The Japanese Manufacturing Industries - Its Capabilities and Challenges -

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Takahiro Fujimoto

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Executive Director, Manufacturing Management Research Center
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Evolutionary Analysis of Capability and Architecture

Decisions and Behaviors of Designers

- Capability-Building Environment
- Capability-Building Competition
- Capability-Building Capability

Manufacturing (monozukuri) Capability (local concentration)

Comparative Advantage of Design Sites

Other Environmental Factors, and Chances

Product-Process Architecture (Different by Products)

- Customer or Market Requirements
- Constraints imposed by Society
- Constraints imposed by Technology

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The Architecture - Capability Framework

1. Design-Information View of Manufacturing (Monozukuri)

2. Organizational Capability – Controlling Design Flows


4. Product-Process Architecture

5. Capability-Architecture Fit --- Explaining Competitiveness

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A firm’s products and processes are artifacts that has been designed.

Manufacturing is essentially creation and transmission of design information to customers.

A firm’s manufacturing (monozukuri) capability is its distinctive ability to handle flow of design information toward customers.

Product-process architecture is designers’ basic way of thinking when creating design information for the product and processes.

“Design” is the common denominator for these analyses.
Open Manufacturing (Monozukuri) Means Creating Design Information Flows to the Customers

We focus on **design** (as opposed to material) side of manufacturing

artifact = design information + medium

c.f., Aristotle: object = form + material

where form is more essential

Products (goods and services) are the artificial (≠ something **designed**) manufacturing, if medium is tangible

service if medium is intangible

Primary source of customer value is design information

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Body Exterior Design Embedded in Press Dies

Product Development

Production

Purchasing

Media (Material)

Design Information

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0.8 mm thick steel sheet
Product = Design Information + Media

Body Exterior
Design
Embedded in
Press Dies

0.8 mm thick
steel sheet

Production = Marriage of Design Information Media

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What is Going on at the Press Shop

Body exterior design information, embedded in press dies (steel block), is transmitted to 0.8 mm thick sheet steel (media)

Information transmission time = value-adding time

Information non-transmission time = MUDA
Design information, embedded in press dies, is transmitted to sheet steel.

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Open Manufacturing (Monozukuri) as a System of Design Information between Productive Resources

Manufacturing activity is design information flows between productive resources

- Design Information flow
- productive resource
- design information
- medium

- Design Information flow
- productive resource
- design information
- medium

- design Information flow
- product
- design information
- medium

- material (media) flow

firms

development

production

sales

customers

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Goods and service as flows of design information

Physical goods • • • 2 stage transmission:
① to tangible medium
② to customers

Service • • • intangible medium; direct transmission to customers

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What is Genba (Manufacturing Site)?

A Place Where People on the Spot Work Together, Control Artifacts, and Thereby Create a Good Flow of Value (Function) to the Society

- People work together
- Manual Control of Artifacts
- Automatic Control
- Structure of Artifacts (Controller)
- Structure of Artifacts (Controlled)
- Energy and Material Inputs
- Energy and Material Outputs
- Info. on Structures and Environments
- Feedback Info.
- Receiving and Enjoying Value (Community)
- Service to Customers – Service Site
- Service to Materials – Production Site
- Service to Themselves – Community, Family

Function, Service, Value
**Broader View of Lean Manufacturing**

<table>
<thead>
<tr>
<th>Narrow View of Manufacturing</th>
<th>Production</th>
<th>Development/Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing Sector</td>
<td>Production Sites in Manufacturing Sector</td>
<td>Non-Manufacturing Sector</td>
</tr>
<tr>
<td>Non-Manufacturing Sector</td>
<td>Development and Purchasing Sites in Manufacturing Sector</td>
<td>Non-Manufacturing Sector</td>
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</table>

**Shifting attention from Materials to Designs**

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<tr>
<td>Manufacturing Sector</td>
<td>Production Sites in Manufacturing Sector</td>
<td>Operation Sites in Service Sector</td>
</tr>
<tr>
<td>Non-Manufacturing Sector</td>
<td>Development Sites in Service Sector</td>
<td>Non-Manufacturing Sector</td>
</tr>
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1  Design-Information View of Manufacturing

2  Organizational Capability  –  Controlling Design Flows

3  Performance Measurement  --  A Multi-Layer Approach

4  Product-Process Architecture

5  Capability-Architecture Fit  ---  Explaining Competitiveness
Design-Based Comparative Advantage

Decisions and Behaviors of Designers

- Capability-Building Environment
- Capability-Building Competition
- Capability-Building Capability

Manufacturing (monozukuri) Capability (local concentration)

Fit?

