

Summary of the White Paper on Manufacturing Industries (Monodzukuri) 2009

May 2009

Ministry of Economy, Trade and Industry
Ministry of Health, Labour and Welfare
Ministry of Education, Culture, Sports,
Science and Technology

Chapter 1 Status of Manufacturing Industries in Japan under the Worldwide Recession

[Overview of Manufacturing Industries in Japan]

(1) Production

- Since October 2008, the Japanese economy has declined rapidly to a great extent, and many industrial sectors have been hit significantly. While industrial production initially slowed down at a similar rate to the decline suffered in the previous recession, this time the decline has been more rapid because of a sharp decline in overseas demand. (See Chart 1-1)
- The economic slowdown in Japan is greater than that in the United States, where the worldwide recession originated. This is because the automobile industry and electronics industry, which have witnessed significant declines in sales, account for a major share of the Japanese economy, and exports make up a high portion of total demand. (See Chart 1-2)

(2) Cash position

- The cash position of manufacturing industries has deteriorated sharply since 2008. In particular, small and medium enterprises have experienced substantial negative figures. (See Chart 1-3). In consideration of these severe business conditions, the Japanese government has been adopting the following supportive measures to improve the cash position of manufacturing industries: 1. Expand the safety net loan programs towards small and medium enterprises, 2. Introduce low-interest loan programs and the purchase of commercial papers (CPs), and 3. Strengthen support to overseas subsidiaries of Japanese companies by the Japan Bank for International Cooperation (JBIC) and Nippon Export and Investment Insurance (NEXI).

(3) Capital Investment

- In the face of the severe fundamental financial outlook, manufacturing companies started reviewing their capital investment, by postponing and reducing the size of investment, while focusing investment on areas which they expect to grow in the future.

(4) Employment

- The unemployment rate increased from 3.6% in July 2007 to 4.8% in March 2009. The effective job offer rate in the areas of manufacturing process and labor services has declined notably since late 2008.
- In terms of the sentiment of labor excess or deficiency, labor supply exceeded demand in the fourth quarter of FY '08. The excess supply sentiment has been expanding rapidly, especially in manufacturing industries. (See Chart 1-4)
- The number of companies that adopted some form of employment adjustment increased sharply during the period between October and December 2008. The number of such companies in manufacturing industries reached half of all enterprises. (See Chart 1-5)
- According to data collected by the Ministry of Health, Labour and Welfare, about 193,000 non-regular workers in manufacturing industries will leave or are expected to leave their jobs between October 2008 and June 2009 because of suspension of employment. (See Chart 1-6)
- In the face of the severely deteriorating employment situation, the Government of Japan has implemented the following measures:

1. Maintaining Employment

- Relaxing the conditions and raising the rate of Employment Adjustment Subsidy, and offering an Immediate Employment Security Subsidy for SMEs
- Establishing an incentive program to encourage companies to reduce overtime while retaining employment (aimed at stabilizing the employment of workers under fixed-term employment contracts or dispatched workers)
- Investigating the company practice of withdrawing employment offer to fresh graduates and taking hold of the measures taken by universities and other schools against withdrawal of employment offers, giving full advice to business, and implementing job placement assistance to those who were declined a job offer

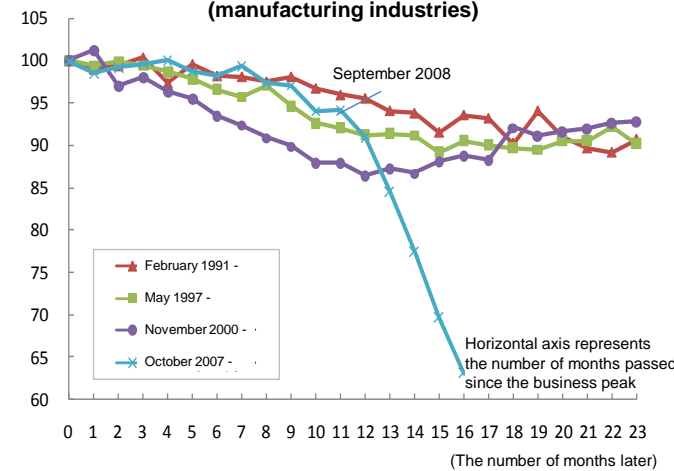
2. Support for the Unemployed

- Supporting those who lost their jobs and places to live with loans for making a living and for job-hunting activities
- Strengthening job training programs for the unemployed and establishing and strengthening the system that enables payment of life security benefits during the training period

3. Job creation

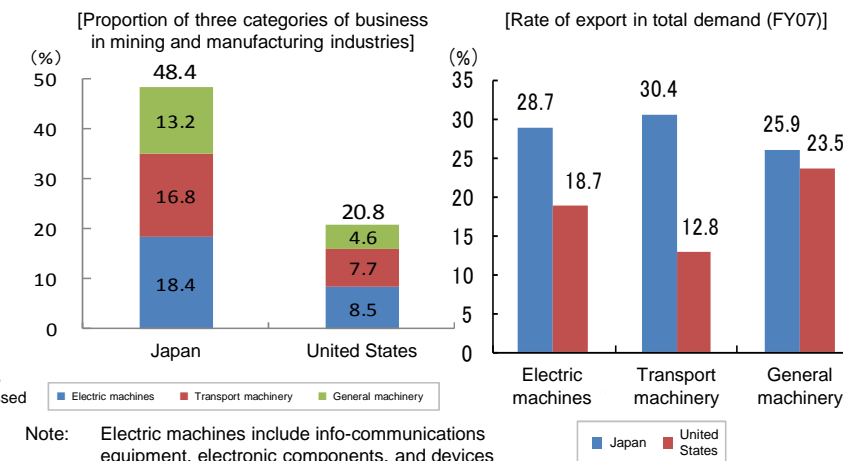
- Supporting local efforts for job creation (by setting up funds)

