

Basic principle of TPS

Part 3

Basic philosophy is “Customer First”

Two pillars

- JIT (Just-In-Time)
- **Jidoka** (Autonomation, Autonomy)

Goal

Create teams and members who continue Kaizen activities always seeking for “To Be”, ideal system

Ideal system:

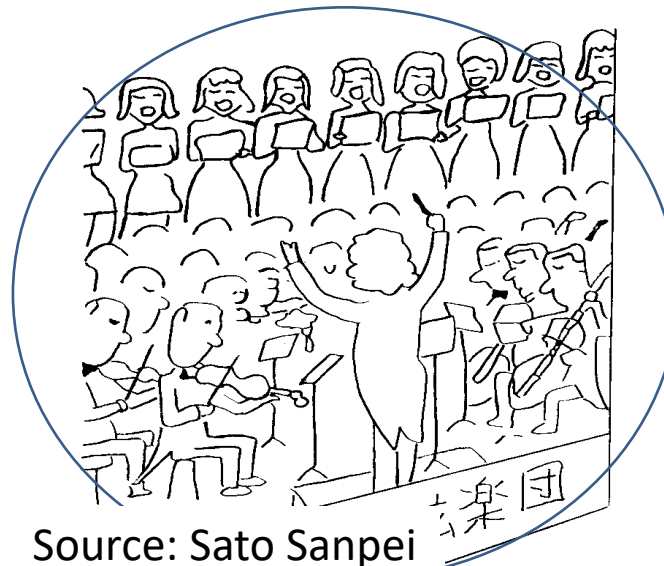
Construct **continuous flow** business process

Objective of JIT:

Shorter lead-time by eliminating waste (*Muda*)

First step to apply TPS

- (1) Awareness of TPS
- (2) 5s
- (3) Visibility (*Mieruka*)



Source: Sato Sanpei

TPS :

Symphony
orchestra
model

Harmonized
autonomous
De-centralized
system

To construct flow process

Improving TPS is an activity that **creates a flow** from materials to parts, to finished products

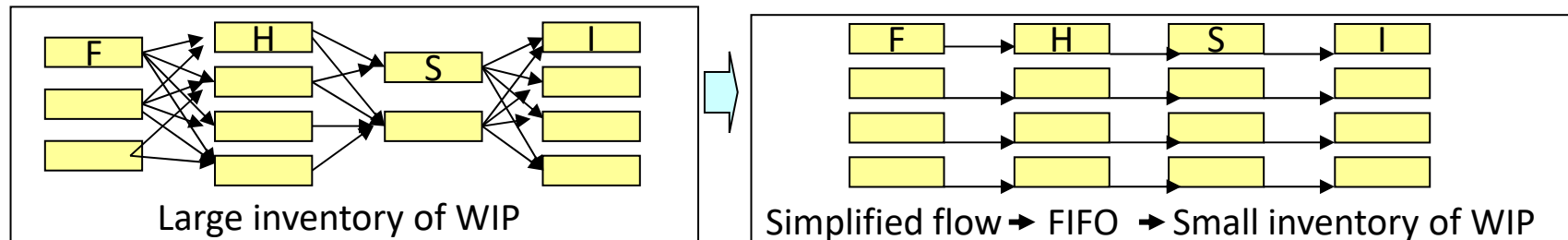
When we improve flow, we;

- ✓ Increase effectiveness
- ✓ Uncover “hidden” capacity
- ✓ Generate more revenue
- ✓ Reduce costs
- ✓ Improve customer satisfaction
- ✓ Improve employee morale

