for Lean (AfL)
- Debriefing 1st + 2nd game round with AfL

- 1st „Aha Effect“: Conflict between traditional accounting and Lean

- Theory: Lean Management
- 1st game round: job shop production
- Debriefing 1st game round
- 2nd game round: one-piece-flow
- Debriefing 2nd game round

**Part 2:** Performance indicators (SFM)

- 3rd game round: Management by numbers
- Debriefing 3rd game round

- 2nd „Aha Effect“: Traditional leadership style unsuitable for management of shopfloor

- Theory: Shopfloor Management (SFM)
- Workshop: Development of SFM board
- 4th game round: Management by “Gemba”
- Debriefing 4th game round

- Theory: Outlook implementation of SFM
4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

- Accounting for Lean: Conflict between traditional accounting and Lean
- **cost object accounting** – calculation of both game rounds

<table>
<thead>
<tr>
<th>Inventory of trolleys</th>
<th>round 1</th>
<th>round 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>starting inventory</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>sales volume</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>ending inventory</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>production volume</td>
<td>15</td>
<td>10</td>
</tr>
</tbody>
</table>

**Round 1: Overproduction**

**Round 2: Production according to customer demand**
4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

- Accounting for Lean: Conflict between traditional accounting and Lean

**Enormously improved performance indicators in the Lean game round!**

<table>
<thead>
<tr>
<th>Product cost calculation</th>
<th>round 1</th>
<th>round 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>material costs</td>
<td>30,00 €</td>
<td>30,00 €</td>
</tr>
<tr>
<td>direct costs pre-assembly</td>
<td>0,53 €</td>
<td>0,80 €</td>
</tr>
<tr>
<td>overhead pre-assembly (110 %)</td>
<td>0,59 €</td>
<td>0,88 €</td>
</tr>
<tr>
<td>direct costs assembly</td>
<td>0,53 €</td>
<td>0,80 €</td>
</tr>
<tr>
<td>overhead assembly (110 %)</td>
<td>0,59 €</td>
<td>0,88 €</td>
</tr>
<tr>
<td>direct costs QA</td>
<td>0,33 €</td>
<td>0,50 €</td>
</tr>
<tr>
<td>overhead QA (113 %)</td>
<td>0,38 €</td>
<td>0,57 €</td>
</tr>
<tr>
<td>direct costs packaging</td>
<td>0,27 €</td>
<td>0,40 €</td>
</tr>
<tr>
<td>overhead packaging (142 %)</td>
<td>0,38 €</td>
<td>0,57 €</td>
</tr>
<tr>
<td><strong>product costs</strong></td>
<td><strong>33,60 €</strong></td>
<td><strong>35,40 €</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Income Statement</th>
<th>round 1</th>
<th>round 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>sales</td>
<td>500,00 €</td>
<td>500,00 €</td>
</tr>
<tr>
<td>cost of sales (units sold * product cost)</td>
<td>336,00 €</td>
<td>354,00 €</td>
</tr>
<tr>
<td><strong>gross profit</strong></td>
<td><strong>164,00 €</strong></td>
<td><strong>146,00 €</strong></td>
</tr>
<tr>
<td>return on sales (ROS)</td>
<td><strong>33%</strong></td>
<td><strong>29%</strong></td>
</tr>
</tbody>
</table>

- Higher product costs
- Less return on sales
- Traditional accounting supports overproduction and seems anti-Lean
4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

- Accounting for Lean: Conflict between traditional accounting and Lean

<table>
<thead>
<tr>
<th></th>
<th>round 1</th>
<th>round 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>sales</td>
<td>500,00 €</td>
<td>500,00 €</td>
</tr>
<tr>
<td>material costs</td>
<td>450,00 €</td>
<td>300,00 €</td>
</tr>
<tr>
<td>wages &amp; salary</td>
<td>36,00 €</td>
<td>36,00 €</td>
</tr>
<tr>
<td>machine costs</td>
<td>9,00 €</td>
<td>9,00 €</td>
</tr>
<tr>
<td>auxiliary material</td>
<td>1,00 €</td>
<td>1,00 €</td>
</tr>
<tr>
<td>rent</td>
<td>4,00 €</td>
<td>4,00 €</td>
</tr>
<tr>
<td>additional costs</td>
<td>1,00 €</td>
<td>1,00 €</td>
</tr>
<tr>
<td>total value stream costs</td>
<td>501,00 €</td>
<td>351,00 €</td>
</tr>
<tr>
<td>value stream profit</td>
<td>- 1,00 €</td>
<td>149,00 €</td>
</tr>
<tr>
<td>return on sales (ROS)</td>
<td>-0,2%</td>
<td>29,8%</td>
</tr>
<tr>
<td>adjustment to external financial rules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>corporate overhead</td>
<td>3,00 €</td>
<td>3,00 €</td>
</tr>
<tr>
<td>inventory change</td>
<td>168,00 €</td>
<td>- €</td>
</tr>
<tr>
<td>gross profit</td>
<td>164,00 €</td>
<td>146,00 €</td>
</tr>
</tbody>
</table>

- Simple **direct costing** of the **value stream** using actual costs on a **cash basis** (no accrual basis)

- **Non-material costs** are treated as fixed costs of the period

- No complicated allocation of overhead

- Easy to understand

- Support of Lean Thinking

- Adjustable to external financial rules
4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

- Shopfloor Management: Traditional leadership style unsuitable for management of shopfloor

**Approach**

- Personal verification on-site (Go-to-Gemba)

**Result**

- Managers know their processes

**Style of management**

- „Management by Process Improvement“ (Genchi-Genbutsu)

**Character**

- Extremely high reference to reality

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4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

- Shopfloor Management: Traditional leadership style unsuitable for management of shopfloor

**Approach**

- Reports, ERP systems...

**Result**

- Do managers know their processes?

**Style of management**

- „Management by Remote Control“

**Character**

- Focus on supposed reality
4. Simulation Game for Lean Leadership – Shopfloor Management combined with Accounting for Lean

- Shopfloor Management: Traditional leadership style unsuitable for management of shopfloor
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5. Conclusion

- traditional accounting as a barrier for Lean transformation
- operational benefits of a Lean production system over a mass production system
- traditional full absorption costing shows less profit in Lean
- successful Lean transformations need a holistic Lean management system
- need to install a shopfloor management system as well
- result indicators are important, but unable for management and steering of the shopfloor
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Simulation Game
Round 1: job shop production

- Mass production system
- Batch production
- Push system
- High division of labour and different departments
- Piece rate wages
- 12.5 min production run
Simulation Game
Round 2: one-piece-flow

- Lean production system
- One-piece-flow
- Pull system
- Heijunka
- All processes integrated in one value stream
- 12.5 min production run