Toyota’s Way to the New World No.1 Carmaker

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1 Globalization of Toyota
1-1a Production and Exports, 1960~2007

Except for the production volume of Daihatsu and Hino Brands Vehicles.
1 Globalization of Toyota
1-1b Milestones in Toyota’s Globalization (1)

- Change from export-centered strategy to localization of production around the 1985, where Toyota really began its overseas production by NUMMI, in order to replace exports by localized production because of trade conflicts with the USA and of export quota imposed.

- Before 1985, Toyota had been giving the priority to exports, thinking that the Toyota Production System (TPS) was difficult to be transplanted outside of Japan because of its specificity.

- Successful transplantation of the TPS at the NUMMI gave Toyota a self-confidence in making the TPS run well even in the USA labor relations.

- This led Toyota to construct its transplants in the North America and the UK.

- Of course, some adaptations were necessary especially in the human resources management (HRM), because of the difference in the labor relations and the labor market of each country.
1 Globalization of Toyota
1-1c Milestones in Toyota’s Globalization (2)

- The ten years stagnation of Japanese economy and the worsening of trade conflicts with the USA pushed Toyota to promote its localization of production.
  - ‘New Global Business Plan’ for the years 1994-8, which aimed to increase the ratio of overseas production to the overseas sales from 48% to 65%. With this Plan, Toyota began to organize its global production network.
  - Result: rapid growth of overseas production from 2000.

- The American ‘new economy’ carried away the trade conflicts, so that exports toward the North America began to increase in 1996.
  - From then, the production in Japan increases at the same cadence as the exports, but its domestic sales are always stagnant.
1 Globalization of Toyota
1-2 Production Structure in 2006

Japan is always the main production base of Toyota.
1 Globalization of Toyota
1-3a Evolution of Sales Structure
1 Globalization of Toyota
1-3b Evolution of Sales Structure

Sales, 2006

Now, the North American Market is the most important one for Toyota
1 Globalization of Toyota
1-4 Status quo

- In 2007, Toyota became No.1 carmaker as for the production, with high profitability. In 2008, it would be No.1 carmaker even as for the sales.
  - Toyota is too dependent on the American Market. Does it share the same difficulty as the American Big 3?
  - The crisis of GM provoked a reorganization of Japanese automobile industry, of which Toyota is epicenter by acquiring shares of Subaru and Isuzu.

- Its world production network has been regionalized:
  - The privileged regions: North America, Europe, and Asia except for the China are on the way to be managed respectively by a regional headquarter. This might be a very beginning of the decentralization of the management.
  - It has some difficulties in China because of the late comer.

- The TPS doesn’t run in the same way at its transplants.
  - The TSP consists not only of production techniques but also of a HRM, the human factor.

- Did Toyota become No.1 carmaker without any serious problem?
2 Essence of TPS
2-1a Characteristics of TPS

- TPS cannot be reduced to the well-known just-in-time, Jido-ka (autonomization of machines and workers), but a specific way of kaizen (continuous improvement).
- Importance was given to the Kaizen for reducing the production costs.
- Two types of Kaizen activities exist:
  - Well known voluntary kaizen activities made by workers through suggestion system and QC circles.
  - Not well known kaizen activities made by supervisory staff and engineers assigned to the shop-floor.
- This latter had been controlled by the top management through a cost management system, established also by Taiichi Ohno, founder of the TPS, until the end of the 1980s.
  - This cost management consisted of two dimensions: cost of materials and energy, and labor cost.
  - The labor cost has been controlled by a production efficiency management (or productivity management).
2 Essence of TPS

2-1b Cost Management System at Toyota

Target Profit for long and short terms

Cost Reduction Target

TARGET PROFIT

TARGET COST

PRICE

Planning of a new product

YOSAN KANRI
(Management by Costing)

PRODUCT DESIGN

Genka Kikaku
(Target Costing)
- Cost Management per model
- Participation of Production Engineering Div. and Production Div.

PRODUCTION

Genka Kaizen
(Kaizen Costing)
- by Project Team
- by Bench Marking

Genka Iji
(Cost Keeping)
- Management of Anomalies by Eyes

Investment Program

Kaizen and Its Diffusion

Planning of a new product
2 Essence of TPS
2-1c Procedure of Target Costing

1st Stage of Product Development

- Proposals on a New Vehicle
- Project of Chief Eng.
- Developmen Program

Repetition of Design – Try Product

- Analysis of Profitability
- Decision on Preconditions of Target Costing
- Setting of Target Profit & Target Cost
- Value Engineering
- Followup of Cost Reduction

Definitive Sales Price

Target Costing Council

Cost Management Council

Sales Div.