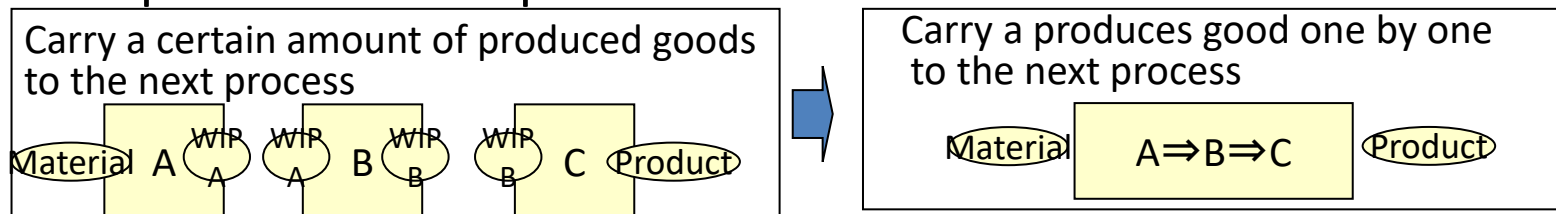
1. Simplification of flow process

Never outsource the intermediate process; In-house using cheap equipment

2. Merging process eliminating branch (From turbulence to rectification)

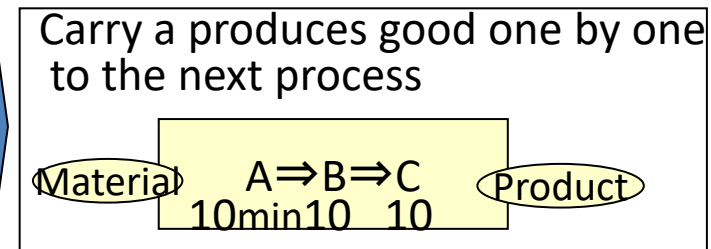
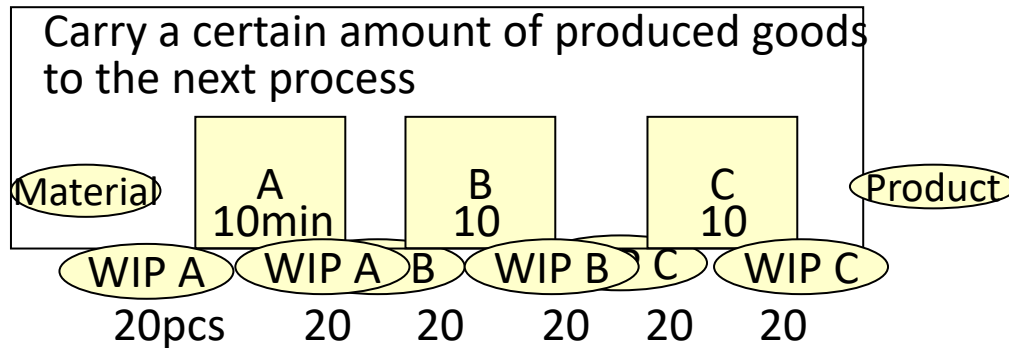


3. One-piece-at-a-time production in a continuous line



Example of kaizen for a continuous line

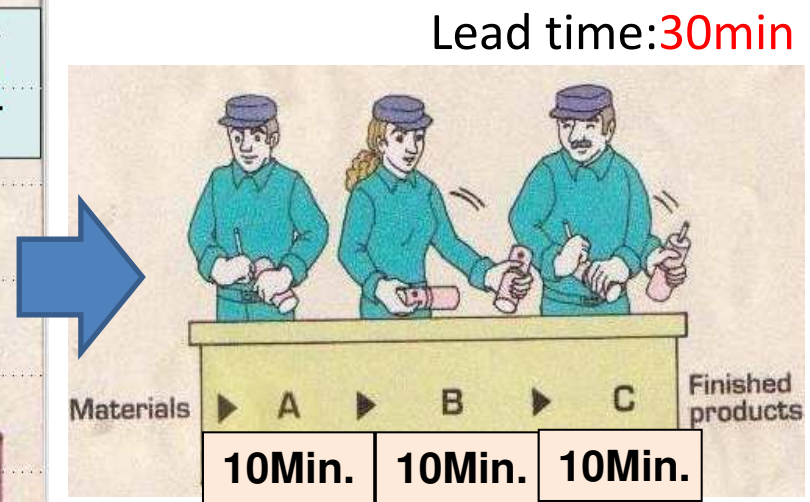
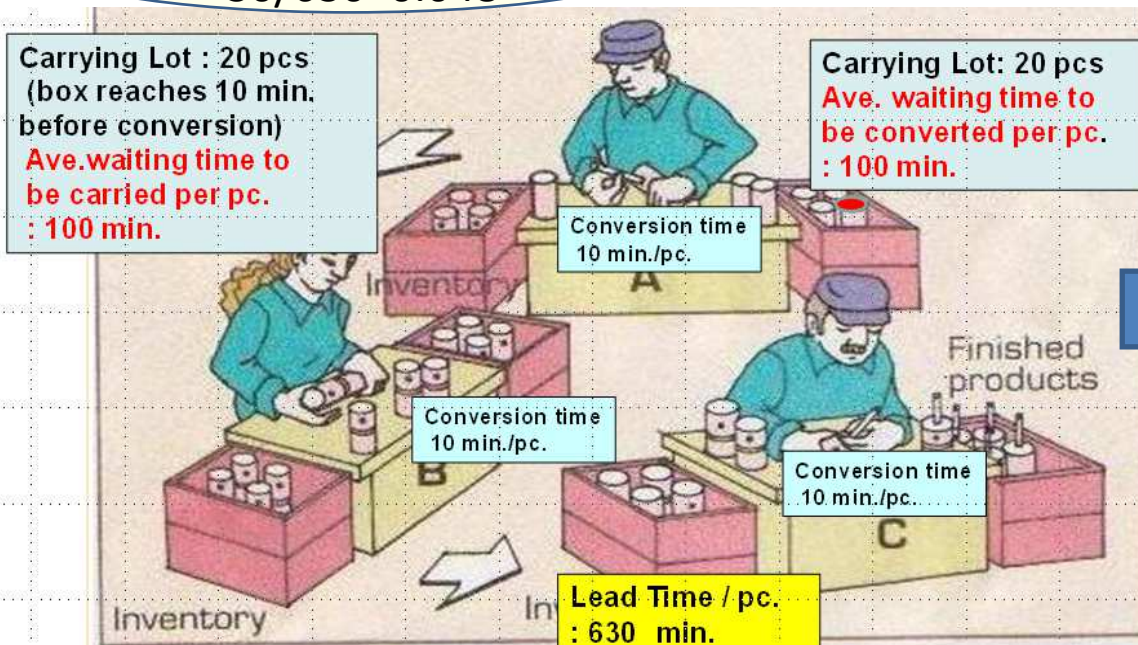
One-piece-at-a-time production in a continuous line