[Chart 1-1 Comparison with prior recession]
(Comparison in terms of economic peak)
Changes in mining and manufacturing production index (manufacturing industries)



Note: Data was indexed on the basis of a recession peak of 100
Source: "Indices of Industrial Production, Shipment, and Producer's Inventory," Ministry of Economy, Trade and Industry

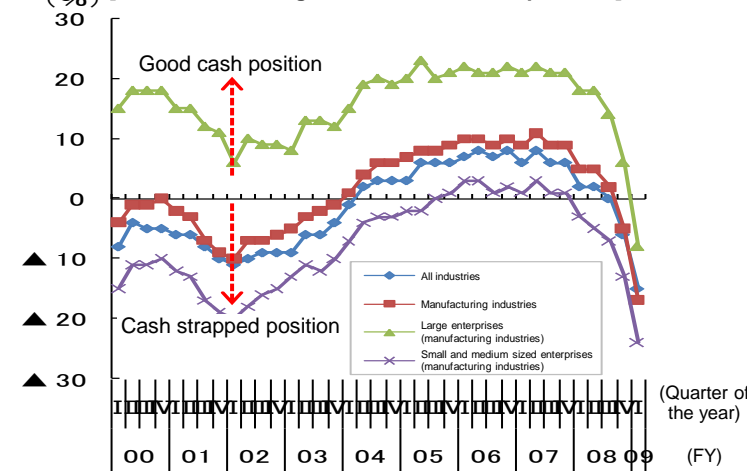
[Chart 1-2 Reasons for the large effect of the recession in Japan]



Note: Electric machines include info-communications equipment, electronic components, and devices
Source: "Industrial Production Index" (FY 05 weighted average), Ministry of Economy, Trade and Industry
"Industrial Production and Capacity Utilization" (FY07 weighted average), FRB

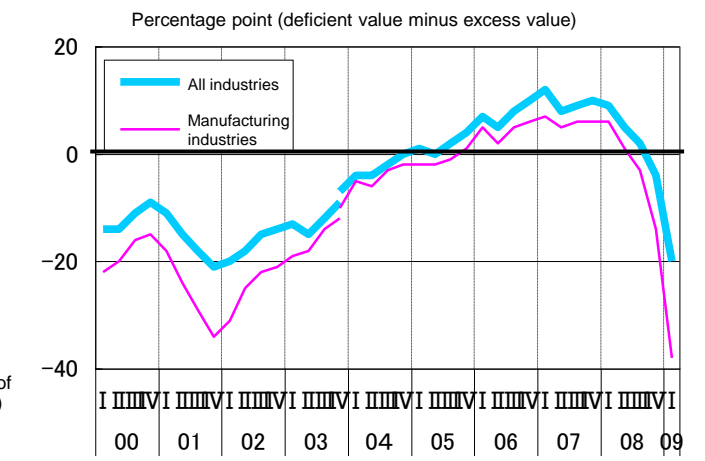
Source: "National Economy Accounting," Cabinet Office
"inter-industry relations table," Commerce Department (U.S.)

[Chart 1-3 Changes in the D.I. of cash position]



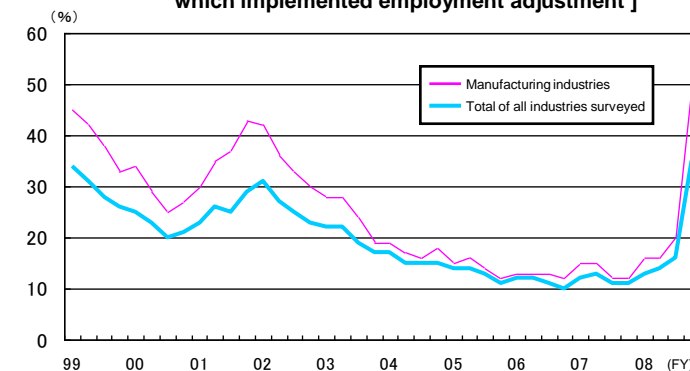
Source: "Short-term economic survey of enterprises," Bank of Japan

[Chart 1-4 Changes in the D.I. of employment classification]



Source: "Short-term economic survey of enterprises," Bank of Japan (FY)

[Chart 1-5 Changes in the rate of enterprises which implemented employment adjustment]

