Chapter 3

Boosting Economic Growth and Competitiveness via ICT

This chapter examines Japan's route to economic growth through ICT, as well as the route to enhancing international competitiveness through the global deployment of ICT-dependent innovations.

Section 1

Current Status of Japan's ICT industry and Contributing to Economic Growth via the Thorough Application of ICT

This section analyzes the current status of the Japanese ICT industry and paradigm shifts expected to bring benefits, as well as examining the route to acceleration of ICT investment across all industries and economic growth through propagation of ICT utilization.

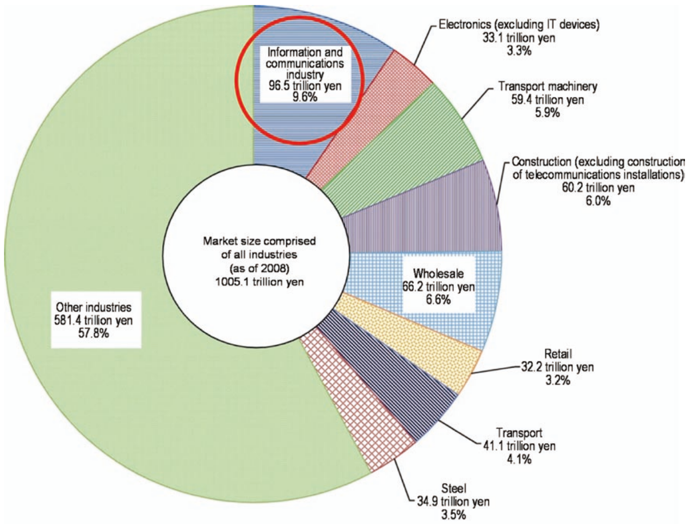
1. Current state of the ICT industry in Japan, and their contributions to growth

(1) The ICT industry as an engine of growth

A. Market size of the ICT industries

In 2008, the market size of Japan's ICT industry[11] (amount of nominal domestic production) registered 96.5 trillion yen, accounting for approximately 10% of all markets, making it the largest of all industries (Figure 3.1).

Figure 3-1 Market size of major industries including the ICT industry (amount of nominal domestic production)



(Source) Ministry of Internal Affairs and Communications "Survey of Economic Analyses on ICT" (2010)

B. Contribution of the ICT industry to economic growth

The contribution of the ICT industry to Japan's economic growth (growth rate in real GDP) is considerable, given that in 2008 when the economy as whole shrank due to the influence of the global recession, ICT was the only sector to grow. The average contribution rate of the ICT industry to economic growth over the five years from 2002 to 2007 was about 34%.

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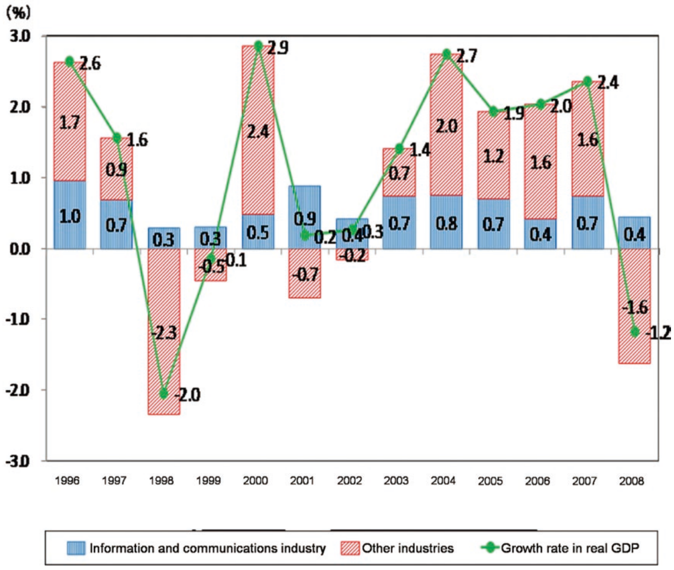
[11] Information and communications statistics database defines the ICT industry as an industry that conducts information and communications operations as its economic activity, such as production, collection, processing, accumulation, provision and transmission of information, and data are collected as a sum of eight sectors: namely, communications, broadcasting, information services, video/audio/text information production, ICTrelated manufacturing, ICT-related services, ICT-related construction, and research.