Product-Process Architecture (Selected by Products)

Comparative Advantage of Design Sites

Customer or Market Requirements
Constraints imposed by Society
Constraints imposed by Technology

Other Environmental Factors, and Chances

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Organizational Routines and Capability of Manufacturing

Organizational routine of manufacturing

Repeated control of design information flow between productive resource

Organizational capability of manufacturing

A system of organizational routines for fast, efficient and accurate flows of design information to customers
(1) Higher Productivity and Shorter Throughput Time

Organizational Capability Regarding Productivity and Throughput Time (Toyota)

- **M+A**
  - Product Design
  - **Product Design** (M+A+B)

- **A**
  - Supplier's Kaizen (improvements)

- **B**
  - Supplier Kanban

- **C** Takahiro Fujimoto, University of Tokyo
Toyoita-style system as an **integrative manufacturing capability**

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The Lean Principle (Manufacturing)

Design Information is Transmitted to Materials

Creating **Good Flows of Good Design** (Value) to Customers

Reducing **MUDA** (Non-Value-Adding Time)

Maximizing **Value Adding Time Ratio**

Total **Process** First, Individual **Operations** Next

**Lead Time** Reduction First, **Cost** Cutting Next

**Pursue High Quality** First – Quantity Follows as a Result
Efficient/Accurate Information Processing at Toyota
Integrative Manufacturing Capability

Production --- Dense and Accurate Transmission of Design Information from Process to Product

Development --- Early and Integrative Problem Solving Cycles For Fast Creation of Design Information

Purchasing --- Long-Term Relationship, Capability-Building Competition, Bundled Outsourcing for Joint Creation of Design Information with Suppliers

Toyota’s Manufacturing capability - Smooth, dense and accurate transmission of design information between flexible (information-redundant) productive resources.

--- Integration-Based Manufacturing Capability

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Information Transmission and Reception in Production

Transmission side (working)

Reception side (process)

Design information flow
Material flow

Value adding time (transmission)
Value adding time (reception)
Non-value-adding time
Inventory, waiting, transporting, etc.
Productive resource

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Basics in Product Development

Themes in Clark & Fujimoto (1991) *Product Development Performance*

1. Early Supplier Involvement in PD
2. Applying JIT–TQM to PD
3. Overlapping Problem Solving
4. Compact and Coherent Team
5. Heavy–Weight PM as Champion

The Key is “Early and Integrated Problem Solving”

New Information Technology is Necessary, but not Sufficient Organizational Capability is Key After All
History Matters in Industry’s Capability-Building

Decisions and Behaviors of Designers

Capability-Building Environment

Capability-Building Competition

Capability-Building Capability

Manufacturing (monozukuri) Capability (local concentration)

Other Environmental Factors, and Chances

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Evolutionary Hypothesis for Integrative Manufacturing Capability

Common Experience during the High-Growth Era May Create A Common Set of Capabilities at Manufacturing Sites of the Same Country

“Economy of Scarcity” ・・ Hungry Organizations Are Forced to Become Lean

Common Experience of “Poverty” (Input-Hungry Situations) When the Organization Was Young, Small and Growing.

→ Limiting Intra-Firm Division of Labor (= Multi-Skilled Workers) Promoting Inter-Firm Division of Labor (= Supplier Systems) ・・ Promoting Coordination Inside and Between Firms (= Team Work)

→ Forced Increase of Productivity (High Altitude Trainings of Marathon Runners)

→ Subsequent Increase of Inputs Results in Rapid Expansion of Outputs, But Expansion of Supplies Also Intensifies Competition Among Firms. Capability-Building Continues in the Sectors of Tradable Goods.

