Managing Global Production Networks
Presentation at the Controller Congress 2017

Paul Lemoine, Vice President Global Manufacturing & Operational Excellence
Inalfa Roof Systems, Venray (NL)

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Paul Lemoine
Vice President Global Manufacturing & Operational Excellence at Inalfa Roof Systems in Venray, NL
42 years in international Business thereof 28 years experience in Lean Manufacturing and Business Excellence

Work History (amongst others):
- Starting a Lean Plant (GM/ Opel Eisenach, 1992)
- Restructuring a Vehicle Operations plant (brownfield) (Ford Cologne, 2002)
- Harbour productivity report Europe: Number one and two
- Lean Production Award 2006
Global Challenges and Trends

**Challenges**

- A globalized world requires Global presence and Global Production networks (despite some new nationalistic trends like 'America first').
- The markets underly permanent changes in high frequency. They are volatile, facing continuous technical innovations and become more complex.
- The process of becoming global to get access to growing markets or to achieve quality, service, and/or cost advantages from the reconfigured Value Chains is one of the most complex processes that companies undertake.
- Designing and implementing global manufacturing and logistics networks require innovative methodological approaches.
- The segmentation of the markets and increasing trends to customization result in smaller volumes per product type and higher variations (complexity).
- New competitors are entering the markets with innovations and new business processes.

**Consequences**

- Most of the companies need to analyse, assess, define, and deploy the operations strategy.
- Complex networks need effective coordination and control of the value chains.
- Flawless and aligned processes in Purchase, Logistics and Production are essential for the success of the company.
- Companies need to stay agile. Changes need to be anticipated and counter measured.
- Value chains will be integrated in global networks.
- Production will be partially localized.
- Higher complexity requires flexible manufacturing with low throughput times.
- Standard products are under high price pressure, innovations are needed for profitability (products and processes).
- Greater focus on total cost along the value chain.
- Industry 4.0 or the 'internet of things' will force the Production network into new conditions.
Essentials for a Global Production Network

1. Focus on customer demand, - understand the local markets.
2. Need for a clear mission / strive for World Class
3. Common production philosophy, processes and tools
4. Decentralized Leadership, - central government versus regional and local decision making
5. Strong representation in the region
6. The “Voice of Manufacturing” needs to be heard (throughout the value chain).
7. Minimise the input of your resources in order to stay lean/ agile.
8. Strong Supply Chain function to steer the global supply network from raw material to customer. Concentrate on the total value stream (holistic approach). Involve all parties within the value stream.
9. Excellent Controlling System to provide the decision makers with the right input (real time monitoring as much as possible, high level of data integrity)
The XX-company global Business Model:

**DELIVERING PREMIUM PRODUCTS & SUPERIOR BUSINESS RESULTS**

**“VITAL FEW” PRIORITIES**
1. Deliver quality & delight the customer
2. Build the brands & grow revenue
3. Develop distinctive products that deliver the brand promise
4. Achieve a competitive cost base
5. Create the winning team

**INTENSIFY COMMUNICATION**
Communicate consistently
Focus on vital few priorities
Keep the message simple
Help people prioritise
Remove barriers

**IMPROVE WORKING PROCESSES**
Simplify
Stabilise
Standardise
Set cadence
Sustain

**GO SIMPLE, GO COMMON, GO FAST**
Take decisions and execute! Execute! Execute!
Policy Deployment over all units and entities globally

The **Scorecard** identifies the priorities and targets.

The **Value Stream Map** identifies the opportunities.

The **A3** identifies the actions and the resources required.

The **Master Schedule** identifies the timing and follow up frequency.
Common production philosophy – the Toyota House (e.g.)

- Best Quality – Lowest Cost – Shortest Lead Time
- Best Safety – High Morale

Through shortening the production flow by eliminating waste

- Just-in-Time
  - Right part, right amount, right time
  - Takt time planning
  - Continuous flow
  - Pull system
  - Quick changeover
  - Integrated Logistics

- People & Teamwork
  - Selection
  - Common goals
  - Ringi decision making
  - Cross-trained

- Waste Reduction
  - Genchi
  - Genbutsu
  - 5 Why’s
  - Eyes for Waste
  - Problem Solving

- Jidoka
  - (In-station quality)
  - Make Problems Visible
  - Automatic stops
  - Andon
  - Parson-machine separation
  - Error proofing
  - In-station quality
  - Control
  - Solve root cause of problems (5 Why’s)

- Leveled Production (heijunka)

- Stable and Standardized Processes
  - Visual Management
  - Toyota Way Philosophy
Landscapes look like this:
Many Initiatives not linked and not aligned (a typical syndrome)
Example of a holistic (lean) production system