NCTR / pc.
= $30/630 = 0.048$

Lead time: **630min**

NCTR/pc. = $30/30$



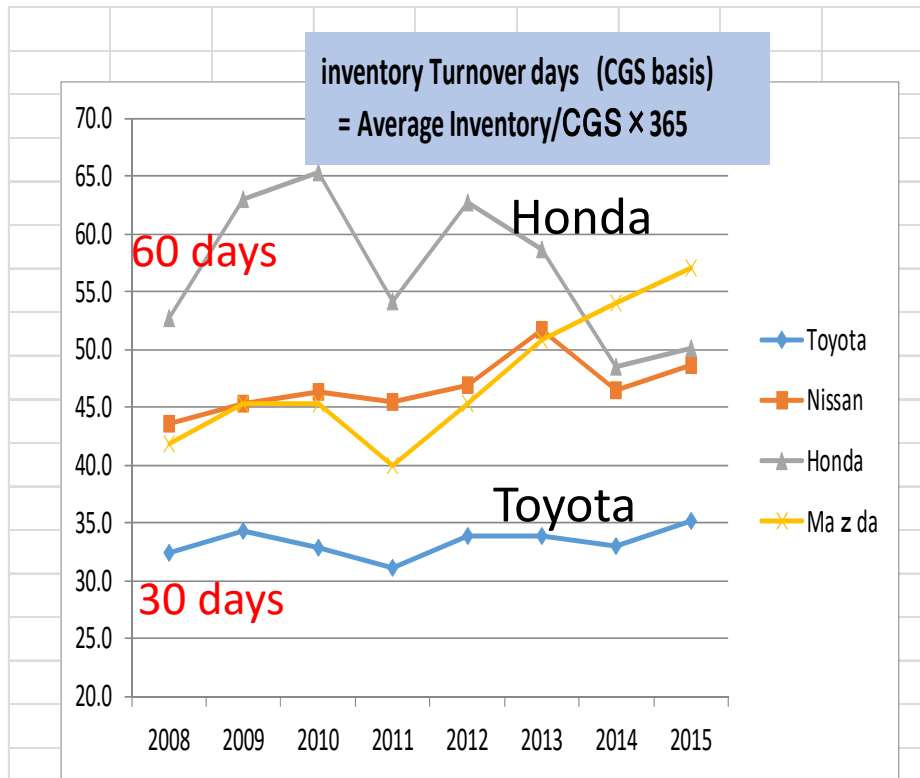
NCTR= Net Conversion Time Ratio

Business advantage is to construct faster flow

Main objective of TPS is to construct flow process.