Figure 3-2 Contribution of ICT industry to the growth rate in real GDP



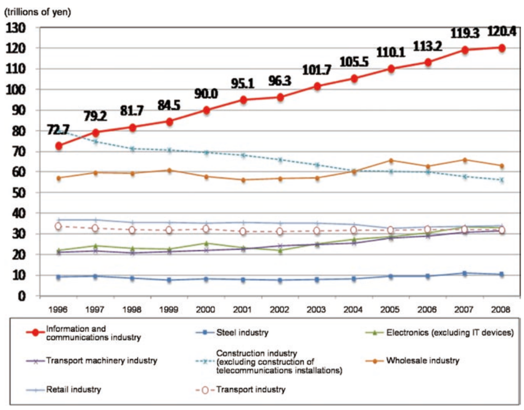
(Source) Ministry of Internal Affairs and Communications "Survey of Economic Analyses on ICT" (2010)

(2) Ripple economic values from the ICT industry

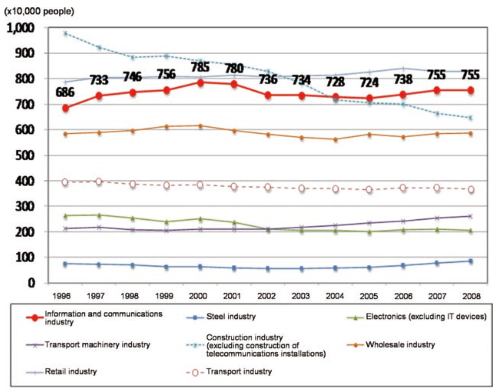
Regarding the ripple economic values (amount of added value stimulated, jobs stimulated) of the ICT industry on all other industries, a look at the ripple economic values of production activities for each sector[12] shows that the amount of added value stimulated for the ICT industry was 120.4 trillion yen in 2008, giving it the top position among Japanese industries (Figure 3-3, left side). In terms of employment as well, the number of jobs stimulated by overall production activities for the ICT industry in 2008 was 7.55 million, second only to retail, and comparable to the retail and construction industries (Figure 3-3, right side).

Figure 3-3 Changes in ripple economic values of production activities in major industrial sectors (amount of added value stimulated, jobs stimulated)

(Amount of added value stimulated)



(Jobs stimulated)



(Source) Ministry of Internal Affairs and Communications "Survey of Economic Analyses on ICT" (2010)

[12] The "ripple effects of production activities" refers to the ripple (spillover) economic values of production activities in a particular industry on domestic industry as a whole

2. A paradigm shift in the ICT industries: cloud service trends

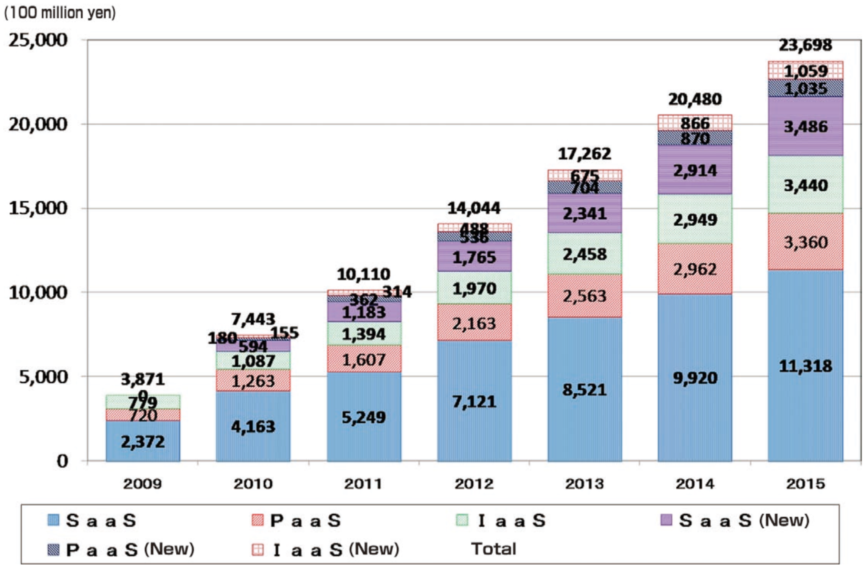
(1) Market size of cloud services industry

Cloud computing is among the fruits of development of technologies for utilization of the computer resources already existing on networks. Services incorporating cloud computing technology (cloud services) allow users to access computer resources “when they need, in just the amount they need,” and constitute an ICT system utilization method radically different from anything that has gone before and is prompting an ongoing paradigm shift in the ICT sector.