<table>
<thead>
<tr>
<th><strong>Expectations</strong></th>
<th><strong>Leas</strong></th>
<th><strong>Tools / methods</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer perspective</strong></td>
<td><strong>Information &amp; communication</strong></td>
<td>- Transparency - Overview - Communication - Safety - Simple directions</td>
</tr>
<tr>
<td><strong>Internal Perspective</strong></td>
<td><strong>Workplace Organisation</strong></td>
<td>- Safety in the workplace - Cleanliness and order - Ergonomics - Employee workplace design - Environmental awareness and protection</td>
</tr>
<tr>
<td><strong>Financial perspective</strong></td>
<td><strong>Standardised Processes</strong></td>
<td>- Standardised work processes - Optimisation + flexibility - Facilitate training - Constant capacity - Reduction of wastage - Process safety/security</td>
</tr>
<tr>
<td><strong>Innovation &amp; training</strong></td>
<td><strong>Material systems</strong></td>
<td>- Optimised stock - Optimised material routes - Operator-friendly material supply - Self-built ma negocio - Optimised logistic costs</td>
</tr>
<tr>
<td><strong>Balance Score Card</strong></td>
<td><strong>TPM</strong></td>
<td>- Staff involvement - Improvement of systems availability - Optimisation of systems - Optimised maintenance costs - TPM-compliance planning</td>
</tr>
<tr>
<td><strong>Continuous Improvement</strong></td>
<td><strong>Continuous Improvement</strong></td>
<td>- Six sigma - KAIKEN workshops - Mafact audits - Standardised problem solving</td>
</tr>
<tr>
<td><strong>Employee systems</strong></td>
<td><strong>Employee systems</strong></td>
<td>- Leadership - Staff motivation - Communication and information - Clearly structured duties - Staff involvement</td>
</tr>
<tr>
<td><strong>Quality processes</strong></td>
<td><strong>Quality processes</strong></td>
<td>- Meets customer requirements - Quick response quality control - Staff individual responsibility - Preventative quality management</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Goals</strong></th>
<th><strong>Results</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety</strong></td>
<td>- SPC/5S - JIT/JS - 5S</td>
</tr>
</tbody>
</table>
World Class Leadership thinks global

Iceberg Model – every department is globally involved and needs to think global

Visible participants

- Logistics
- Shop floor
- Product Flow
- Operator

Processes

1. Strategy & Alignment
2. Leadership
3. Behaviour & Engagement

Global Leadership

Supporting / Enabling

- SCM
- Human Resources
- Manufacturing Engineering
- Purchase
- Supplier
- Product Engineering
- Finance
- etc.

Prof. Hines in June 2013
# Quantitative and Subjective Criteria of a Global Lean Business Model

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Stage 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactive</td>
<td>Formal</td>
<td>Deployed</td>
<td>Autonomous</td>
<td>Way of Life</td>
</tr>
</tbody>
</table>

## Processes, procedures & Systems

- **Extent** - Clearly defined processes are found in all or required parts of the business
- **Reach** – The required processes have been deployed through all levels
- **Adherence** – The required processes are effectively being used and are not passed-by

## Individual & Collective Behaviour

- **Engagement** – Leaders and Employees adhere to values and strategic and operational requirements
- **Trust** - There is respect for others with evidence of listening and involvement
- **Focus** – Leaders and Employees display a relentless attention to the requirement for results

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Prof. Hines in June 2013
Global Production Networks need Leaders!

<table>
<thead>
<tr>
<th>Manager</th>
<th>Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administers</td>
<td>Innovates</td>
</tr>
<tr>
<td>Is a copy</td>
<td>Is an original</td>
</tr>
<tr>
<td>Maintains</td>
<td>Develops</td>
</tr>
<tr>
<td>Focuses on system and structure</td>
<td>Focuses on people</td>
</tr>
<tr>
<td>Relies on control</td>
<td>Inspires trust</td>
</tr>
<tr>
<td>Has a short-range view</td>
<td>Has a long-range perspective</td>
</tr>
<tr>
<td>Asks how and when</td>
<td>Asks why</td>
</tr>
<tr>
<td>Has his eye on the bottom line</td>
<td>Has his eye on the horizon</td>
</tr>
<tr>
<td>Imitates</td>
<td>Originates</td>
</tr>
<tr>
<td>Accepts the status quo</td>
<td>Challenges the status quo</td>
</tr>
<tr>
<td>Classic good soldier</td>
<td>Is his own person</td>
</tr>
<tr>
<td>Does things right</td>
<td>Does the right thing</td>
</tr>
</tbody>
</table>

Prof. Hines in June 2013
Focus on customer’s demand

**Product development**

Meeting customer requirements:
Fulfil specifications
with minimal efforts

**Tools:**
Value Analysis (VA)
Value Engineering (VE)

**Definition:**
Technical cost reductions
with VA/VE-Methods and tools
Value Analysis / Value Engineering (VAVE):

Definition:
Technical cost reductions with VAVE Methods and tools

Conditions:
Product specifications have to be complied with and may only be changed in agreement with the customer

VAVE is a structured process

The difference between VA and VE:

- VA looks at products and services that have already been completed
- VE looks at products and services in the product development phase
What is VAVE?

