LEAN SUPPLY CHAIN (=LEAN OPERATIONS) :
A KEY STRATEGY TO BUSINESS COMPETITIVENESS

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Bandung, November 7, 2009
OVERVIEW

1. CURRENT GLOBAL TOYOTA WAY & THE BUSINESS IN INDONESIA
2. TPS : LEAN SUPPLY CHAIN (=OPERATIONS)
3. IMPLEMENTATION OF LEAN SUPPLY CHAIN AND MANUFACTURING TO ENHANCE CUSTOMER SATISFACTION
I. CURRENT GLOBAL TOYOTA WAY AND THE BUSINESS IN INDONESIA
LOGISTICS & SUPPLY CHAIN CENTER
WIDYATAMA UNIVERSITY

WORLD MAP (Potentiality of Domestic & Global Market)

From Indonesia for Global Market

Eurasian Economic Community (EEC)
North America (NAFTA)
South America (MERCUSOR)
Asia
Africa
COMESA
 GCC
APEC
Australia
AFTA
AFTA+3
Northern America
From Indonesia for Global Market

SEMINAR "THE TOYOTA WAY & SCM"
Bandung, 7 November 2009
Current Situation of Global Toyota

51 manufacturing companies in 26 countries
170 importers / distributors in 140 countries
Current Situation of Global Toyota.

Multi - Polarization of Multi - Sourcing Companies Complexity of Supply Route.

Expansion of Logistics
### THE CHANGE IN THE BUSINESS PERFORMANCE ENVIRONMENT

#### 3S factors:

| SCALE         | From national to global  
|               | The forces of democracy, trade deregulation or free trade area, and technology changed | Increased competition |
| SPEED         | From steady to fast and flexibility  
|               | Responsiveness and agility | Reduced timeline for all activities |
| STANDARD      | From local to world class standard  
|               | Measurement is by globally and be world’s best | Everyone must have a world class value - preposition |
The "4P" Model of Toyota Way

- **PROBLEM SOLVING** (Continuous Improvement & Learning)
- **PEOPLE & PARTNERS** (Respect, challenge and grow them)
- **PROCESS** (Eliminate waste)
- **PHILOSOPHY** (Long-Term Thinking)

- Respect & Team Work
- Genchi Genbutsu
- Kaizen
- Challenge
- Toyota's Term

The Toyota Way:
- Respect for People
  - Respect
  - Team Work
- Continuous Improvement
  - Challenge
  - Kaizen
  - Genchi Genbutsu
1. JABOTABEK Region (74 Suppliers)
2. BANDUNG Region (2 Suppliers)
3. MAJALENGKA Region (1 Supplier)
4. SURABAYA Region (2 Suppliers)
4 STEPS AUTOMOTIVE REVOLUTION

1. Mass production (from craft industry) → by FORD Leap
2. Customized → by SLOAN Leap
3. Lean manufacturing/operation → TOYOTA Leap
4. The 4th revolution, UNBUNDLED → who’s the next??
2. TPS : LEAN SUPPLY CHAIN (= Lean OPERATIONS)

TOYOTA Production System

Toyota’s Core Competence
Managerial Philosophy
Origin of Toyotaism

Implemented not only at production sites but also in other sectors
Permeation among all levels of employees in a way easy to understand

- The Toyota Precepts: Established in 1935
- Guiding Principles: Established in 1992
- The Toyota Way: Established in 2001
a. Corporate Objectives

Develop business while keeping harmony with the international communities (through supply of automobiles in the case of TOYOTA)

To Fulfill the social mission

- Offer people more civilized and affluent life
- Activate communities through corporate activities
- Promise employees stable basis for life

To this end, it is essential for the company to survive by securing profits
b. Cost Reduction is Absolute Requirement for Increased Profit

(1) Selling price = Cost + Profit

(2) Profit = Selling Price - Costs

Methods for increasing profit

- Raise the selling price
- Reduce the costs
- Demand > Supply
- Demand < Supply

Customers determine the selling price
b. Cost Reduction is Absolute Requirement for Increased Profit

Productivity is not just Labor productivity

Productivity

- Labor Productivity
  (with smaller man power)

- Equipment/machine Productivity
  (with smaller equipment/machine investment)

- Material Productivity
  (with less costly materials and higher yield ratio)

The quality of design plays a decisive role. There is the costs vary depending on the manufacturing method.
c. Cost Dependent on Production Method

Cost change depending on the production flow/method, even with the same design, same equipment, and the same material.