According to the Smart Cloud Study Group Report (2010, MIC), the market size for cloud services is estimated at 390 billion yen as of 2009. The SaaS market makes up a large portion of this amount, accounting for 61.3%. Estimates for the future cloud service market indicate that by 2015 it will have more than quadrupled in size to 1.81 trillion yen (Figure 3-4).

Also, if support is provided for the widespread adoption of cloud services in government, medical care, education, agriculture, forestry and fisheries, and for the construction of a smart cloud infrastructure, it will be possible to generate a new market worth approximately 560 billion yen by 2015, meaning that the total size of the cloud services market will reach 2.37 trillion yen.

Figure 3-4 Market size of cloud services industry (Estimated)



(Source) Smart Cloud Study Group Report (2010) Ministry of Internal Affairs and Communications

(2) Inter-industry configuration changes due to the development of cloud services

Figure 3-5 compares industry in 2008 and as projected in 2020, using the 2008 Inter-Industry Table and an RAS[13] Growth Projection for 2020 to which the projected cloud service market has been added, and shows how the ICT industry will be positioned in the inter-industry configuration in 2020 using the “index of power dispersion” and “Index of sensitivity dispersion.”[14]

The “index of power dispersion” is an index of comparison of the amount of production (or of added value) generated in all sectors by the production activities of one sector when there is one unit of demand in said sector.[15] Meanwhile the “Index of sensitivity dispersion” is, conversely, an index of comparison of the amount of production (or of added value) generated in one particular sector by the production activities of all sectors when there is one unit of demand in each sector.[16] This means that industrial sectors in the “first quadrant” (where both index of power dispersion and Index of sensitivity dispersion have average values of 1 or over) are industries that play a

[13] The RAS method is a means of estimating input coefficients of inter-industry tables, and works by distributing the differences between known product outputs and the sums of the rows of the present intermediate matrix proportionally along the rows and then to distribute the differences between known industry outputs and the sums of the columns proportionally along the columns.

[14] An interim output table (transaction values) for 2020 is produced based on the input coefficients estimated using the RAS method, and adding the interim input for the size of the cloud services market (estimated) in 2020

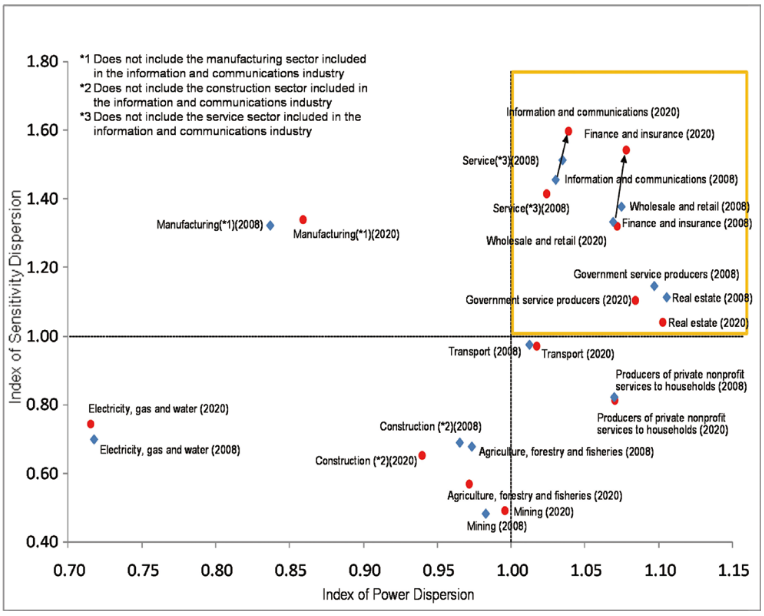
[15] If a large amount of assets and services are input from the production activities of relevant fields (that is, if the interim input rate is high), it is easy to gauge large figures

[16] If there is a high rate of use in fields other than the relevant field (that is, if the input coefficients for other fields are high), it is easy to gauge large figures