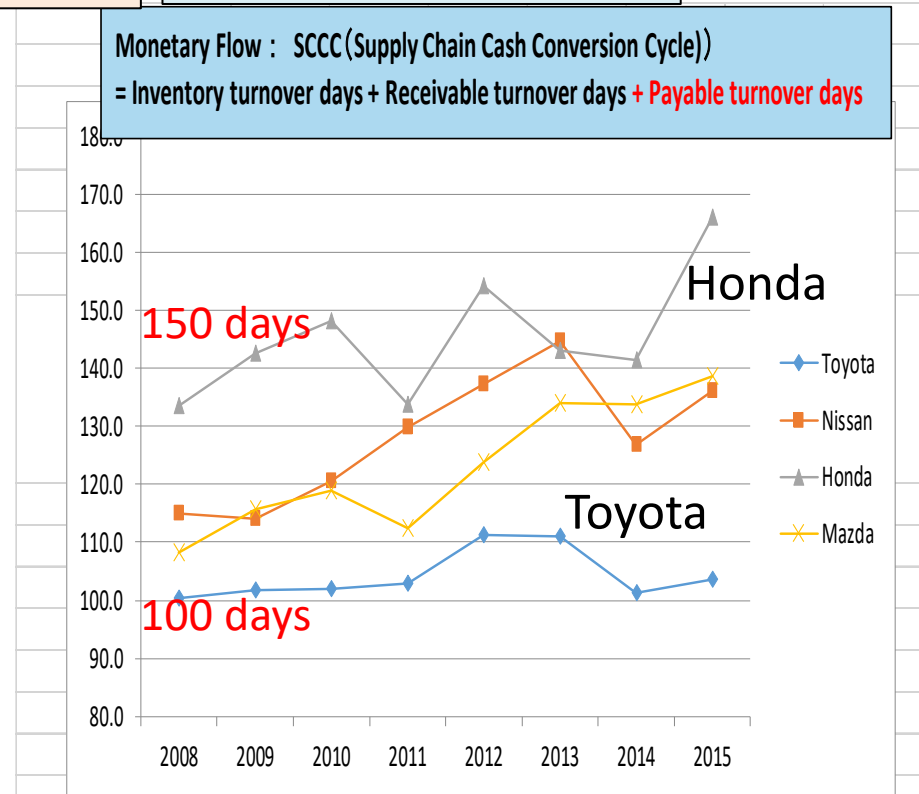
Source: Dr. Kawada

days MATERIAL flow



	2008	2009	2010	2011	2012	2013	2014	2015
Toyota	32.4	34.3	32.9	31.1	33.8	33.8	33.0	35.2
Nissan	43.6	45.3	46.4	45.5	47.0	51.7	46.4	48.6
Honda	52.8	63.0	65.3	54.1	62.8	58.6	48.5	50.0
Mazda	41.9	45.3	45.4	39.9	45.4	50.9	54.0	57.1

days MONETARY flow



	SCCC	2008	2009	2010	2011	2012	2013	2014	2015
Toyota	100.4	101.8	102.0	102.9	111.2	111.1	101.2	103.7	
Nissan	114.9	114.1	120.6	129.9	137.3	144.7	126.9	136.0	
Honda	133.7	142.6	148.2	133.8	154.2	143.2	141.5	166.1	
Mazda	108.3	115.7	118.8	112.5	123.8	134.1	133.8	138.6	