・・ Partly Unintended Results of Industrial Histories in the Late 20th Century.

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1 Measuring and Analyzing Industrial Performance
--- From Competitiveness to Profitability

Capability, Competitiveness, and Profitability

other factors of environments and strategy

Organizational Capability
- organizational routine

Productive Performance
- productivity
- lead time
- conformance
- quality etc.

Market Performance
- price
delivery
perceived
quality etc.

Profit Performance

Arena of Capability-building Competition

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Example: Productive Performance of Japanese Auto Firms
-- Development Productivity (Adjusted Person-Hours per Project) --

Adjustment scheme:
(1) # of body types = 2, (2) New design ratio = 0.7, (3) Supplier’s contribution = 0.3, (4) Product class = compact/sub-compact

Example: Productive Performance of Japanese Auto Firms
-- Assembly Productivity (Adjusted Person-Hours per Vehicle) --

Source: M. Howleg & F.K. Pil, *The second century* (IMVP Survey)
Final Assembly Productivity (2006)

Assembly Productivity (person hours per vehicle)  
Factories of Asian Multinationals in Asian Countries

Productivity (man-hour/vehicle) (assemble)

Japan Average (10)  
Korea&Taiwan Average (6)  
Taiwan Average (3)  
Thailand Average (6)  
China&India Average (6)  
India Average (3)

C Takashi Oshika, and Takahiro Fujimoto, IMVP
Example: Productive Performance of Japanese Auto Firms
-- Assembly Throughput Time (from Welding to Assembly) --

Throughput Time (Start of Body Assy–Final Line off)

<table>
<thead>
<tr>
<th>Country Region</th>
<th>Throughput Time (Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP/JP</td>
<td>17.1</td>
</tr>
<tr>
<td>JP/NA</td>
<td>20.1</td>
</tr>
<tr>
<td>NA/NA</td>
<td>25.5</td>
</tr>
<tr>
<td>EU/EU</td>
<td>36.3</td>
</tr>
<tr>
<td>KR/KR</td>
<td>20.5</td>
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</table>

Data: IMVP2000yr. Survey, made by Jeweon Oh, MMRC

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Manufacturing (monozukuri)
(Selected by Products)

Product-Process Architecture
(Selected by Products)

Comparative Advantage of Design Sites

Fit?

Constraints imposed by Technology
Constraints imposed by Society
Customer or Market Requirements

Other Environmental Factors, and Chances

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**Product architecture**, Basic way of thinking of engineers when they design **functions** and **structures** of a new product
Basic Classifications of Product-Process Architecture

**Modular architecture**
*one-to-one correspondence*
between functional
and structural elements

**Integral architecture**
*many-to-many correspondence*
between the functional
and structural elements

**Open architecture**:
“mix and match” of component
designs across firm

**Closed architecture**:
mix and match only within a firm
Three Basic Types of Product Architecture

(1) **Closed-integral**, (2) **Closed-modular**, (3) **Open-modular**

<table>
<thead>
<tr>
<th>Integral</th>
<th>Modular</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Closed</strong></td>
<td></td>
</tr>
<tr>
<td>small cars</td>
<td>mainframe computer</td>
</tr>
<tr>
<td>motorcycle</td>
<td>machine tools</td>
</tr>
<tr>
<td>game software</td>
<td>LEGO (building-block toy)</td>
</tr>
<tr>
<td>compact consumer</td>
<td>personal computer (PC)</td>
</tr>
<tr>
<td>electronics</td>
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<td></td>
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</table>
Closed-Integral Architecture (Car)

Figure 6   Basic Types of Product Architecture

- Closed
  - small cars
  - motorcycle
  - game software
  - compact consumer electronics

- Modular
  - mainframe computer
  - machine tools
  - LEGO (building-block toy)

- Open
  - personal computer (PC)
  - bicycle
  - PC software
  - internet

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Closed-Modular Architecture (Mainframe Computer)

**Basic Types of Product Architecture**

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Open-Modular Architecture (PC)

![Diagram showing basic types of product architecture.]