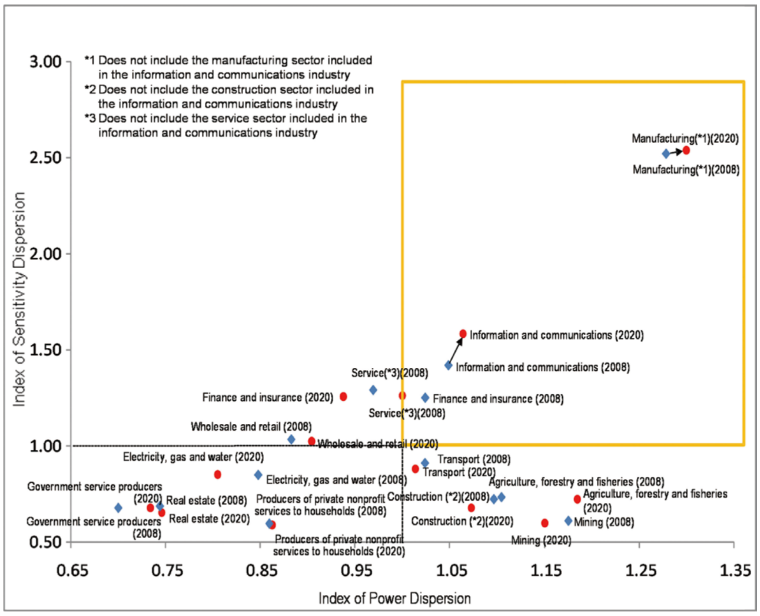
vital role in the linked structure. In this comparison, the ICT industry is the only one to be in the first quadrant both by added value base and by production base and to be trending higher in value, and it is safe to say that this industry will continue to exert a major presence in the future as well. With the progress of cloud services, the ICT industry will absorb aspects of other sectors and will also feed on the growth of other sectors, making the industry an indispensable engine of sustainable economic growth for Japan.

Figure 3-5 Change in Index of Power Dispersion and Index of Sensitivity Dispersion between 2008 and a 2020 projection with cloud penetration added

(Added value base)



(Production base)



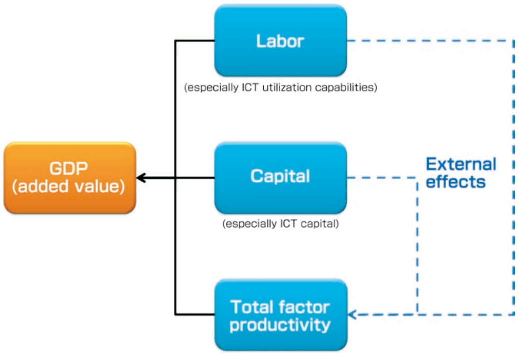
(Source) Ministry of Internal Affairs and Communications "Survey of Economic Analyses on ICT" (2010)

3. Economic growth through acceleration of investment in digitization and utilization of ICT

(1) Contribution of ICT capital and ICT utilization capabilities to economic growth

The growth of ICT capital makes a direct contribution to industrial growth in response to elasticity of production (Figure 3-6). Some of the contribution is in the form of external effects, and is included[17] in total factor productivity[18]. Also, there may be factors of technological change that are not sufficiently embodied at present, not only in ICT capital but in labor as well. For example, the growth of human capital that accompanies acquisition of knowledge and techniques related to ICT capital and utilization of ICT services, may make a contribution to growth through total factor productivity.

Figure 3-6 ICT and economic growth



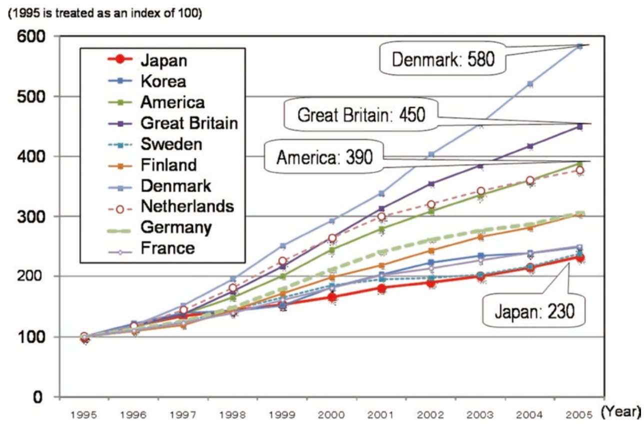
(Source) Ministry of Internal Affairs and Communications "Survey of International Comparative Analyses of ICT capital Contributions in Industry Growth" (2010)

(2) International comparison of ICT capital

A. Changes in ICT capital (all industries)

Figure 3-7 shows the changes in ICT capital[19] for all industries since 1995, based on the EU KLEMS database[20], for 10 countries – Japan, South Korea, the US, the UK, Sweden, Finland, Denmark, Germany, the Netherlands and France. It can be seen that the growth of Japanese ICT capital since 1995 is at the very bottom, along with France et al.