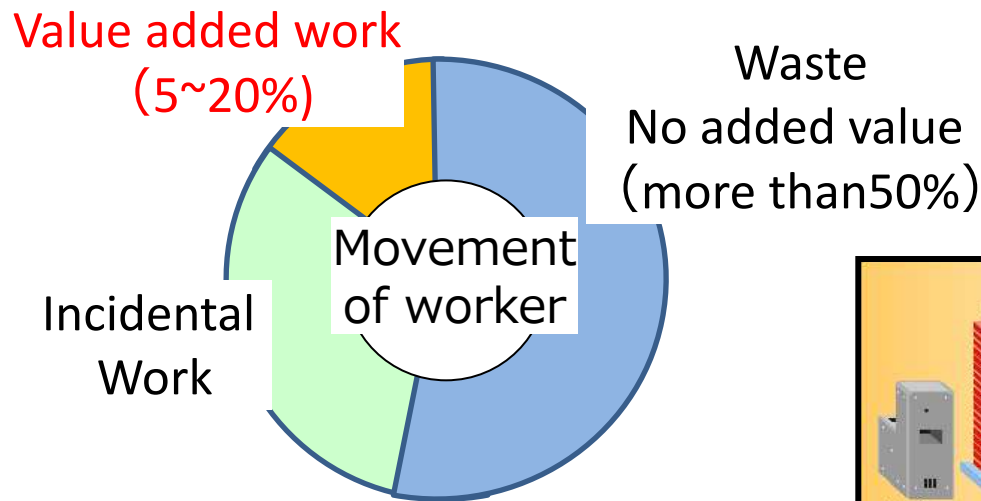
Waste (Muda) in TPS

Defining of waste

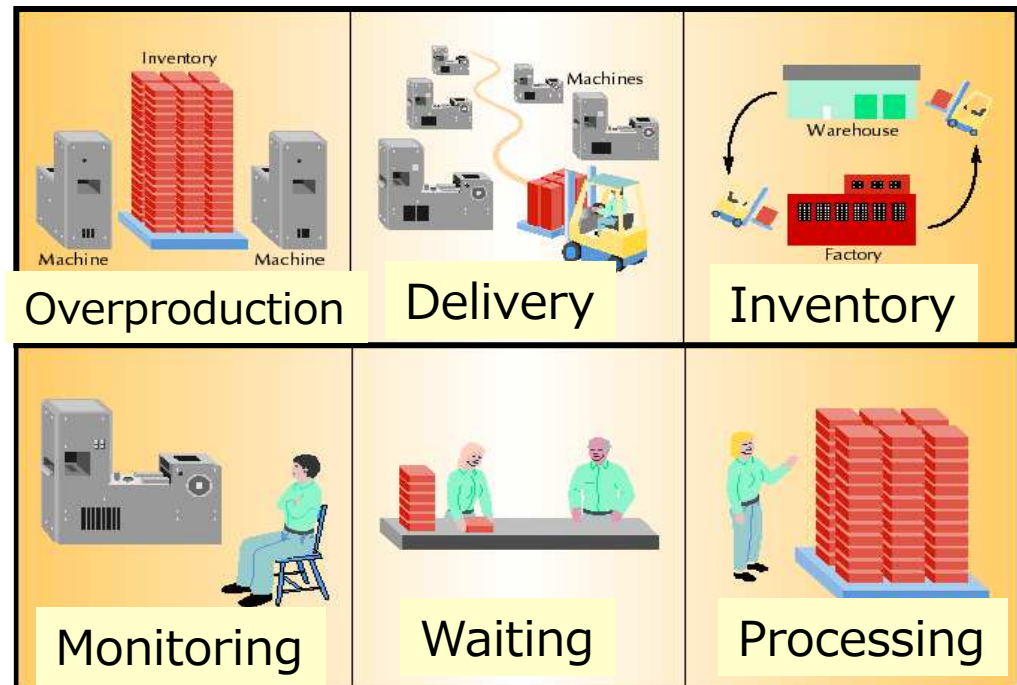
- Operational elements increasing cost
- Work elements of no added value

<Seven wastes in TPS>

- 1) Overproduction
- 2) Waiting
- 3) Delivery
- 4) Processing itself
- 5) Inventory
- 6) Motion
- 7) Rework



- Increase the value-added work by eliminating waste.
- The first is awareness : In almost all business, the added value of work element is less than 20%.



5S is the first step to apply TPS

- Good workplaces develop beginning with the 5S.
- Efficient Work -Visualization -Better services -Company image

1. Seiri (整理) – sort, sort out, Organize

Separate out all the things that are not necessary and eliminate them or tidy them away.

2. Seiton (整頓) – straighten, stabilize, Make neat

Arrange the essential things in order so that they can be quickly and easily accessed and put away.

3. Seiso (清掃) – scrub, shine, Clean

Keep machines and working environment clean.

4. Seiketsu (清潔) – systematize, Standardize

Make cleaning and checking a routine practice; maintain a pleasant environment

5. Shitsuke (躰) – sustain, self-discipline, Discipline

Standardize the previous four steps and constantly improve them.