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Closed-Integral Architecture (unit-body)

Basic Types of Product Architecture

Closed
- small cars
- motorcycle
- game software
- compact consumer electronics

Open
- mainframe computer
- machine tools
- LEGO (building-block toy)

- personal computer (PC)
- bicycle
- PC software
- internet
Closed-Modular Architecture (Body-on-Frame, or Truck-type)

- Small cars
- Compact consumer electronics
- Internet
- Bicycle
- LEGO (building-block toy)

Open
- Game software
- Mainframe computer
- Personal computer (PC)
- PC software
- Internet

Basic Types of Product Architecture

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Quasi-Open-Modular Architecture? (Chinese local makers)

Figure 6   Basic Types of Product Architecture

- Open
  - small cars
  - game software
  - compact consumer electronics
  - mainframe computer
  - machine tools
  - personal computer (PC)
  - internet

- Closed
  - motorcycle
  - game software
  - Internet

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Evolution of Architectures

– a Macro-Micro Loop –

Product-Process Architecture (Selected by Products)

Customer or Market Requirements
Constraints imposed by Society
Constraints imposed by Technology

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Evolution of Architectures

Designers’ Intentions -- or Chances

variation

selection

retention

Over-Performance

Improving Functions

Unintended Design Changes

Simplifying Structures

Under-performance

Surviving Architectures

-- by Performance

-- by Cost

Constraints by Society, Markets, Physics --

Micro-Architecture

Macro-Architecture

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Loops of Macro-Architectures and Micro-Architectures

**Macro Architectures**
- are Selected by Society, Market and Technology
- Architecture of the Whole Product = Aggregation of Parts’ Architectures
- Macro-Architectures Affect Structures and Cultures of Industries and Firms
- Macro-Architectures Affects Micro-Architectures through Structures/Cultures

**Micro-Architectures**
- are Selected by Designers’ Intended/Unintended Behaviors
- The Same Product may Have Different Architectures
- Layer by Layer (Vertically), or Area by Area (Horizontally)
- Ex Ante, Designers Intend to Improve Performances or Decrease Costs by Changing Micro-Architectures
- Ex Post, Micro-Architectures that Survived in Internal/External Selection Environments are Aggregated into a Macro Architecture of the Whole System
Selection of Macro Architectures

- Technological Progress Expands Cost–Performance Frontier
- The Same Kind of Products with Different Architectures May Have Different Cost–Performance Frontiers
- Customers of Different Tastes (e.g., Performance–Oriented or Cost–Oriented) May Select Products of Different Architecture

Performance–Oriented Customers May Choose Integral Architecture; Cost–Oriented Customers May Choose Modular Architecture

- Architectures, Coordination Mechanisms, and Industrial Structures are Selected Simultaneously

Modular Architecture — Market Coordination — Dispersed Industrial Structure
Integral Architecture — Organizational Coordination — Concentrated Industrial Structure

- Organization’s Coordination Capability Building → Shift to Integral Architectures
- Market’s Coordination Capability Building → Shift to Modular Architectures

- Middle Range in the Architecture Spectrum
  Relational (Long–Term) Contracts and Other Hybrid Coordination Mechanisms.

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Technological Progress Expands Cost-Performance Frontier

Average Cost (Price) vs. Performance

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Expanding the Frontier (Electric Calculator)

Price (yen)

Function Index

Casio

Sharp

© J.Shintaku
Architectures and Cost–Performance Frontier

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Overall Cost-Performance Frontier (Envelope)

Average Cost (Price)

Modular

Integral

Performance
Overall Cost-Performance Curve and Choice of Architectures

Overall Cost-Performance Curve

Average Cost (Price)

Modular

Integral

Indifference Curve of Performance-Oriented Customers

Indifference Curve of Price-Oriented Customers

Customer Types and Overall Reservation Price Curves

Price

Modular

Intermediate

Integral

Choice of Price-Oriented Customers

Choice of Intermediate Customers

Choice of Performance-Oriented Customers

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Design-Based Comparative Advantage

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- Constraints imposed by Technology
- Customer or Market Requirements

Other Environmental Factors, and Chances:

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Hypothesis: Capability-Architecture Fit at National Level

A group of firms in the same country or region, facing similar environmental constraints, national-regional institutions, demand patterns or other forces specific to a particular geographical area may develop similar types of organizational capabilities.