Figure 3-7 Changes in ICT capital (all industries / international comparison)



(Source) Ministry of Internal Affairs and Communications "Survey of International Comparative Analyses of ICT capital Contributions in Industry Growth" (2010) and EU KLEMS Database (Release 2008, Additional files)

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17 For example, in Stiroh (2002), as well as Shinozaki (2003), Kazunori Minetaki & Kiyohiko G. Nishimura (2010) and many others

18 Total-factor productivity (TFP) is a variable which accounts for effects in total output not caused by inputs. In economics, this would consist of economic growth not accounted for by increases in capital investment and labor, and is generally understood to include technological advances, knowledge stock of management know-how, changes in the industrial structure, etc. The increase in productivity due to ICT innovation is thought to be largely expressed through this TFP

19 ICT capital in the EU KLEMS databse includes three types, calculation devices, communications devices, and software

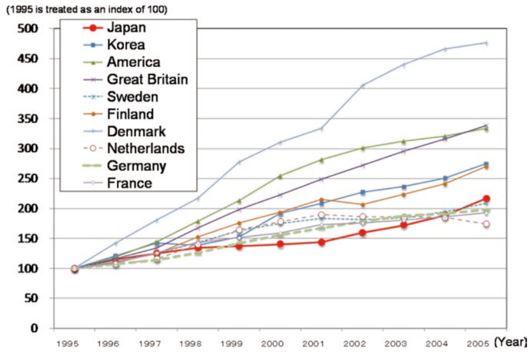
20 The EU KLEMS database is produced from industry-specific data collected from each of 20 countries, including EU countries and Japan, South Korea, the US, etc., on capital (K), labor (L), energy (E), materials (M), and services (S).

B. Changes in ICT capital (by industry)

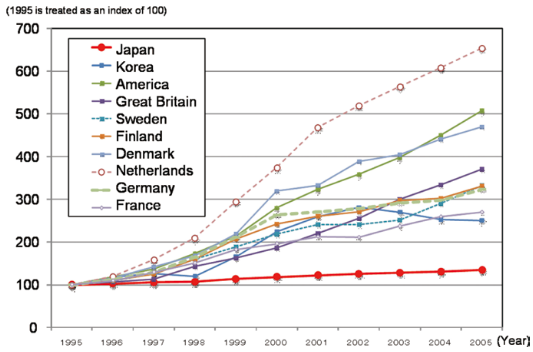
The changes in ICT capital for various individual industries are shown in Figure 3-8. While Japanese ICT capital shows slow growth overall, it is particularly behind in the retail, individual services (food and drink, accommodations, self-owned business, etc.), agriculture, forestry and fisheries, medical care and social welfare and education sectors, where it was lowest among all countries surveyed.

Figure 3-8 Changes in ICT capital by industry (international comparison)

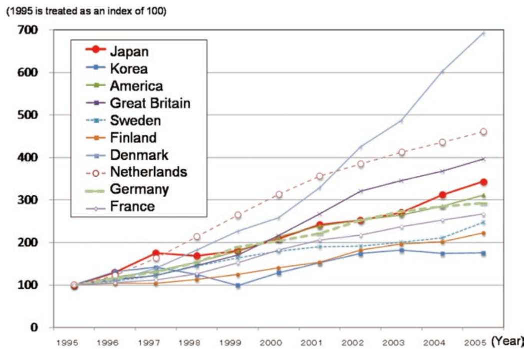
(Manufacturing)



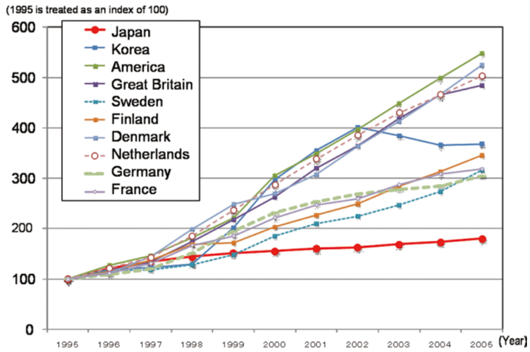
(Retail)