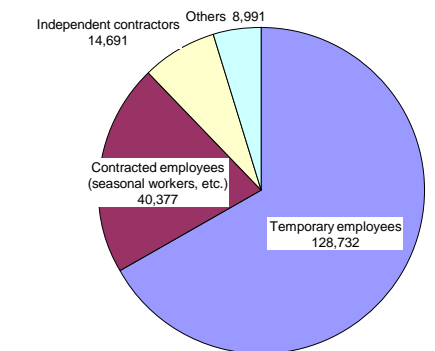


(Method of employment adjustment in manufacturing industries between October and December 2008)

| Total | Number of companies that have implemented or plan to implement | Method of employment adjustment | | | | | | | |
|-------|--|---------------------------------|---|--|--|--------------|---------------------|-----------------------|--|
| | | Employment adjustment | Increased the number of holidays and days-off such as substitute holidays and summer holidays | Reduction or suspension of mid-career employment | Terminate the contract with or lay off temporary, seasonal, or part-time workers | Reallocation | External assignment | Shutdown (stand down) | Solicit voluntary retirement or displacement |
| 100 | 50 | 34 | 11 | 14 | 10 | 15 | 5 | 5 | 3 |

Source: Survey on Labor Economy Trends, Ministry of Health, Labour and Welfare

[Chart 1-6 Situation of employment suspension of part-time workers in manufacturing industries]



Total for manufacturing industries = 192,791

Note: 1. As the survey was carried out in the form of arbitrary hearings with the enterprises to the possible extent based on the information obtained from the general operations of the Prefectural Labor Department of Ministry of Health, Labour and Welfare and the Employment Service Agency, not all the information on turnover examples and their details were collected.
2. The data on employment suspension was obtained from those implemented or scheduled for the period of October 2008 until June 2009, as of April 17, 2009.
Source: Prepared by the Ministry of Health, Labour and Welfare

Chapter 2 Challenges and Prospects facing Japan's Monozukuri Industries

- Strategic move for the growth of Japan's monozukuri industries -

(1) Japan's monozukuri industries turn expanding limitations on resources and environmental constraints into a strength and continue to grow

- As the unstable situation with resource prices is expected to continue, it is essential to address the issues of securing the rights to exploit and run mines, investing in plant in resource-rich countries, and developing alternative energy sources on a continuous basis. (See Chart 2-1)
- With limitations on resources and environmental constraints growing, the need for energy-efficient and "energy-productive" products is increasing. It is vital for Japan's monozukuri industries to enhance their international competitiveness by developing and implementing aggressive business plans as well as by developing new technologies. Though overseas demand is currently slowing down because of the global recession, from a long-term perspective, it is necessary for Japan's industrial sector to compete for demand not only from developed nations but also from emerging economies such as China and Brazil.

(2) Japan's monozukuri industries strive to enhance the level of manufacturing (monozukuri) capability

- It is critical for monozukuri industries to review their field capability and R&D capacity and brush up their management resources, in order to overcome the cataclysmic changes that have occurred and to grow further.
- The marketing approaches, which surpass the conventional "monozukuri" practices, such as providing customers with value-added services, have progressed. In order to avoid easy price competitions, it is essential to expand the efforts to raise customer satisfaction not only at the time of purchase but also when the customers use the product. (See Chart 2-2)
- In addition, it is expected to expand the possibility of our manufacturing industries that creating "kansei value", a new measure of value dissimilar to conventional ones such as functionality and price that have served as sources of competitiveness in manufacturing or enhancing efforts toward "collaboration between agriculture, commerce and industry".

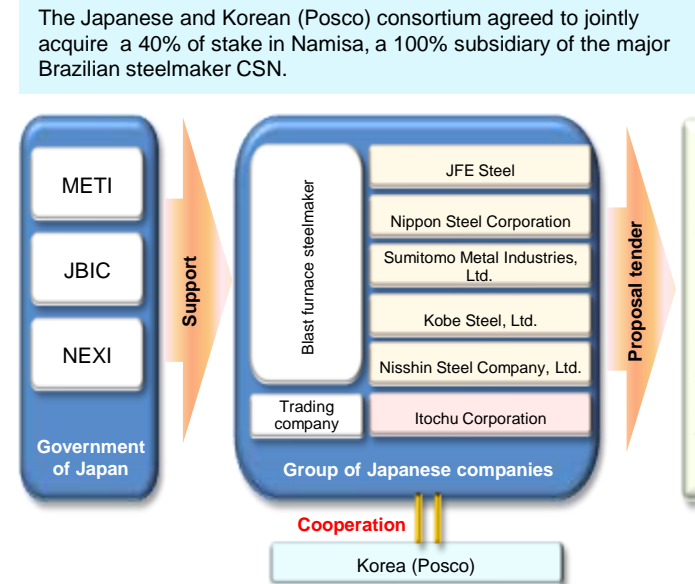
(3) Restructuring of global supply chains and merchandise strategy under worldwide recession

- It is of special importance to review and restructure the global supply chain and identify consumers on the basis of medium and long-term growth market analyses, especially when the world economy is slowing down. In fact, Japanese companies have a tendency to consolidate their overseas operating bases especially in Thailand, Indonesia, and Vietnam in South East Asia by reexamining their management resources and expanding economic partnership agreements (EPA).
- In addition, while the market presence of emerging countries' middle-income group (called the "volume zone") is expanding, Japanese manufacturing companies should focus on developing products that meet the needs of not only the wealthy group but also of the middle class. To do so, it is necessary to restructure the strategy regarding domestic and international manufacturing systems. (See Chart 2-3)

(4) Strategic moves for the growth of manufacturing industries/approaches to and challenges for the development of prospective areas