Products with the architecture which fits this organizational capability tend to demonstrate competitive advantage (if not profitability).

History matters

Japan’s Architectural Comparative Advantage

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Ratio of Export and Integral Architecture Index Scatter chart (1)
(Regression Equation for Assembly products: 52sample)
Ratio of Export and Integral Architecture Index Scatter chart (2) (Regression Equation for Process-Oriented Products: 43sample)
Asian Industrial Performance

History matters

Different history, different capability, different advantages

Complementary nature of Asian trades
Design-Based Comparative Advantage

(1) Products may be Designed
Where Organizational Capability and Product Architecture Fit

(2) Products may be Produced
Where Products are Designed
(Scale Economy and Product Differentiation) or
Where Organizational Capability and Process Architecture Fit or
Where Products are Sold (Production Located in the Market)

Design Matters When Policy Makers Choose Industries to be Promoted
Predictions on Architecture-based Comparative Advantage

**Japanese firms -- integration capability**
More competitive in products with *closed-integral architecture* based on *integration-based manufacturing capability*

**Chinese firms -- mobilization capability**
More competitive in labor-intensive products with *open-modular (or quasi-open) architecture*

**Korean (large) firms -- concentration capability**
More competitive in capital-intensive products with *modular architecture* (moving toward *integral*)

**ASEAN firms -- labor-retaining capability??**
More competitive in labor-intensive products with *closed-integral architecture*?

**U.S. firms -- conceptualization capability**
More competitive in knowledge-intensive products with *open-modular architecture*

**European firms -- expression capability**
More competitive in *closed-integral products* based on brand-design-marketing capability

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Architectural Geopolitics:
A Prediction in the Pacific Region

Modular Axis
- China (south)

Integral Axis
- Japan
- Korea
- Taiwan
- ASEAN
- India?
- US

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Application of the Framework

Toyota Recall 2010

EV and Future of the Automobile

3.11 Earthquake and Supply Chain Robustness
No excuse! – but it is not so simple.

Root Cause: over-complexity, over-speed, over-confidence

The war against the demon of complexity continues.

Toyota stumbled, but is still among the leading runners

The rule of the game changed
  – stricter regulations & requirements

Toyota may still have advantages in the long run.

But difficult dual strategy may be needed
  – developing both complex and simple vehicles
Toyota Problem as Complexity-Capability Imbalance

Decisions and Behaviors of Designers

- Capability-Building Environment
- Capability-Building Competition
- Capability-Building Capability

Out of Balance

Over-Confidence of Quality-Handling Capability

Explosion of Product Complexity

Toyota Problem In Design Quality

Other Environmental Factors, and Chances

- Customer or Market Requirements
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- Constraints imposed by Technology

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Capability, Complexity, Quality and Volume

Acceptable Toyota Quality

Complexity in Design, Production and Purchasing

Upper Limit of Production Volume Compatible with Toyota Quality

Capability-Building in Quality

Frontier of Toyota’s Quality-Handling Capability

Over-Growth of Toyota’s Global Production?

© Takahiro Fujimoto, University of Tokyo
– Can EV Change the Industrial Structure?

Currently – NO, for ordinary household use.

**Variable cost** is too high. **Volume** does NOT solve this problem.

Breakthrough **battery innovations** may solve it, but when??

EVs for developed car markets are still integral architecture.

**It may become modular architecture,**
but unless battery cost goes down dramatically,
EV use will be limited to the application
with high utilization ratio, short-range, & limited area.