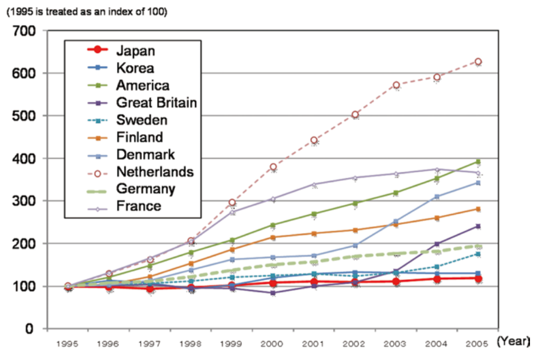
(Financial / Insurance)



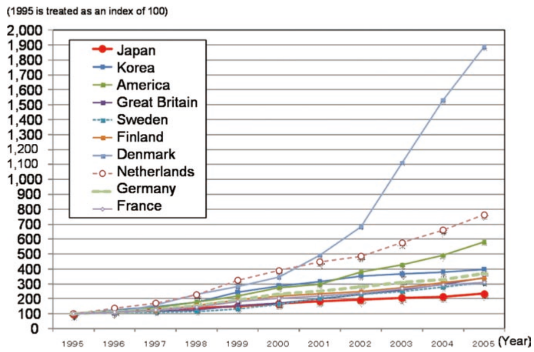
(Service industry)



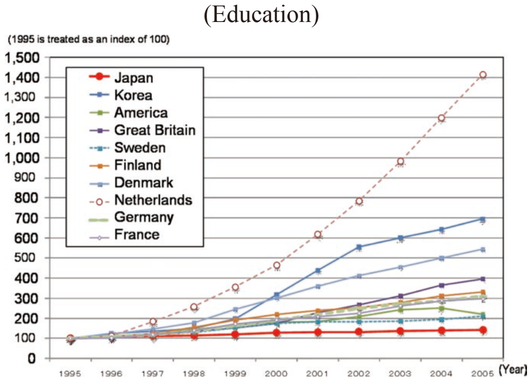
(Agriculture, forestry and fisheries)



(Medical care / Social welfare)



(Education)



(Source) Ministry of Internal Affairs and Communications "Survey of International Comparative Analyses of ICT capital Contributions in Industry Growth" (2010) and EU KLEMS Database (Release 2008, Additional files)

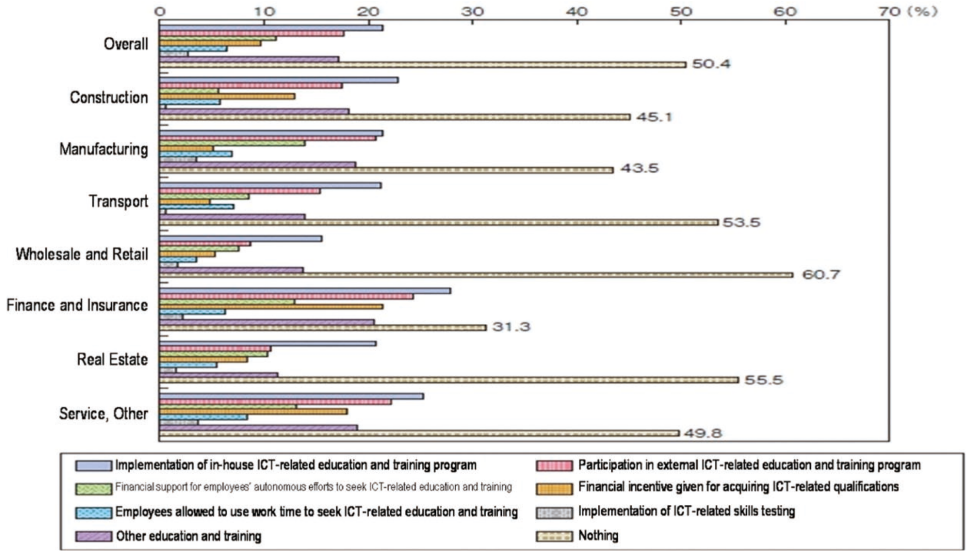
(3) The effects of ICT utilization capability on labor productivity

As ICT constitutes a new type of capital and technology, the degree to which it impacts production volumes depends on whether it is utilized effectively. With this in mind, we will undertake a quantitative analysis of the impact of acquisition of knowledge and techniques related to ICT capital and ICT utilization, etc., on labor productivity.