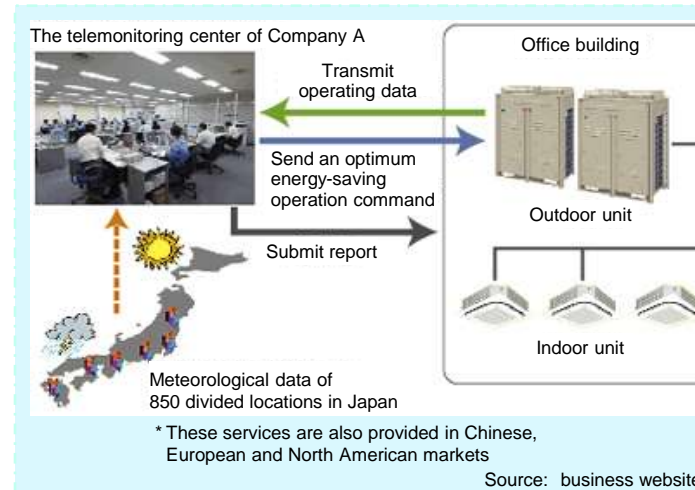
- While manufacturing industries are experiencing severe business conditions, it is especially necessary to develop and implement strategic measures keeping in mind future growth. It is critical to develop a social environment in which the next generation products, which may create potentially large demand, such as next generation automobiles, solar cells, service robots, etc. are born in Japan and spread to the global market. (See Chart 2-4) (See Chart 2-5)

[Chart 2-1 Acquisition of rights to exploit and run mines by the Japan-Korea consortium]

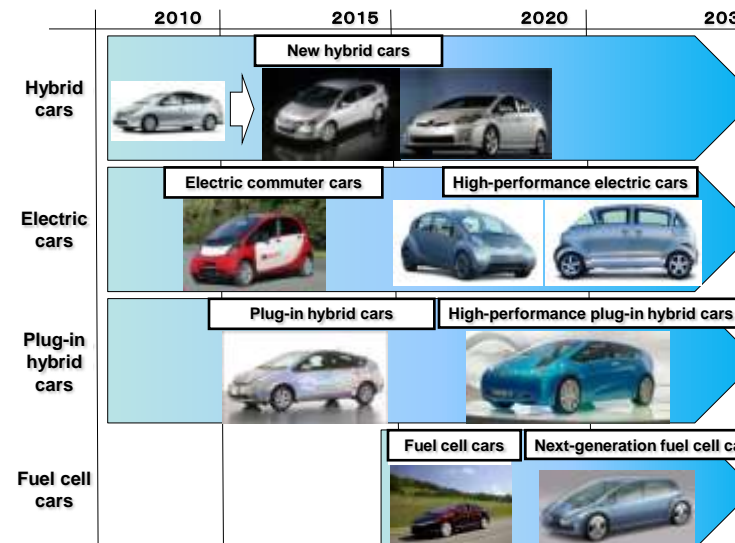


Source: Prepared by the Ministry of Economy, Trade and Industry

[Chart 2-2 Provision of added services to raise customer satisfaction]

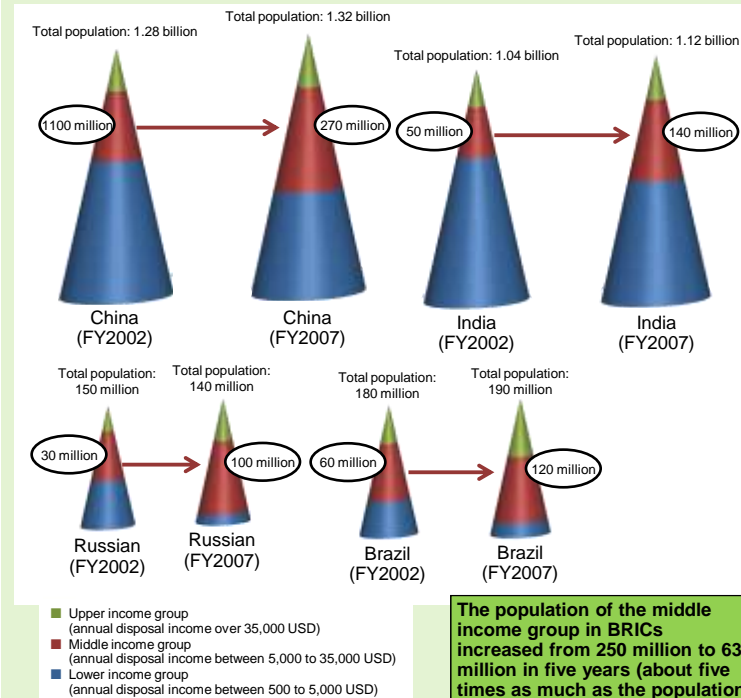


[Chart 2-4 Images of next generation automobiles - typical example]



Source: Prepared by the Ministry of Economy, Trade and Industry on the basis of various resources

[Chart 2-3 Emerging economies' volume zones and the measures taken by their business enterprises]