Proposal of Sales Price & Prevision of Sales Volume

Followup of Cost Reduction
2 Essence of TPS

2-1d Production Efficiency Management

- Evaluation of Production Efficiency
- Calculation of Production Allowances
- Target Setting of Productivity Increase and Followup of Results

Productive

KAIZEN based on TPS

- Modification of products and production process
- New Standard Time

Summing up Real Working Hours per Working Group (Kumi)

Prevision of Workers Number

Product Program

Council of Adjusting Workers

Production Program Council

Production Div. Cour

Production Management

Production Management Div.

Calculation of wage (Production Allow.)

Human Resources Management Div.
2 Essence of TPS
2-2a Production Efficiency Management and Production allowance: production efficiency

Production efficiency (PE): simplified formula

Production Efficiency = \sum \frac{(Standard Time) \times (Production Volume)}{Real Working Hours of Working Group}

The production efficiency means the productivity per man-hour, measured against the standard time.
- This coefficient enables a comparison of productivity of all production lines producing different products.
- Reducing the real working hours of working group gives a higher production efficiency, to the condition that products quality is assured.
2 Essence of TPS
2-2b Production allowance:

Monthly wage (except for overtime payment and various allowances)

\[
\text{Wage} = \text{basic wage (40\%)} + \text{production allowance (60\%)}
\]

Production allowance = basic wage x production allowance coefficient

Adjustments of production efficiency (simplified explanation) per working group (kakari, or shift group)

First: taking account of production efficiency of the company as a whole.
Second: rounding off the fluctuation of raw PE

\[
\text{Adjusted PE} = (5/6) \text{ PE (t-1)} + (1/6) \text{ PE(t)}
\]

Third: classification of APE en 4 groups: A(20\%), B(30\%), C(30\%), D(20\%) from top to bottom.

Decision of the production allowance coefficient (PAC)

PAC of a shift is the average APE of the group to which it belongs.

Production efficiency cutting rule:

The standard time of the working groups of which APE is over the average APE of the group A until their APE become the average APE.
This Kaizen is the organized Kaizen, carried out by supervisory staff, mainly by GL, and CL.

**The production allowance fluctuates from one month to the next.**

Because of the reduction of its workers, the working group in question could not keep its production efficiency as before.
2 Essence of TPS

2-2d Results

Movement of the average production efficiency of the company
3 Crisis of TPS at the end of the 1980s
3-1 Labor crisis

- TPS encountered the labor crisis.
- Background of the labor crisis
  - The labor force shortage for the manufacturing industry, due to the declining birth rate and the rising university advancement rate.
  - The “bubble economy” of 1987-91:
    - It gave an occasion to get an easy but high wage work in the tertiary industry, especially in the service sector.
    - It heated up the demand and the diversification of parts and products.
- Toyota’s problems in such a situation:
  - Many of newly hired young workers quitted Toyota and worsen the labor shortage problem.
  - In order to solve this problem, Toyota hired massive temporary workers: 2 540 TW in the 23 370 direct workers (11% on average).
  - This provoked a confusion on the shop-floor: considerable lowering of the production efficiency, and exhaustion of supervisory stuff.
Confusion of the TPS in the “bubble economy”

Note) “Labor force” means the number of the direct workers on the production lines. The production excludes that produced by subcontracted assembly companies. Productivity represents the productivity per man-hour.
3 Crisis of TPS at the end of the 1980s
3-2 Solution

Toyota decided to solve this labor crisis in the radical way, by organizing a joint committee of the management and union.

- **Training system of blue-collar workers**
  - Longer training of newly hired high school graduates
  - New vocational training system

- **Hierarchical positions of supervisory staff**
  - Creation of experts positions (EX, SX, CX) and abolition of Team (han) and team leader (TL, han cho)

- **Way to work on the assembly line**
  - Making assembly work attractive by making disappear heavy loaded, dangerous and dirty works identified by TVAL method
  - Segmented assembly lines, quality control by segment, use of buffers, and ergonomic devices, etc.
  - Successive two shifts work without night shift (6:30–15:15 and 16:15–1:00)

- **Cost management, especially the production efficiency management**
  - Renounce of its unilateral management giving an autonomy and responsibility to the factory, and revision of the wage system
  - Making more efforts to reduce the production costs in the design phase rather than in the production phase taking account of feasibility of factories.
Fruits of the new vocational training system

<table>
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<th>Factories</th>
<th>S</th>
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<td>25</td>
<td>9</td>
<td>5743</td>
<td>4850</td>
<td>18976</td>
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Skill levels
C 20% of the operations taken charge by a group (Kumi )
B 60% of the operations taken charge by a group (Kumi )+repairing
A 80% of the operations taken charge by a group (Kumi )+repairing+maintenance
S All operations taken charge by a group (Kumi )+instruction+repairing+maintenance
## Grade System and Job Title at Toyota: during the 1990s