Component of COST

- **Other**
- **Energy**
- **Labor Expense**
- **Part purchase**
- **Raw material purchase**

- **Cost in Common between companies**
- **Cost caused by difference in production method**
d. TRADITIONAL Production vs CFP

**Traditional Production**

- Operator A (Material)
- Operator B (Material)
- Operator C (Finished production)

**Continuous Flow Production (CFP)**

- Operator A (Material)
- Operator B
- Operator C (Finished production)
e. WORK CONCEPT (eg. Operator’s Motion)

[A] **MUDA**: Motion no necessary for production work

[B] **Non-Value-Adding Work**: Motion that are necessary but do not add any value to the product at the present work stage.

[C] **Net Work**: Motion that add values to the product

MUDA: WASTE, UNNECESSARY WORK

MURA: UNEVERNESS, UNSTABLE, FLUCTUATIVE THINGS

MURI: OVERBURDEN, OVERLOAD, OVERWORK CONDITION
There are several types of Muda

- Muda of waiting
- Muda of motion
- Muda of processing
- Muda of conveyance

- Muda of over-production, Process, Inventory, Waiting, Motion, Conveyance, Repair, Un-utilized member voice/creativity, etc

Increase Cost
f. **Apparent Productivity Enhancement vs. true Productivity Enhancement**

**Apparent Productivity Enhancement**
- Production of 100 units/day by 10 operators
- Production of 120 units/day by 10 operators
- Necessary amount: 100 parts/day

**True Productivity Enhancement**
- Production of 120 units/day by 10 operators → Over production 20 units
- Production of 100 units/day by 8 operators (by KAIZEN)
g. Overall Efficiency is more important than Individual Efficiency
h. Difference between Raising Productivity & Forcing Work

Raising Productivity Against Sales

‘Change Muda into Work’

Forcing Work

To make operators work harder without implementing KAIZEN
Realization embodying “Customer First” discipline

Providing customers with well made products at reasonable price in a timely manner

Taking back the investigation promptly in the limited capital resource

Elimination of waste
- **Muda** (Non-value Added)
- **Mura** (Uneverness)
- **Muri** (Overburden)

Well-made product at reasonable cost

**J.I.T**

Timely

**Jidoka**
TPS ROLE IN MANUFACTURING

METHODS
(Toyota Production System)

MAN
(Labor Productivity)

QUALITY
(Must meet standards)

MATERIAL
(Material Productivity)

QUANTITY
(Must produce require volume)

MACHINERY
(Machine Productivity)

COST
(Able to lower as much as possible)

SAFETY

Importance of labor Productivity in performing cost reduction

How to do the best method
How to produce in efficient way
**What is “Just-In-Time”?**

JIT is the system and idea of manufacturing and conveying only what is needed, when it is needed, in just the amount needed.

**Basic Operating Principles**

1. **Pull System**
   - The following processes withdraw from preceding processes the parts they need, when they need them, in the exact needed amount.

2. **Continuous Flow Processing**
   - Eliminating the stagnation of work in and between processes to facilitate one-piece-at-a-time production.

3. **Takt-time**
   - \[ \text{Sales face} = \frac{\text{Production face}}{\text{Total daily operating time}} = \frac{\text{Total daily production requirement}}{\text{Total daily operating time}} \]
Importance of Heijunka

1. What happens in the preceding process if the following process makes large withdraw?

<table>
<thead>
<tr>
<th>3 MACHINE LINES</th>
<th>1 ASSEMBLY LINE (TAIK TAIIME = 1')</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part A</td>
<td>Case I: ABCABCABC.... ➔</td>
</tr>
<tr>
<td>Part B</td>
<td>Case II: AABBBCCC.... ➔</td>
</tr>
<tr>
<td>Part C</td>
<td></td>
</tr>
</tbody>
</table>

2. What happens if the production is in large batches?

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>70'</td>
<td>60'</td>
<td>70'</td>
<td>60'</td>
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<tr>
<td></td>
<td>50'</td>
<td>50'</td>
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</tbody>
</table>

(Average)
Concept of Jidoka

Basic Philosophy

“Change motion into work”

Different from mere automation

1. Stop and notify in case of abnormality
   - Built in quality in the process
   - Cost reduction by Kaizen

2. Separate and notify from machine work
   - Manpower saving
3. IMPLEMENTATION OF LEAN SUPPLY CHAIN & MANUFACTURING TO ENHANCE CUSTOMER SATISFACTION
Subject on Implementation of JIT Manufacturing