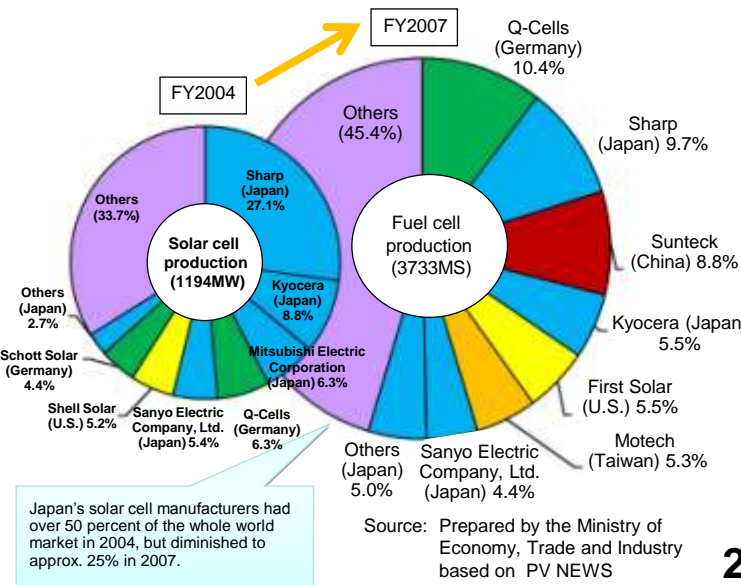


Source: Prepared by METI based on the information obtained from the White Paper on International Trade and Foreign Direct Investment (2008, JETRO) and "the World Economic Outlook Database" (IMF)

Electric manufacturer A
 > Introduces the products in consideration of each country's market characteristics targeting the middle income group in emergent economies
 > Microwaves, air conditioners, washing machines, TVs cordless telephones, dryers, etc.

Analytical/measurement instrument manufacturer B
 > As for high class products, instruments made in Japan, which have a high brand image in China, will be introduced into the Chinese market.
 > As for middle class products, their designing, development and production are done locally and more parts are procured locally so that the cost can be reduced by about 40 % in comparison with products made in Japan

[Chart 2-5 Solar cells: Share by world's major manufacturers]



Japan's solar cell manufacturers had over 50 percent of the whole world market in 2004, but diminished to approx. 25% in 2007.

Source: Prepared by the Ministry of Economy, Trade and Industry based on PV NEWS

Chapter 3 Strengthening the manufacturing base by developing human resources as the core for monodzukuri

In the severe business environment for manufacturing industries, training and securing “core human resources” at the manufacturing site and succeeding skills are critical challenges in order to meet the need for high quality and accurate products and the delivery of goods within a short duration.

(Securing and training core human resources at “Monodzukuri” sites)

The knowledge and know-how required of core human resources focus on the managerial ability to control production lines, such as of “quality management,” “streamlining and improving production line,” and “maintaining and improving the facilities.” (See Chart 3-1) In terms of types of core human resources needed, the need for on-site skilled workers with leadership skills and multiple handling skilled workers with the abovementioned knowledge and know-how is high; this need exceeds the need for highly experienced workers. (See Chart 3-2)

More than half of the manufacturing companies secure core human resources successfully. The rate of securing human resources in medium-sized companies is a little less than that of large-scale companies. (See Chart 3-3) Securing core human resources depends on the hiring and retention of competent workers. In particular, the smaller the companies are, the clearer this trend is. Meanwhile effective implementation of OJT and environment where skilled workers are trained affect the retention of competent human resources. (See Chart 3-4)

(Skill succession at “Monodzukuri” work site)

A little less than half companies feel that they face skill succession problems (See Chart 3-5). In terms of the scale of business, the rate of large-scale companies that feel they have problems with skill succession is higher than that of small and medium-sized companies. Whereas, the latter feel that they will encounter the same problem in the future. (Chart 3-6)

The measures taken by small and medium sized companies to ensure the transition of skills to the next generation include “the succession of skills via daily operation” and “employment extension of veteran employees.” In addition, medium sized companies with 200 or more employees tend to adopt a multilateral approach including “visualization and standardization of skills and know-how.” (See Chart 3-7)

(Challenges for human resource development)

In order to secure and train core human resources easily, companies should effectively implement OJT, streamline the environment to train skilled workers, and raise the motivation of skilled workers to develop their ability. Moreover, it is necessary to promote the measures to improve the worksite environment for training human resources and other elements of the work environment to make hiring and retention of competent workers easy.

Quite a few companies are currently obliged to suspend business because of the severe business conditions. They should consider now to be the best time to reconsider the best location for future business operation and focus on employee training and education. It can be considered to be a good opportunity for small and medium-sized companies to obtain competent human resources.

(Skill development measures related to “monodzukuri”)

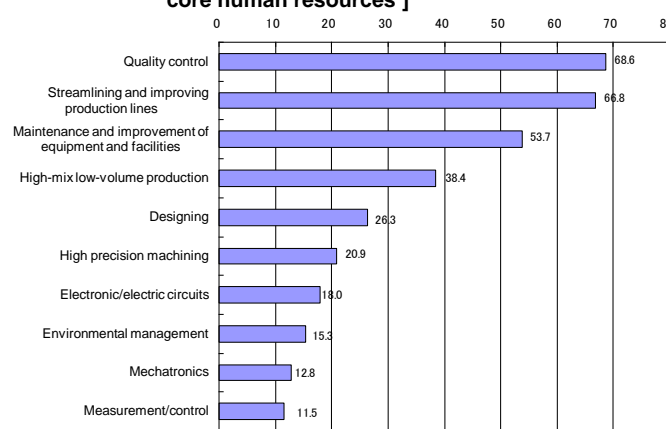
Public job training programs are designed to provide training aimed at developing and training highly skilled workers who may become core human resources in monodzukuri industries in the future and training for the existing workers to respond to new technologies and improve the production process.