First step is 2S

Seiri

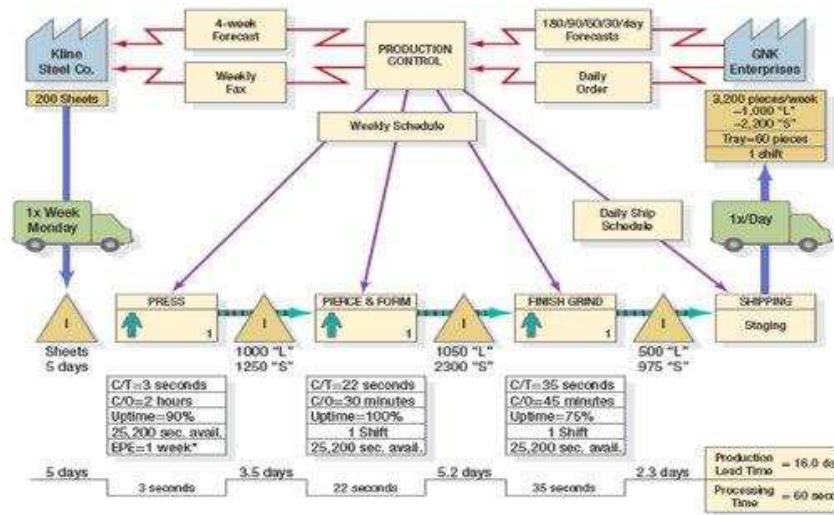


Seiton



Visibility is one of the most critical for TPS

Value Stream Mapping



Andon (行灯) (Signal board)



Visibility in software development



The basis of TPS is “Trust the worker”

1. Mutual Trust between Labor and Management

- ◆ Improved productivity brings prosperity to the company and the employees

2. Strong Employee Motivation

2.1 Creative Ideas and Suggestion System

- Valuing practical experience over theoretical knowledge
- Total number of suggestions submitted ; 2.65 Million
- Average per employee; 48 per employee
- Percentage of acceptance 96% acceptance
- Total prize money 2,100 Million Yen

('87 results)

2.2 QC Circle (Problem Solving Circle)

- Small groups in which workers discuss and assist each other
- Carry out Kaizen in **quality, cost, safety** and so forth
- 6,650 circle, 6persons/circle, 25,000 themes/years

('87 results)

As of 2001, Toyota had approximately 4,800 Circles

Kaizen activities by teamwork

1. First step is Safety (KYT), 5S , Visualization,
2. Information sharing and Visibility
 - Organization Policy,
 - Actual Results (Sales, Production, Quality)
 - Standardization (No kaizen without standard)
3. Communication
 - Greeting -Meeting -Ho-Ren-So (報連相)
4. Workplace activation
 - Idea suggestion system -QCC - Multi-skilled worker

