Lean production systems – Streamlining production and logistics

Dr. Stephan Keßler | Essen, 05.11.2010
Agenda

1. **Definitions, structure and background of Lean Production Systems (LSP)**
2. **Dimensions of dissemination**
3. ** Typical elements of LSP and exemplary consequences for production organisation**
4. **Conclusion and future challenges**
Understanding and objectives of lean production systems (LPS)

Definitions

• LPS are operating instructions for the production of products and services and support the planning, operation and continuous improvement of production processes. Innovative organizational concepts/components that have proven to be a best-practice solutions, are matched in an overall system. /Fraunhofer IAO/

• LPS can be understood as a dynamic network of design principles, methods and tools for the planning, operation and ongoing improvement of business processes. It is run with a high degree of employee participation. /MTM/

Objectives

- Structuring, describing and quantifying the strategies, methods and instruments / tools associated with the value creation process
- Representation of interlinkages and interdependencies between the individual components
- Establish transparent and comprehensible but also flexible standards for the entire company

Management philosophy

Focussing on overall optimization of production instead of pursuing solutions for single point optimizations
Structure of lean production systems

- **Objectives**
  - Delivery, costs, quality

- **Principles**
  - Process orientation, pull, prevention of errors, flexibility

- **Methods**
  - Poka Yoke, production levelling, Milk Run & supermarkets, Kanban, Kaizen, 5S, PDCA, Jidoka, FMEA

- **Tools**
  - Manual, operating instructions, team meeting, Schulungen, brainstorming, maintenance plan, Kanban-card, workshops, interview, qualification matrix, KPI-board, audit check list

Also called:
- Specification
  - Elements / sub-systems / modules / field of action
  - Functions to achieve corporate objectives
  - Bundling of methods

- Normative production management
  - Methods
  - Also called: components / concepts
  - Approaches to implement the single principles

- Strategic production management
  - Also called: instruments / techniques
  - Supporting implementation of methods

- Operative production management
Phases of development of lean production systems

- **Taylorism**
  - Division of labour
  - Assembly line production
  - Standardisation
  - Mass production

- **Fordism**

- **REFA**

- **Toyota produktion system (TPS)**
  - Innovative work organisation
  - Decentralisation
  - Processes

- **Volvoism**
  - Group work

- **Lean... Management**
  - Production
  - Administration
  - Manufacturing

- **Lean Thinking**

- **LSP**
  - Integration of isolated elements of production organization
  - Applicability in all business areas (not fixed to production)
  - Origin: automotive industry, especially TPS
  - Applicability to all industries / business types

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Examples for the structure of LPS of some companies

- Toyota production system
  - Total Quality Control (TQC)
  - Just-in-Time (JIT)
  - Jidoka (Automation)
  - Flexible production
  - Cost reductions by systematic avoidance of waste

- Bosch Production System (BPS)
  - Quality
  - Processorientation
  - Error prevention
  - Avoidance of waste and continuous improvement
  - Employee satisfaction

- Hella Production System (HeIPS)

- Mercedes Benz-Production System (MPS)

- KVP
  - Visualisation and standardisation
  - Null-Failure principle
  - Total productive maintenance (TPM)
  - Material flow

- Control
  - Production System (MNPS)

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Levels of dissemination of lean production systems

Sectors
- Industry
- ... (omitted)
- Service providers

Branches
- Automotive
- Mechanical Engineering
- Electronics
- ... (omitted)
- Process industry

Level of added value
- OEM
- Tier 1
- Tier 2
- ... (omitted)
- Tier n

Business processes
- Production
- Production related processes
- ... (omitted)
- Product / process design
- Administration processes

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Value chain-wide dissemination of lean production systems

Current focus of impact of Lean Production Systems

Logistics Service Providers (LSP)

Industrial Logistics

Commercial Logistics

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Inter-organizational dissemination of lean production systems

Current focus of impact of Lean Production Systems

Future target / postulation: application of production system principles to all business processes
Interbranch dissemination of lean production systems

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Sources: /WINN02, DOMB05, own research/
Cross-sector dissemination of lean production systems

Increasing requirements:
- e.g. shorter development times, higher quality, Need for cost reductions, ...
- e.g. higher delivery reliability, stronger customer integration, more variants, ...
- e.g. more complex process control, higher flexibility, shorter time for reaction, integration to customer/supplier-processes...

**Objectives**
- ... Value stream design ...

**Methods**
- ... robust processes, material supply ...
- ... Kaizen workshops ...
- ... standardisation, GIP ...
- ... kanban workshops ...

**Principles**
- ... CIP ...

**Processes**
- (e.g. development, manufacturing)
- (e.g. packaging, manufacturing)
- (e.g. transport, warehousing, consignment, waste disposal)
- (e.g. ship to line)
- (e.g. assembly)

**Logistics Service Provider (LSP)**

**Consignor**

**Consignee**

**Legend:**
- Processes in responsibility of LSP
- Processes in responsibility of consignor/consignee

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Derivation of typical elements of lean production systems

Detailed analysis of structure of four reference-production systems

Consolidation to standard elements of a typical lean production system

Standard elements of LPS

Plausibility check by matching standard elements with elements of more than 30 industrial LPS

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Typical elements of lean production systems

- Fostering quality thinking and acting
- Supporting zero-defects-manufacturing by systematic error detection, prevention and avoidance
- Capability and stabilisation of processes
- Synchronization of demand and production
- Flexibility of process chains
- Levelled production
- Flow orientation
- Lean processes in indirect business areas
- Taking lean principles into account in all life cycle phases of products
- Planning of processes capable for lean production
- Continuous checking of current state
- Use of employee creativity by involving all stakeholders
- Promotion of willingness to change
- Standardised and binding, but changeable sequences
- Transparency and simplification in service provision
- Common Best Practices

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Implications of LSP for production organisation:
Simplified Current State of a Value Stream of a First-tier Supplier
Implications of LSP for production organisation: Simplified Future State of a Value Stream of a First-tier Supplier after introducing a LSP
Conclusion…

- LPS consolidate and systematise the manifold organisational approaches in an overall framework

- they ensure a stringent alignment of methods and tools in use to superordinated business objectives

- LPS are becoming increasingly widespread among companies of different branches, sizes, sectors

- the content of LPS has multiple impacts on the organisation of production of a company

- overall, the definition and implementation of a LPS seems to be a success story …
...and future challenges

- Often companies see the introduction of LPS still highly bureaucratic (focussing on the creation of the manual, staff positions, ...), the true "spirit" is to be anchored better / more consistent in many cases.

- Stronger consideration of environmental issues requires critical analysis and possibly adjustments/changes to the pool of well established lean techniques and methods.

- Adaptation of the method level to the needs of a demographic change among labor force (within the standard element work organization).

- Continue to force the transfer of the successes in the use of LPS contents on industries/ processes beyond automotive/production.
Thank you very much.

Do you have any questions or remarks?