- A structured effort to achieve product specification at lowest costs without negative implications on the required quality, reliability and marketability of the product.
- A proven approach to increase the value and/or to reduce the costs for products, processes, services, organisational structure and procedures.
- A comprehensive and structured way of solving problems considering tasks and requirements of the management as well as human behaviour in an open, complex and dynamic system.
- Is not only used to increase the value of existing products, however, for products which are still under development (Value engineering), also.
**VAVE - analyzing all the aspects of production costs**

<table>
<thead>
<tr>
<th>Material / Weight</th>
<th>Design</th>
<th>Tooling</th>
<th>Logistics/Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>part</td>
<td>intern</td>
<td>Production</td>
<td></td>
</tr>
<tr>
<td>part</td>
<td>extern</td>
<td>Assembly</td>
<td></td>
</tr>
<tr>
<td>part</td>
<td></td>
<td>Measuring</td>
<td></td>
</tr>
<tr>
<td>........</td>
<td></td>
<td>.........</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>TOTAL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process</th>
<th>VAVE Summary</th>
<th>Quality/ Guarantee</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material</td>
<td>Supplier</td>
<td>.....</td>
</tr>
<tr>
<td>2</td>
<td>Process</td>
<td>In house Prod</td>
<td>..........</td>
</tr>
<tr>
<td>3</td>
<td>Developm.</td>
<td>Supplier</td>
<td>..........</td>
</tr>
<tr>
<td>........</td>
<td>Quality</td>
<td>Supplier</td>
<td>TOTAL</td>
</tr>
<tr>
<td>TOTAL</td>
<td>TOTAL</td>
<td>Supplier</td>
<td>TOTAL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supplier</th>
<th>In house Prod</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier</td>
<td>Supplier</td>
</tr>
<tr>
<td>Supplier</td>
<td>Supplier</td>
</tr>
</tbody>
</table>

**CA AKADEMIE**
Benchmarking: Door Design Comparison

**Door - P xxx**

- Tailor Welded Inner
- 11 Parts
- 6 Load Sequences
- 121 Welds
- 3 Metal Forming Operations

**Benchmark Door**

- Tailor Welded Inner
- 8 Parts
- 3 Load Sequences
- 80 Welds
- 1 Metal Forming Operation
Benchmarking: Impact of Design on Process

Ford Door Process - P 221

- 67.5 Cycle Time
- 47.9 JPH Net
- 700 Jobs/Day on 2 Shifts
  (2 styles 70/30 volume swing to support 1000/day)

Benchmark Door Process

- 61.6 Cycle Time
- 48 JPH Net
- 768 Jobs/Day 2 Shifts
The **Value Stream Analysis** can be applied to nearly any value chain – from raw material to finished products. It includes production-, material- and information-flow.

It gives us a representation of the overall picture of a value chain from suppliers to customers. It creates transparency. Potentials are being flagged.

All kinds of waste are shown for the entire product family and for the complete value chain.

This results in potentials, which can be adjusted to each other in an optimal way (due to involvement of all related processes).

Value Stream Mapping is a key element of World Class Manufacturing (WCM).
World Class Manufacturing - The Value Stream

How to design an optimal value stream?:
Always consider Total Costs / Total delivered costs
Question the value stream / speak in data
Rationalize the number of suppliers
Optimise logistics flow (information/physics)
Create product variants in the value stream
process as late as possible

Tools:
1. Total delivered costs
2. Value Stream Mapping
3. Supplier development
4. Logistics optimisation
5. Design for Manufacturability (DFM) / Design for Assembly (DFA)

What is the customer willing to pay for?
In the area of performance:
Minimise investments
Use World Class Manufacturing techniques and tools

Tool:
Lean Toolbox

Definition:
Achieve desired results with minimal resources
Elimination of waste as an on-going task
Holistic approach as a MUST

- Procurement logistics
- Distribution logistics
- Production logistics
- Sales + Purchase + Production +
  - Continuous production, large batches
  - Purchase worldwide, cheap, large batch sizes
  - Sell many variants

High level of problem recognition
Low level of problem recognition

Low level
High level
Organise continuous improvements (CIP)

1. Reduce material costs
   - Reduce unit costs
   - Reduce weight
   - Reduce scrap
   - Use recycled materials
   - Avoid cuttings

2. KAIZEN activities (from raw material until delivery)
   - Own production
   - Administrative areas
   - Suppliers

   Focus: small but continual improvements
Organise continuous improvements (CIP)

