ERP Meets Lean Management

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High-Tech meets No-Tech!

**ERP**
- Work Orders
- Push
- Data Entry
- Reports
- Security/Access
- Data Accuracy
- Complicated

**Lean**
- Flow
- Pull
- Kanban
- JIT
- Visual
- Empowerment
- Simplified

**Digital**

**Visual**

Spread Sheets
ERP & Lean – Similarities and Differences

**ERP**
- Strives to minimize inventory
- Order based
- Utilizes a computer
- It is a PUSH system
- ERP is a set of business processes and methodologies, enabled by computer technology, designed to integrate all functional areas within an enterprise to optimize the use of resources used to accomplish tasks

**Lean**
- Strives to eliminate waste
- Flow (JIT & Kanban)
- Primarily visual
- It is a PULL system
- A philosophy of work that focuses on the elimination of all waste and the minimization of the amount of resources used to accomplish tasks
ERP II – Next Generation of Total Integration

**ERP is the core data base and transaction engine.**

- **APS** = Advanced Planning System
- **B2B** = Business to Business
- **B2C** = Business to Consumer
- **B2E** = Business to Employee
- **CRM** = Customer Relationship Management
- **DRP** = Distribution Requirements Planning
- **EDI** = Electronic Data Interchange
- **ERP** = Enterprise Resources Planning
- **FSS** = Field Service System
- **MES** = Manufacturing Execution System
- **MMS** = Maintenance Management System
- **MRP II** = Manufacturing Resources Planning
- **QMS** = Quality Management System
- **TMS** = Transportation Management System
- **WMS** = Warehouse Management System

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ERP Processes

ERP Processes

Planning
- Business Planning
- Sales and Operations Planning
- Resource Reqmts Planning
- Demand Management & Forecasting

Scheduling
- Master Production Scheduling
- Rough Cut Capacity Planning
- Material Requirements Planning

Execution
- Capacity Requirements Planning
- Execution
Digital and Visual Environments

ERP

Planning

Scheduling

Tracking

Getting

Making

Moving

Measuring

Reporting

Finishing

JIT

Planning → Execution
Computerized and Visual Environments

Data and information is in the computer but access may be limited. Accuracy may also be questionable.

Data and information tends to be visual but availability may be limited. Accuracy is typically not an issue.
Linking Sales/Marketing to Operations

S&OP

The critical link between Sales, Marketing, Forecasting and Operations
Planning & Scheduling (ERP) – Why Do It?

- Lead time to procure raw materials and components is longer than the lead time presented to customers (internal & external).
- Lead time to manufacture products is longer than the lead time presented to customers (internal & external).
- We must have products in the incoming pipeline well before we have actual demand from customers (internal & external).
- JIT and Kanban assume we can get what we need, on demand, when we need it.
- We must schedule long lead time items in order to be able to have or get them through the supply chain on demand when we need them.
- Therefore, we must find a way to merge the benefits of ERP and Lean to service our customers effectively and efficiently.
Planning & Scheduling with Lean

- Firm Orders
- Final Assembly
- Some Firm Orders
- Some Forecast
- Sub-Assembly
- Forecast
- Procure Raw Materials
- Procure Components

Cumulative Lead Time (Purchase part procurement through completed finished good)

JIT & Kanban

JIT & Kanban
 ERP

JIT & Kanban
 ERP
The Dynamics of Planning & Scheduling

Months 0 1 2 3 4 5 6 7 8 9 10 11 12
Firm Orders
Forecast
Forecast Accuracy 100% ➔ 0%

S&OP ➔ Production Plan

Material Requirements Planning ➔ Sub-assembly ➔ Sub-assembly
Material Requirements Planning ➔ Raw Materials Components
Work Orders Versus Kanban

**SFC**

- **Work Order**
  - Part Number
  - Quantity
  - Start Date
  - Due Date

**Kanban**

- **Production Schedule**
  - Rate Based
  - Single piece flow
  - Production reporting not required
  - Good for repetitive or flow manufacturing

**Push Push Push**

**Pull Pull Pull**
ERP Performance Feedback

ERP

Demand

Planning Scheduling

Execution

Financial Systems
Lean Performance Feedback

ERP

Demand

Planning Scheduling

Lean Execution

Financial Systems
Tracking & Reporting Mfg. Cost

ERP

- Work Order
- Product Master
- Bill of Material
- Standards
- Routing
- Work Center
- Purchase Order

Financials

- Overhead
- Labor
- Material

Kanban

- Schedule

Kanban does not provide shop floor data reporting.
## Applying Lean Principles (5-Ss) to ERP