1. Total system from vehicle order up to delivery:
   ◇ Product order up to production planning
   ◇ Production sequential plan with various product by heijunka (leveled production)
   ◇ Production up to delivery with shortening lead time

2. Part order, production and logistic system:
   ◇ Flow of Part Order to Supply
   ◇ Shortening Lead time of part order to supply
3.1. MANAGING DEMAND AND SUPPLY

CUSTOMER/DEALER ORDER (DEMAND) → PRODUCTION → DELIVERY TO DISTRIBUTOR/CUSTOMER (SUPPLY)

FLOW OF ORDER TO DELIVERY

Customers Order

Distribution Center Stock Yard

MARKETING Dealer /Distributor

MANUFACTURING Administration
- Prod. Plan. & Control
- Part Proc. & Log. Arrangement

MANUFACTURING / Plant

SUPPLIERS: - Overseas - Domestic
TOTAL SYSTEM FROM VEHICLE ORDER UP TO DELIVERY

(To Fulfill Customer Order / Demand)

CUSTOMERS ORDER

Domestic & Export

ORDER FLOW
Product Flow
Fax & phone
Control & Follow-up

Production sequential plan with various product by heijunka (leveled production)
- One by one production (Zero Stock Base)
- Daily/ Hourly/ Minutes CONTROL & FOLLOW-UP

FIRM ORDER (Model, color, quantity)

PRODUCTION PLAN (with weekly/daily order change)

Production to delivery with shortening lead time

DEALER/DISTRIBUTOR
(Sales/Vehicle Control)

Vehicle Logistic

MONTHERABY Plant

Monthly Prod. Volume
Daily Information / Indication
Delivery Schedule

PRODUCTION PLAN

- WELDING (Body)
- PAINTING
- ASSEMBLY
- PDI
- Delivery Yard

Order Flow
Product Flow
Fax & phone
Control & Follow-up

Assembly Line Control
3.2. PRODUCTION SYSTEM & LOG. FOR PART/ MATERIAL ORDER (SUPPLIER/EXPORTER → ASSEMBLER)

FLOW OF ORDER TO SUPPLY ARRANGEMENT

PROD. CONTROL

• Annual Plan
• Six Months Plan
Three Months Tentative Plan + 1 Month Plan (FIRM ORDER)

PURCHASING

• N Month Firm Order & 5 Months Tentative Order

PLANT ADMINISTRATION

Buy/ Off

A


T

W

Paint Material

SUPPLIER/EXPORTER:

• Japan
• 3rd Country (Taiwan, Malaysia, Philippine, USA, etc)

CONTAINER YARD

SUPPLIER MARKETING, PPC

e-KANBAN ORDER

• Supply based on Production Necessity

( DOMESTIC )

( OVERSEAS )

Press Part

Part Rundown Pipe Line Stock

( Daily )
**THE TOYOTA WAY & SCM**

**Seminar**

Bandung, 7 November 2009

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**Supply flow Kaizen procedure ~ Merit of milk-run delivery ~**

<table>
<thead>
<tr>
<th>Single delivery (Current)</th>
<th>Milk-run delivery (IMV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5m3</td>
<td>1m3 / order</td>
</tr>
<tr>
<td>35m3</td>
<td>1m3 / pick</td>
</tr>
<tr>
<td>45m3</td>
<td></td>
</tr>
<tr>
<td>1m3</td>
<td></td>
</tr>
</tbody>
</table>

**Receiving dock**

- **1 delivery amount + safety stock**
  - 1 del / D → 16H + 4H
  - 2 del / D → 8H + 4H

**PC store**

- Even in case of line stop, impossible to control Supply speed
- Complicated schedule (Not even pitch)
- 1) Huge space
- 2) Hard to grasp irregular condition
- 3) Long operation trace

**Assembly line**

**Truck Yard**

- Simple schedule (Even pitch)

**Progress lane**

- Possible to control Supply speed based on Production speed

**1 order amount + safety stock**

= 1m3 + 4H

1) Small space
2) Easy to grasp irregular condition
3) Short operation trace
Should be Short L/T

--- L/T should mean “TOTAL L/T”.