The skilled worker registration system and application program have also been launched to support skill succession in small and medium-sized companies, by which registered skilled workers carry out practical training.

By entrusting private training institutions, job training programs that combine classroom study and practical training are provided for supporting small and medium-sized companies in securing and developing workers in “Monodzukuri” sites.

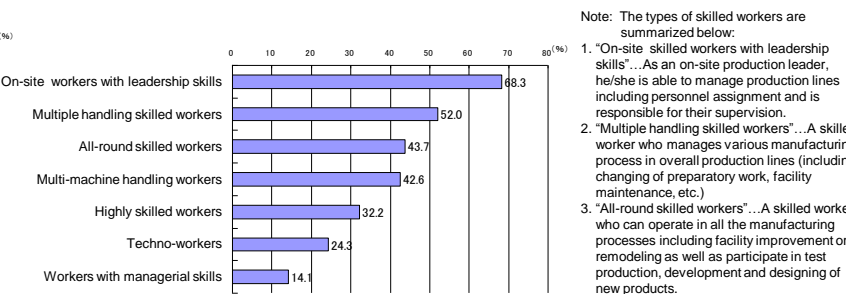
Other programs include the introduction of the National Skills Competition to raise social awareness of skilled workers by fostering the atmosphere to respect skilled workers. (See Chart 3-8)

[Chart 3-1 Knowledge and know-how required for core human resources]



Source: “Research on Training, Development, and Treatment of Skilled Workers in Monodzukuri Industry – the Current Situation in Machines and Metallurgical Industry (2009),” Japan Institute for Labour Policy and Training

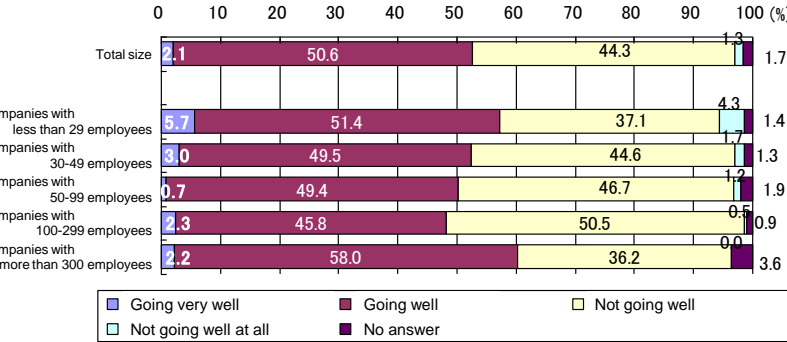
[Chart 3-2 Type of desired core human resources (multiple answers)]



Source: “Research on Training, Development, and Treatment of Skilled Workers in Monodzukuri Industry – the Current Situation in Machines and Metallurgical Industry (2009),” Japan Institute for Labour Policy and Training

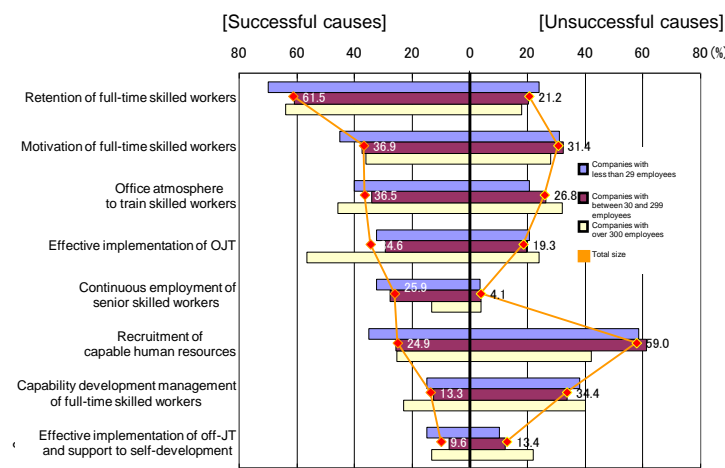
Note: The types of skilled workers are summarized below:
 1. “On-site skilled workers with leadership skills”... As an on-site production leader, he/she is able to manage production lines including personnel assignment and is responsible for their supervision.
 2. “Multiple handling skilled workers”... A skilled worker who manages various manufacturing processes in overall production lines (including changing of preparatory work, facility maintenance, etc.)
 3. “All-round skilled workers”... A skilled worker who can operate in all the manufacturing processes including facility improvement or remodeling as well as participate in test production, development and designing of new products.
 4. “Multi-machine handling workers”... A skilled worker who can operate in a series of manufacturing process, including facility improvement or remodeling by using similar machines in the production line.