Car is not PC, after all

**Diversification of motive power**
in the first half of the 21-st century?

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A Simple Economic Analysis of EVs

Mitsubishi’s commercialized EVs –
Battery pack alone is 200kg, $20,000, practical range is 100km.
Vehicle price is over $40,000 (less than $30,000 after subsidy)
Diversified Mix of Motive Power in the 21st Century?

No technology dominates.

Right vehicle for Right use
East Japan Earthquake and Supply Chain Crises

Unprecedented! Compared with Past Disaster

Complete Destruction in Broad Area

→ Restoration of Design Information Flows is Key

Past Example: Nihonzaka Tunnel Fire, Kobe Earthquake, Aishin Fire, Chuetsu Earthquake, etc.

Difference from the Past Disaster:

Global Operation, Global Competition, and Electronic Control

“A Huge Disaster that Happened in the Era of Global Competition”
The Tohoku Earthquake and Supply Chain Crises

Critical Parts that Affected Global Supply Chains

① Microcomputer Chip ・・
  Design Information is not Substitutive, not Portable
  ・・ But Restoration is Faster than Expected

② Functional Chemical ・・ Rubber and Paints
  Tsunami and Nuclear Plant

③ Piece Parts & Expendable Supplies ・・ Lower-Tiers, -- not Visible

Toyota’s Recovery from the Supply Chain Destruction by the Earthquake is Faster than Initially Expected.
Supply Chain as Flow of Design Information

Flow of Design Information

Flow of Material (Medium)

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The Tohoku Earthquake and Supply Chain Crises

Analysis of Supply Chain Robustness/Weakness

- **Monozukuri** (Manufacturing) Theory
  Based on the Concept of Design Information Flow

- Four Attributes of Supply Chain Robustness/Weakness

  1. Dependence on Supply to one Supplier/Factory
  2. Lack of Visibility of Supply Chain
  3. Lack of Substitutability of Design Information
  4. Lack of Portability of Design Information
The Tohoku Earthquake and Supply Chain Crises

Some Remedies Under Discussions -- Their Limits

Robustness without Competitiveness is Not Feasible in the Long Run

1. **Adding Inventories (✗)**
   
   Don’t Design Inventory Systems Based on Rare and Unpredictable Events Whose Probabilities Cannot be Calculated

2. **Switching to Standard/Common Parts (✗)**
   
   Survivable Product Architectures are Selected by Customers

3. **Duplicating Supply Chains and Equipment (✗)**
   
   Feasible only When Market Growth Absorbs Added Capacity

4. **Transfer of Facilities out of Eastern Japan (✗)**
   
   In the Long, Run, There are Risks Everywhere in the World

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Counter Measures for Robust Supply Chains Against Huge Disasters

Goals:
Recovery of Supply Chains within a Few Weeks after Huge Disaster?

① Reducing Product Inventory

①’ Adding Inventories for Safety

② Switching to Standard Parts?

②’ Modifying Standard Parts to Customized/Optimized Parts?

③ Dual Tooling

③’ Virtual-Dual Tooling

④ Dual Sourcing (Dual Lines or Suppliers)?

④’ Virtual-Dual Sourcing (Design Portability)?

Is Product Design Information Product-Specific or Substitutable?

Is Process Design Information Portable?

Supply Responsibility & Competitiveness

Standard Parts

Destroyed?

Process, Equipment, Tools, Dies, Recipes

Prod. Design

Proc. Design

Back-up Equipment, etc.

Product Inventory

WIP

material
Increasing Supply Chain Robustness Without Sacrificing Competitiveness

- Huge Disaster Someday – But Global Competition Everyday

- The Goal is Recovering Design Information Flows (In A Few Weeks)

- Improving Supply Chain’s Visibility (Getting Info in a Few Days?)

- Improving Design Information’s Portability (Transferability)

- Making the Supply Chains Virtual-Dual by Nominating Back-up Production Lines/Suppliers

Industrial Marathon Continues in Asian Industries

What is Going On in the Early 21th Century?