3. **Quality Leadership**
   Objectives:  
   - Quality at the source / in the station  
   - Minimise scrap and rework  
   Process improvements  
   Reduce variabilities (6-Sigma)

4. **Logistics**
   Objectives:  
   - Improve performance  
   - Minimise logistics costs  
   Level Schedule  
   „Lean Logistics“ will lean out the value chain  
   Optimise packaging density  
   Improve utilization of transport capacities  
   Optimise total costs  
   **Pseudo flow** vs. **One-piece-flow**
WCM Strategies and Methods: Part Production Assessment Process

Quality assurance mapping

Process flow

| Process map for quality assurance of key customer concerns |
| In Process and inspection assurance proposals for customer concern items |
World Class Manufacturing At Work / Best practice Sharing
VAVE – case

**Actions taken**
- Train VAVE Coordinator for the division
- Run VAVE workshop with intradivisonal participation / close follow up
- Reduce rework in accordance with the customer
- Reduce material usage (cut-out holes)
- Optimize material, scrap and rework thermoforming holes
- Change recipe of heavy layer (extrusion line) to lower costs
- Recycling of heavy layer material

**Results**
- 152.000 € /year - less worker (3 shifts), less glue, reduction of scrap
- 45.000 €/year - thermoforming holes avoided, no scrap and rework
- 150.000 €/year (only 2013)
- 90.000 €/year – accomplished optimization, improved material usage
## Actions taken

- Truck utilization significantly increased matching trucks and packaging dimensions
- Increased use of mega-trailers (100cbm, 20% more compared to Euro-trailer) as standard equipment
- By combining shipments from several suppliers or split shipments for better transport utilization

## Results

- Use of ~ 80% megatrailers, smaller Euro-trailers only if required due to part and packaging dimensions
- Improvement of packaging to ensure stack ability and quality (no damage)
- Truck utilization increased from 79% to 91%
- **Annualized transport cost savings > 1 mio €**

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**Previous State**

![Empty space](image1)

**Current State**

![Fully used](image2)
World Class Manufacturing At Work/ Best practice Sharing
Value Stream Mapping

**Actions taken**

- Utilize practical VSM approach to visualize the value stream and understand the key improvement items
- Use 5-day workshop with skilled trainer
- Use tacttime control, Yamazumi and “Spaghetti”-diagram

**Results**

- Reduction of throughput time from 2369 min. to 980 min. (=50%)
- Reduction of WIP by 50%
- Productivity improvement: 12%

**Previous State**

![Previous State Diagram]

**Current State**

![Current State Diagram]
A Modern Controlling Function will support the Global Production Network
Supply Chain Controlling

SUPPLY CHAIN OPERATIONS
REFERENCE (SCOR) MODEL

Supply Chain Controlling supports the optimization of the
value chain amongst multiple companies
Production-Controlling in a global network

Production Controlling supports and controls the value adding processes globally with high standards and a common process / system.
Global Finance – Turning the pyramid to spend more time for strategy (= financial performance)
# Common global Performance Measurement System

<table>
<thead>
<tr>
<th>Differentiation</th>
<th>Traditional KPI system</th>
<th>Performance Measurement System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time horizon</td>
<td>Past</td>
<td>Future</td>
</tr>
<tr>
<td>Primary</td>
<td>Financials</td>
<td>Monetary and Non-monetary</td>
</tr>
<tr>
<td>Interrelationship</td>
<td>Isolated metrics of single KPI</td>
<td>Cause-effect chain / reference</td>
</tr>
<tr>
<td>Targeted Direction</td>
<td>Finance</td>
<td>Customer</td>
</tr>
<tr>
<td>Leverage</td>
<td>Steer financial data</td>
<td>Control the strategy of the company</td>
</tr>
<tr>
<td>Reporting</td>
<td>Functionally</td>
<td>Process</td>
</tr>
<tr>
<td>Focus</td>
<td>Internal</td>
<td>Internal and external</td>
</tr>
<tr>
<td>Cost-performance</td>
<td>Costs down</td>
<td>Performance up</td>
</tr>
<tr>
<td>Learning</td>
<td>Individually</td>
<td>Companywide qualification</td>
</tr>
</tbody>
</table>
The challenges in a globalized world need a global production network, generally.

A global Production network needs a common vision and strategies reflecting world class standards

Standardized processes and tools are success factors (the ‘lean’ toolbox)

Organisational questions need to be clarified: Central government versus regional and local decision making

Continuous improvements of processes and costs - Best practise sharing

The consideration of the total value stream will avoid isolated solutions and will favour holistic improvements. This will provide sustainable results.

Governance of the value stream, - strong Supply Chain Management

Lessons learnt / best practice sharing will help to improve the results

Total costs consideration and optimization along the value stream - an efficient Production-Controlling process will steer and control the production process and the value stream.