[Chart 3-3 Assessment of procurement of core human resources]



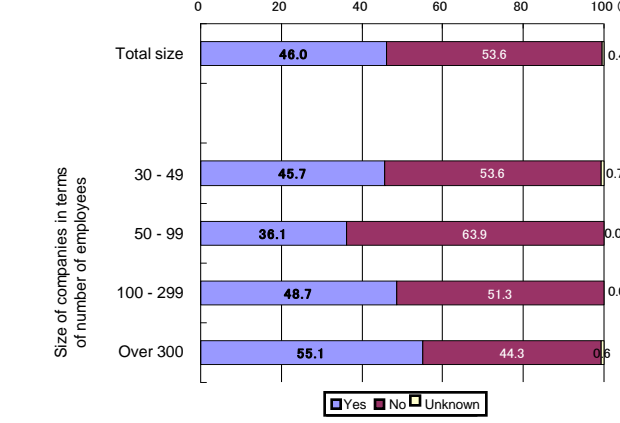
Source: “Research on Training, Development, and Treatment of Skilled Workers in Monodzukuri Industry – the Current Situation in Machines and Metallurgical Industry (2009),” Japan Institute for Labour Policy and Training

[Chart 3-4 Causes for successful and unsuccessful procurement of core human resources (multiple answers)]



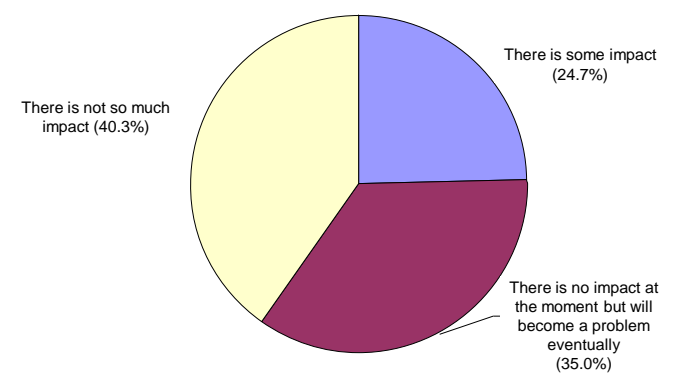
Source: “Research on Training, Development, and Treatment of Skilled Workers in Monodzukuri Industry – the Current Situation in Machines and Metallurgical Industry (2009),” Japan Institute for Labour Policy and Training

[Chart 3-5 Skill succession problems (yes or no)]



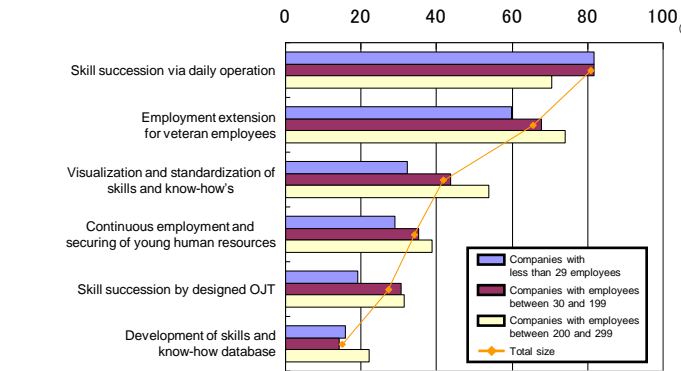
Source: “Basic Survey of Human Resources Development” Ministry of Health, Labour and Welfare (2009)

[Chart 3-6 Impact of loss of skills because of retirement of veteran employees]



Source: “Strengthening the foundation of Monodzukuri and Skill Succession,” Japan Finance Corporation for Small and Medium Enterprise Research Institute (2008)

[Chart 3-7 Measures taken by small and medium sized companies for the skill succession (multiple answers)]



Source: “The Survey on the Human Resource Development and Succession of Skills (2009),” commissioned by Ministry of Health, Labour and Welfare

[Chart 3-8 National Skills Competition 2008]



[Skilled worker participating in the competition of a structural object]

Chapter 4 Research and Development and Promotion of Study to Support the Basis of Monodzukuri

(Situation of R&D and promotion of study to support the basis of monodzukuri)

- The career path of specialized vocational high school graduates is 54.1% choose employment, while the rate of those who go to university is 42.5%. The job opening-to-application ratio for vocational high school graduates who wish to get employed is 23.8%, and the employment rate is 99.4%. The rate of those who enter technical and specialized vocational areas as technical workers is 92.3% of the total. (See Chart 4-1)
- The employment rate of vocational high school graduates (March 2008 graduates) who studied industrial subjects within their home prefecture was 69.8% percent, indicating that they became a human resource to support the local monodzukuri industries.
- Carrier educational programs have been offered, including a 5-day job experience program “Start Week” mainly for junior high school students. The number of internship programs for senior high school students has increased steadily. (See Chart 4-2)

(Promotion of regional R&D for strengthening of industrial capacity)

- Promotion of regional R&D was focused on to vitalize regional economy by raising the level of manufacturing technologies to support regional industry and by developing new business.
- Under regional initiative, the establishment of industry-academia-government network with core universities which have great R&D potential was supported to form the regional clusters for the chain creation of innovation. (See Chart 4-3) (See Chart 4-4)

(Promotion of research and development to enhance industrial capabilities)

- Research and development of fundamental technologies built on science for “monodzukuri” will be accelerated to enhance the international competitiveness of Japan’s manufacturing industries and to lead the world with “monodzukuri” techniques. (See Chart 4-5)
- Collaborative research between universities and business will be promoted, the intellectual property management centers of universities and the Technology License Office (TLO) will be revitalized, and new innovations will be created by supporting the development of university ventures.