<table>
<thead>
<tr>
<th>The 5 Ss</th>
<th>Lean</th>
<th>ERP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sort</strong></td>
<td>Eliminate unnecessary tools, parts, instructions, et. By “red-tagging” them and disposing of them after final disposition of need</td>
<td>Use only parts of ERP that benefit the enterprise. Eliminate redundant or unnecessary programs, reports, data-entry, processes, etc.</td>
</tr>
<tr>
<td><strong>Simplify</strong></td>
<td>A place for everything and everything in its place</td>
<td>Use ERP to enable straight forward business processes integrated with Lean principles, e.g. backflushing</td>
</tr>
<tr>
<td><strong>Shine</strong></td>
<td>Clean everything daily</td>
<td>Ensure all data is always accurate and up to date</td>
</tr>
<tr>
<td><strong>Standardize</strong></td>
<td>Documented rules for maintaining the first three Ss</td>
<td>Documented rules for maintaining and using the ERP system</td>
</tr>
<tr>
<td><strong>Sustain</strong></td>
<td>Operations safely carried out in the optimum sequence, minimizing waste</td>
<td>Business processes enabled by ERP executed on a timely basis, minimizing waste</td>
</tr>
</tbody>
</table>
Applying Lean Principles (8 wastes) to ERP

- **Overproduction**
  - Schedule only what is needed based on MPS & MRP

- **Waiting**
  - Reduce the scheduling cycle – plan and schedule daily or by shift

- **Stocks & Inventory**
  - Eliminate safety stock
  - Become make-to-order

- **Transportation**
  - Use lean techniques not SFC

- **Motion**
  - Minimize the scheduling effort
  - Minimize or eliminate labor and production reporting

- **Processing**
  - Eliminate the use of SFC in lieu of JIT and kanban

- **Defects**
  - Accurate database

- **Information**
  - Efficient and effective planning and scheduling
# Applying Lean Principles (JIT) to ERP

<table>
<thead>
<tr>
<th>Lean &amp; JIT</th>
<th>JIT Applied to ERP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single piece flow</td>
<td>On-line, real-time data collection</td>
</tr>
<tr>
<td>Quality at the source – never pass on a known</td>
<td>Transactions and data input are done accurately</td>
</tr>
<tr>
<td>defect</td>
<td></td>
</tr>
<tr>
<td>Kanban – Pull system – Make parts only when</td>
<td>Zero safety stock – order parts only when needed</td>
</tr>
<tr>
<td>needed</td>
<td></td>
</tr>
<tr>
<td>Visual workplace – information available when</td>
<td>Open access to system– I/O devices where needed</td>
</tr>
<tr>
<td>needed</td>
<td></td>
</tr>
<tr>
<td>Poka-yok (mistake-proofing)</td>
<td>On-line data editing / Automatic Data Collection</td>
</tr>
<tr>
<td>Employee empowerment</td>
<td>ERP empowers the users</td>
</tr>
<tr>
<td>Zero defects</td>
<td>Accurate data</td>
</tr>
<tr>
<td>Team concept &amp; Collaboration</td>
<td>Integration &amp; Collaboration</td>
</tr>
</tbody>
</table>
Integration Without Collaboration

Integrated System

Sales
• Data
• Transactions
• Reports

Planning
• Data
• Transactions
• Reports

Inventory
• Data
• Transactions
• Reports

Cost Acct.
• Data
• Transactions
• Reports

Process Shadow System

Information Flow

Process Shadow System

Information Flow

Process Shadow System

Information Flow

Process Shadow System

Information Flow
Collaboration Without Integration

Un-integrated System

Sales
- Data
- Transactions
- Reports

Planning
- Data
- Transactions
- Reports

Inventory
- Data
- Transactions
- Reports

Cost Acct.
- Data
- Transactions
- Reports

Process Shadow System

Information Flow
Collaboration + Integration = Synergy

Integrated System

There are no shadow systems – everyone is using the same systems and data.
Does ERP & Lean Really Work?

Doing the right “thing”:
- ERP
- Lean
- JIT
- SMED
- Kanban
- TQM
- TQA
- TOC
- ABC
- TLA

Doing “things” right:
- Accurate
- Timely
- Consistently
- Change only when needed and always when needed
Kaizen for ERP

- Use Kaizen events to:
  - Determine when, where, and how to use ERP
  - Set-up and clean up the data base
- Use value stream mapping to design the optimum application of ERP methods
- Use ERP data editing to Poka-yok processes
- Use ERP integration to enable collaboration and empower everyone
Thank You!