(Total L/T = Order ~ Prod by sup ~ Delivery ~ Usage by plant)

<Example> --- The relationship between Total L/T & Delivery Freq

<table>
<thead>
<tr>
<th>1 delivery / day</th>
<th>Supplier</th>
<th>Transportation L/T = 1 day</th>
<th>Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 day</td>
<td></td>
<td>1 day</td>
</tr>
<tr>
<td>Total L/T = 3 day</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 deliveries / day</th>
<th>Supplier</th>
<th>Transportation L/T = 1 day</th>
<th>Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock</td>
<td>1/2 day</td>
<td></td>
<td>1/2 day</td>
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<tr>
<td>Total L/T = 2 day</td>
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</tbody>
</table>

With high frequency delivery, possible to reduce Total L/T.
But Logistics cost & efficiency will be worse.
### Explanation of 4 laws (2)

<table>
<thead>
<tr>
<th>Short L/T</th>
<th>High Freq delivery</th>
<th>Cost increase ...</th>
<th>How goes together ??</th>
</tr>
</thead>
</table>

#### Direct delivery

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#### Milk run 1

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With keeping cost

#### Milk run 2

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<td>Plant</td>
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4 del/day (3.0 day)

### TOTAL L/T

- **Direct delivery**: TOTAL L/T = 3.0 day
- **Milk run 1**: TOTAL L/T = 2.5 day (O)
- **Milk run 2**: TOTAL L/T = 3.5 day (X)
Kanban Operations Image

Image of Kanban Operations:

- Supplier Kanban
- Assembly Shop
- Intra-Process Kanban
- Machining
- Welding Shop
- Inter-Process Kanban
- Press Shop
- Inter-Proces Kanban
- Intra-Process Kanban
- signal Kanban
**TMMIN / TAM KANBAN HISTORY (1/2)**

### 84 ~ 91
- **Kbn Internal**:
  - Str 1 → Str 2
  - W/H → Prod. at Assembling process
  - Used Kanban Photocopy Implement for TUV Model

### 91 ~ 92
- **Kbn External Implementation for 3 Suppliers**:
  - Gemala
  - Cipta Piranti
  - Denso
  - Kanban still using Photocopy Implement for TUV Model

### 92 ~ 93
- **Kbn External Implementation**
  - For All Supplier Kanban still using Photocopy Implement for TUV Model
  - Middle of 1992, Implement for Study Pre-Print Kanban And Implement Using Returnable Box

### 93 ~ 95
- **Kbn External with preprinted Kanban**
  - (Kanban Making with PC) and expansion Using Returnable Box to all Suppliers
  - Implement for Passenger Car (after PC production System changed)
Kbn External Implementation:
- Start study for Kanban Barcode System (KBS) and implement at 1995 to all suppliers.
- Start study for e-Kanban during 2003.

03 ~ 04

04 ~ Now
Implement e-Kbn on IMV Model for:
- LSP (Local Sourcing Part)
- MSP (Multi Sourcing Part)
SAMPLE OF KANBAN

a. KANBAN REGULER

FROM
IRI
BOX TYPE
SP-1
PCS/KBN
0012
KBN NO
008

KF149W

FOR
02 ASSY-KF
SPCL CODE
394990
CYCLIC
LINE LOCATION
T2B-209 LH

b. KANBAN TEMPORARY

FROM
IRI
BOX TYPE
SP-2
PCS/KBN
0006
KBN NO
000

KF-149W

FOR
02 ASSY-KF
SPCL CODE
399300
TEMPORARY
LINE LOCATION
T2C-216 LH
Sample e-Kanban Document in TMMIN
e-Kanban Image

VLT – Release <D - 4>

ORDER

Supplier

Veh. Flow = Parts Flow

Weld

Paint

Assembly

Next Order

SCRAP Reflection

Monitor Scrap
For adjustment order

Physical usage

<D>

<Del Time>

For adjustment order

Physical usage

SCRAP
Reflection

Reflection

Next Order

Veh. Flow = Parts Flow
1. On time delivery (D-1 until D ≥ 99%):
   - Fulfill various customer order in term of model, color & destination.
   - Quick response to customer request (by swapping, delivery advice).
   - Implementing Firm Order system by making accurate forecast, retail & stock plan, and keep appropriated standard stock (by model & color at Dealers / Branches).

2. Flexible order and operation:
   - Reducing vehicle production lead time (3 days → 1.5 days)
   - Establish minimum & reasonable stock control system
   - Optimum component/parts stock (1 day → average 4 hours)

3. Best quality & competitive price:
   - Provide good quality : one by one production & build-in quality.
   - Cost reduction in inventory, logistic handling, and production.
   - Reduce other waste in production activities (eq. repair, etc.)
   - Increase employee awareness for quality, productivity & cost.

THE BENEFITS
THANK YOU