(Development of monodzukuri human resource through school educational programs)

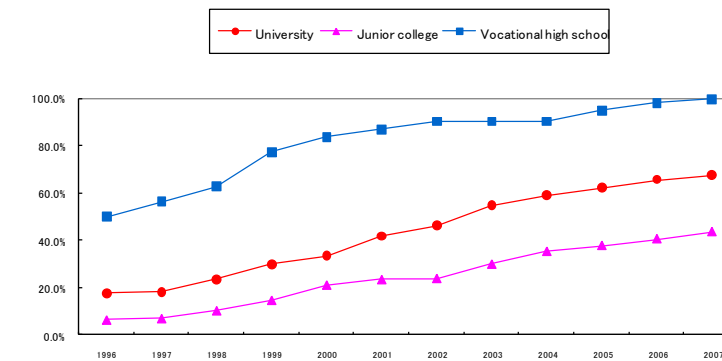
- The New Fundamental Law of Education emphasizes the importance of the relationship between education and occupation as the purpose of education.
- Universities are actively launching educational programs aimed at developing monodzukuri workers trained in using high-level techniques supported by rich knowledge of technologies as well as the long-term internship programs of high quality in cooperation with business industries.
- Specialized vocational high schools carry out practical and creative educational programs focused on experiment and practical training in the five consecutive year curriculum. (See Chart 4-6)
- Special-course schools implement practical vocational educational programs in various areas such as industry, apparel and homemaking, and sanitation (cooking/confectionary production) in cooperation with business industries.
- Educational programs on monodzukuri are included in the subjects taught at elementary school, junior and senior high schools, and special-needs schools. In addition, the New Educational Guidelines for junior and senior high schools stipulate guidance on vocational experience. Education on scientific technologies and mathematics has been strengthened in the school curriculum. For example, the personnel supporting the observation and experiment activities in an elementary school’s science class is assigned to each school. Curriculum development focused on science and mathematics is promoted in senior high school.
- Professional schools are implementing the course combining classroom studies and long-term apprenticeships with support from local companies. (See Chart 4-7)
- Museums, university extension courses, and related cultural activities are also carrying out programs to enrich the understanding of “monodzukuri”. (See Chart 4-8)

[Chart 4-1 Employment rate and job opening-to-application in the past five years]

| | FY '03 | FY '04 | FY '05 | FY '06 | FY '07 |
|----------------------------|------------|------------|------------|------------|------------|
| Rate of job finders | 54.2% | 53.8% | 53.8% | 54.3% | 54.1% |
| Employment rate | 98.1% | 97.7% | 98.7% | 98.7% | 99.4% |
| Job opening-to-application | 10.4 times | 12.5 times | 15.6 times | 20.1 times | 23.8 times |

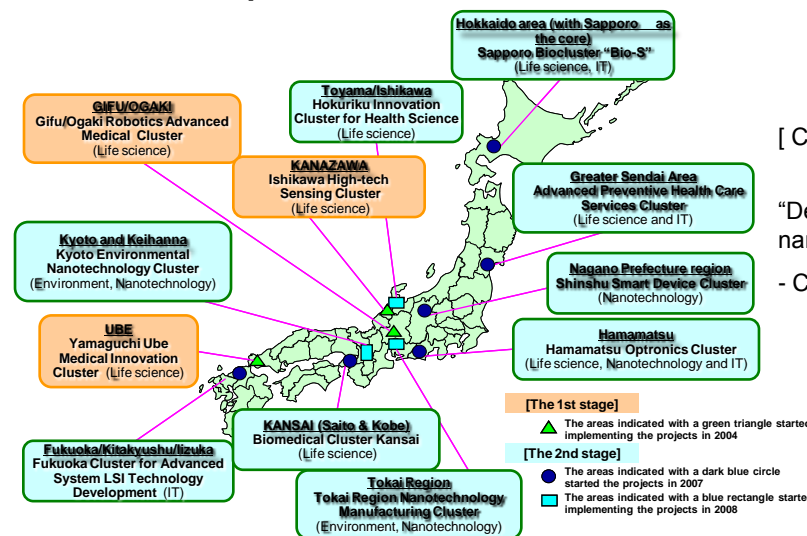
Source: Ministry of Education, Culture, Sports, Science and Technology

[Chart 4-2 Implementation of internship programs at higher education institutions]



* Data on the proportion of schools which implemented internship as a part of subject prepared by the Ministry of Education, Culture, Sports, Science and Technology

[Chart 4-3 Regions implementing Knowledge Cluster Initiative]



[Chart 4-5 Development and spread of VCAD system]

Actual goods are installed in the form of VCAD data, which will be analyzed by a computer, enabling the forecast of the influence of process deflection (detect deflection)



(Analytical example) Strength evaluation of motor bike brake parts

[Chart 4-4 Example of outcome of Knowledge Cluster Initiative]

“Development of resinous composite materials using carbon nanotube (CNT)”

- Commercialization of CNT/resinous composite materials -



Semiconductor tray



Car fuel parts

[Chart 4-6 Example of education programs at specialized vocational high school]



Photo: The 21st Idea Competition: Specialized Vocational High School Robot Contest 2008

[Chart 4-7 Example of monodzukuri education at a professional school]

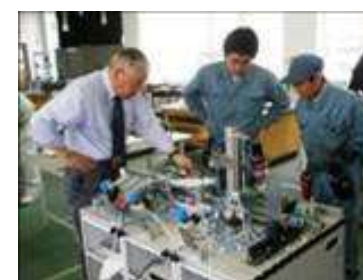


Photo: Students at Gifu Prefectural Ogaki Technical High School challenging for the National Skill Olympic Games

[Chart 4-8 Example of programs provided at social training centers]



Photo: Children making traditional handcrafted “cloisonne ware” at the National Science Museum