<table>
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<tr>
<th>Project Position</th>
<th>Managerial Position</th>
<th>Administrative &amp; Engineering Staff</th>
<th>Production Staff</th>
<th>Managerial Position</th>
<th>Expert Position</th>
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<tbody>
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<td>Project General</td>
<td>Divisional General Manager</td>
<td>Senior General Manager</td>
<td>AA</td>
<td>Deputy G. M.</td>
<td>Project G. M.</td>
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<td>Manager</td>
<td>Department G.M.</td>
<td>Senior Grade 1</td>
<td>1A</td>
<td>Manager</td>
<td>Project M.</td>
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<td>Project Manager</td>
<td>Staff Leader</td>
<td>Senior Grade 2</td>
<td>1B</td>
<td>Chief Leader</td>
<td>Chief Expert</td>
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<tr>
<td>Assistant Manager</td>
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<td>Senior Grade 3</td>
<td>20</td>
<td>Group Leader</td>
<td>Senior Expert</td>
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<td></td>
<td>Assistant Manager</td>
<td>CX</td>
<td>30</td>
<td>(Team Leader)</td>
<td>Expert</td>
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<td>[9B]</td>
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<td>[9C]</td>
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</table>
New Assembly Line Concept

Motomachi Plant (around 1997)

Tahara No.1 plant (around 1997)

Toyota Kyushu Plant No.1
4 Decade of Reconfiguration of the TPS
4-1 Modifications of the wage system

- After minor change in 1990, the first radical change was made in 1993, which abolished the production allowance for the white-collars.
- The latest radical change in 2000 (except for overtime pay):
  - For the blue-collar workers,
    \[ \text{Wage} = \text{AP} (30\%) + \text{PA} (20\%) + \text{GA} (20\%) + \text{PA'} (20\%) \]
  - For the white-collar employees,
    \[ \text{Wage} = \text{AP} (50\%) + \text{GA} (50\%) \]
  - \text{AP}: pay for the employee’s gained ability, replacing the basic wage, which increase every year after the evaluation (‘satei’)
  - \text{PA}: productivity allowance, which is now fixed for one year.
  - \text{GA}: allowance related to the grade position
  - \text{PA’}: proficiency allowance, which replaced the age allowance in 2004.

- Radical character of the latest change:
  - Productivity allowance is fixed for one year, and the same coefficient is applied for all blue-collar workers:
    \[ \text{PA} = \text{its coefficient} \times \text{remuneration fixed per wage grade of workers}. \]
4 Decade of Reconfiguration of the TPS
4-2 New grade system, from 2000

<table>
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<tr>
<th>Ancient Rank</th>
<th>Administrative &amp; Engineering Staff</th>
<th>Production Staff</th>
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<tr>
<td>(required minimum service years)</td>
<td>Qualification</td>
<td>Wage Grade</td>
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<tr>
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<td>Upper Professional</td>
<td>AE1</td>
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<td>40(-)</td>
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<td>AE2</td>
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<td>50(25)</td>
<td>Professional</td>
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<td>60(22)</td>
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<td>7A (18)</td>
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<td>7B (15)</td>
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<td>80(10)</td>
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<td>9A (5)</td>
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<td>9B (1)</td>
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</tr>
<tr>
<td>9C (0)</td>
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<td>AE7</td>
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4 Decade of Reconfiguration of the TPS
4-3 Modification of the Production Efficiency Management

The parts framed by the red box have been abolished as monthly operation.
5 Conclusion: 5-1 Globalization of the TSP?

- Does the radical modification of the wage system in 2000 mean the end of the Ohnoist production management?
  - The technical system of the TPS remains and is diffused as the TPS: Just-in-Time and kanban, jido-ka, pokayoke, andon, line-stop system, etc.
  - But has been renounced the core of the TPS, which consists of the kaizen for reducing production costs, controlled by the top management through the production efficiency management, linked with the wage system (production allowance, renamed productivity allowance).
- Why? The reasons would be:
  - The bringing into question the production efficiency management, linked with the wage system, at the beginning of the 1990s.
  - The difficulty to apply Toyota’s production efficiency management, linked with the wage system, outside of Toyota in Japan itself.
- Did Toyota reconstruct Such TPS as ‘Toyota Way’ applicable everywhere?
- But, can it assure the continuous increase in productivity (production efficiency) as before?
5 Conclusion:
5-2 Problems the New World No.1 is facing

- **In Japan**
  - Instability of products quality due to the employment of massive temporary workers: 8,000 within 26,000 direct workers in 2004.
  - Increase of recalled cars after 2000: 970 thousand units in 2003, 1,880 thousand units in 2005, and 1,098 thousand units in 2006.
  - These are on the way to be solved, but........

- **Outside of Japan**
  - Complexity of management of globalized production
    - Creation of regional headquarters, but not achieved.
    - Difficulty in the China, though increasing production and market shares, because of the status of late comer as well as of the Chinese political and economic régime.
    - The same HRM cannot be imposed because of the difference in labor relations from one country to another.

- **A new problem**
  - Increase in the oil price causing a global cost push inflation, and a decrease in the purchase power of population shrink the automobile market and change the market structure.