Globalization – as Realization of International Division of Labor

Microscopic Intra-industrial Trade based on Comparative Advantage

The Keys Are:

Architecture-Capability Fit -- Comparative Advantage of Design

Capability-Building Competition

Evolutionary Learning Capability

Strong Strategies and Strong Operations

C Takahiro Fujimoto, University of Tokyo
Across the Manufacturing-Service Boundary

Open-manufacturing (monozukuri) principles are applicable to both manufacturing and service sectors

Inter-sectoral learning and knowledge-sharing is key!
Learning Across Industries

Front Runners Can Learn Each Other

Toyota → Canon
Toyota → A Fashion Company (World)
Toyota → A Super Market Chain (Ito Yokado)
Toyota → Japan Post Office
Toyota → Toyota Dealers
Ritz Carlton → Toyota

Lean Knowledge Transfer across Industries is Key
Service and Manufacturing — Difference in Media

The Medium is Intangible and Ephemeral in Typical Service Processes

Service Products are Produced and Consumed at the Same Place and Time

<table>
<thead>
<tr>
<th>Tangible</th>
<th>Intangible</th>
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<tbody>
<tr>
<td>Cars</td>
<td>Design Information</td>
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<td>Semiconductors</td>
<td>Financial Products</td>
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<td>Other Durable Goods</td>
<td>Durable</td>
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<td>Perishable Foods</td>
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<td>Non-Durable Goods</td>
<td>Broadcasting</td>
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</tbody>
</table>
Transfer of Toyota System to Service Sectors

Hospital (5S, streamlining client flows),
Insurance Firms (Customer Oriented Product Development)
Government (Project Management),
Police (Preventive Maintenance?)

Different Aspects in Different Industries

Post Office: Living with Input Volume Fluctuation
Creating Standard Units of Flows (15 min) at the Entrance

Ito-Yokado Super Market
Backyard 2S, JIT Tempura, JIT Meet Cutting,
Piece-By-Piece Cabbage Flow

Toyota Automobile Dealer: Showroom Sales (Home Game by Team)
“Home Doctor” System (Sales Personnel)
45 Minute Inspection (work standardization)

Broad Definition of Customers’ Flow of Total Customer Experience is Key!

C Takahiro Fujimoto, University of Tokyo
The Lean Principle Applied to Service

Design Information is Transmitted to Customers, Not Materials.

Creating Good Flows of Total Customer Experience

Total Customer Experience is a Part of Customer’s Life

Customer’s Life is a Flow -- Imagination on Their Lives is Key

What is Customers’ Muda/Value Experience? -- Not So Clear

Optimizing (Not Maximizing?) Value Adding Time Ratio

Customer Experience First, Service Operations Next

Lead Time Optimizing (e.g. Waiting Time) First, Cost Cutting Next

Pursue High Quality – Quantity Follows as a Result

C Takahiro Fujimoto, University of Tokyo
Creating a Good Flow of Customer Experience: A Super Market

Entrance – Unsatisfied Customers

Unsatisfied Customers

Exit – Satisfied Customers

Lead Time = Information-Receiving Time

Timely and Accurate Information Transmission to Customers

Quality = Information Sending Accuracy

Productivity = Information-Sending Efficiency

Design Info

Tangible Medium

Intangible Medium

C Takahiro Fujimoto, University of Tokyo
Good Flow of Customer Experiences (Harley Davidson Japan)

Flow of Customer Experience

Potential Customer①

Potential Customer②

Existing Customer①

Existing Customer②

Promotion Design

Product Design

Sales Floor Design

Design Info

Consumption

Satisfaction

Production

Sales

Intangible Medium

Tangible Medium

C Takahiro Fujimoto, University of Tokyo
Manufacturing Instructor School for Diffusing Momozukuri Knowledge to SMEs

Transforming Manufacturing Veterans to Manufacturing Instructors

Teaching across industries

Helping the regions and SMEs share manufacturing knowledge
Tokyo University Manufacturing Instructors’ School

Educating Instructors Who Can Teach Lean Manufacturing Across Industries
Over 50 people are now active as lean manufacturing instructors
Reference