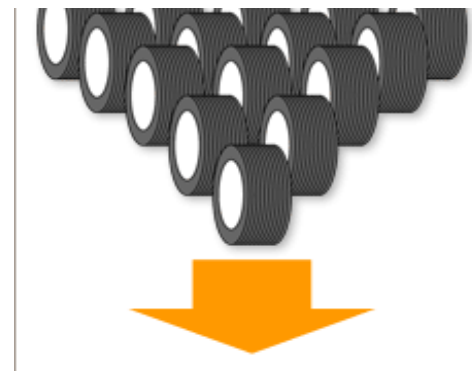
Weak organization



Matching
Vector



Strong organization



Concluding

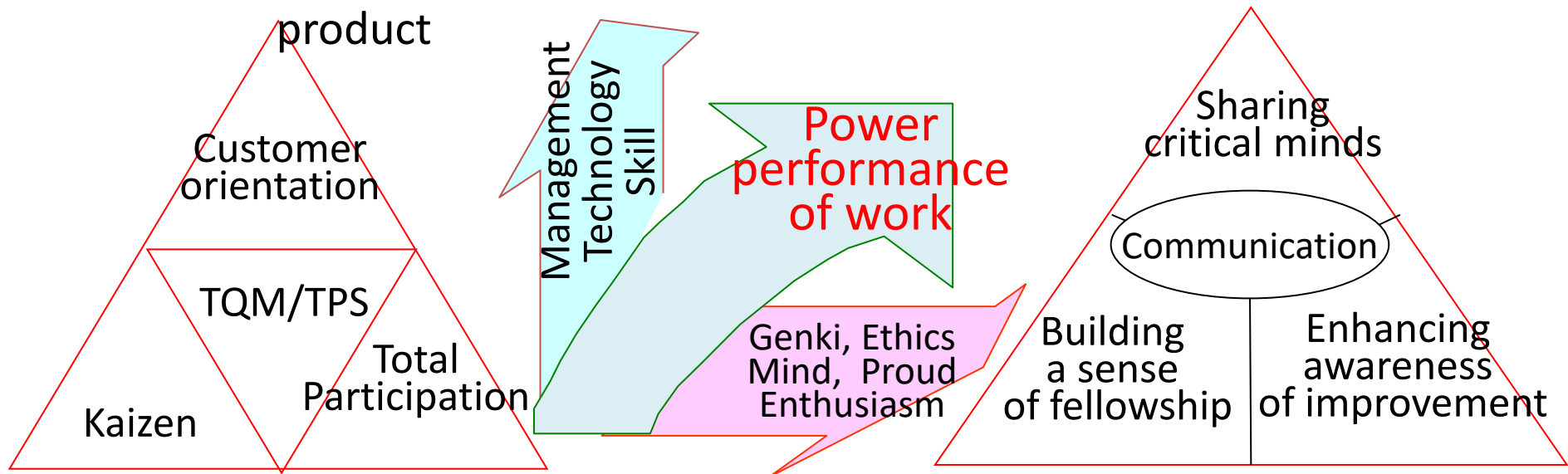
Vitalization of the people & organization

When do you have a strong motivation for work?

Survey results of Japanese and U.S. automakers is almost the same.

1. **Autonomy** (自律)
2. **Responsibility** (責任)
3. **Achievement** (達成)
4. **Opportunity** (機会)
5. **the work itself** (仕事そのもの)
6. **Advancement** (向上)
7. **Recognition** (評価)

TPS kaizen activities; Improving quality of process &



Global factory benchmark by TPS certificate Institution

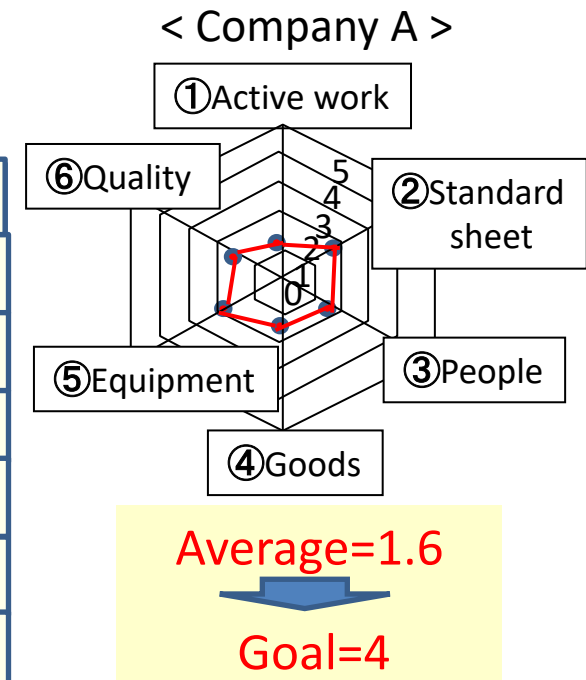
- Long-term goal by TPS improvement activities
Ave.=1.6 ➡ Goal=4 (3 years)
- First, make one year activity plan to implement
- Review based on the result of annual activities

< Grade: 1~5 >
 USA=1.0~3.0
 Korea=1.0~3.0
 China=1.0~2.0
 Japan=1.0~4.5

Evaluate the basic elements of Total TPS

- Checking by factory evaluation sheet
- Evaluate by score 1~5 on each(①~⑥) item

Check item	Contents
①Active worksite	-5S,visualization,motivation
②Standard sheets	-Develop Standard work sheets
③People	-Movement Keep standard work
④Product/part	-Storage space, logistics, stock
⑤Equipment	-Maintenance, changeover, leveling
⑥Quality	-Quality into process



Thank you for your kind attention

“Open the window and look outside.
It`s a big world waiting for you.”

by Toyoda Sakichi (豊田佐吉)



If you have some questions,
do not hesitate to contact me by e-mail.

Satoshi Kuroiwa (黒岩恵)

skuro@esd21.jp