A.Status of implementation of ICT education

As ICT is a field of constant innovation, simply using ICT devices and services does not always achieve the desired effect, a fact that has been pointed out since the 1990s in the US[21], which got a head start on ICT progress. It has also been pointed out that Japanese corporations and the Japanese economic system's inability to take advantage of all the growth potential ICT had to offer was partially responsible for the economic stagnation of the 1990s[22]. Figure 3-9 shows the results of a survey on the extent to which ICT education is being implemented, and they that outside of the finance and insurance industries, as many as 40% to 60% of corporations conduct no ICT education whatsoever. While the finance and insurance industries have a high rate of ICT education implementation compared to other industries, more than 30% of corporations in these fields as well carry out no ICT education at all.

Figure 3-9 Implementation status of ICT education



(Source) Ministry of Internal Affairs and Communications "Survey of International Comparative Analyses of ICT capital Contributions in Industry Growth" (2010) and "Communications Usage Trend Survey" (2009)

B. Estimation of the effects of ICT utilization capabilities on labor productivity

Figure 3-10 shows the results of an estimate of the effects of implementation, or lack thereof, of ICT education,n and levels of ICT knowledge and skill, on labor productivity, based on the data from the MIC Survey on ICT Utilization, and using a model where labor productivity is the explained variable and where the explanatory variables include response regarding presence or absence of ICT education. These results show that in addition to "amount of capital," "Percentage of terminal deployment," "introduction of non-contact IC cards," and "net procurement," "implementation of ICT education" and "CIO establishment" are also significant indicators.

[21] Black and Lynch (1997) Bresnahan et al. (1999) and Brynjolfsson and Hitt (2000), and others have demonstrated that ICT is complementary to the nature of corporate organization and educational level of the work force, and coupled with ICT investment, has a positive effect on productivity. Meanwhile, Basu et al. (2003) have adopted a similar perspective in comparing the UK, where the effects of ICT are slow to appear, with the US

[22] Shinozaki (2003)

Figure 3-10 Effects of ICT education on labor productivity (Estimated results based on regression analysis)

Dependent variable: labor productivity = (operating income + labor costs + depreciation) / number of employees

Explained variable: expected sign	Factor	[Standard Error]	P Value	
Capital (small = 1 to large = 8) +	2.0807	[0.2143]	0.0000	***
Percentage of terminal deployment -	−0.8885	[0.2491]	0.0000	***
ASP, SaaS utilization (yes = 1, no = 2) -	−1.1194	[0.9738]	0.2510	
Electronic tag introduction (yes = 1, no = 3) -	1.0733	[1.3173]	0.4150	
Non-touch IC card introduction (yes = 1, no = 3) -	−1.3218	[0.6265]	0.0350	**
Introduction of devices with new network functions (yes = 1, no = 3) -	0.2362	[0.7523]	0.7540	
Introduction of GPS, etc. (yes = 1, no = 3) -	0.2811	[0.9450]	0.7660	
Net procurement (yes = 0, no = 1) -	−1.4876	[0.7982]	0.0630	*
BtoB Net sales (yes = 0, no = 1) -	−1.6930	[1.6076]	0.2920	
BtoC Net sales (yes = 0, no = 1) -	−0.4046	[1.0689]	0.7050	
Telework (yes = 1, no = 2) -	1.7470	[1.3346]	0.1910	
ICT education implementation (points for principal components) +	0.7015	[0.2943]	0.0170	**
CIO establishment (yes = 1 to no = 4) -	−0.9247	[0.5587]	0.0980	*
Constant terms	3.3236	[6.1350]	0.5880	
Freely adjusted coefficient of determination = 0.1387				
Sample size = 1,414				

※ ***: 1 % significant **: 5% significant *: 10% significant

(Source) Ministry of Internal Affairs and Communications “Survey of International Comparative Analyses of ICT capital Contributions in Industry Growth” (2010) and “Communications Usage Trend Survey” (2009)

(4) Simulation of ICT utilization promotion and accelerated investment in digitalization scenario

This simulation includes [1] a baseline scenario applying the 1995 – 2005 growth rates for various factors to the 10-year period ending in 2020, and [2] an accelerated ICT investment scenario where ICT investment is doubled and ICT utilization promoted through education and other measures (the amount of ICT investment from the baseline scenario is doubled, and improvements in labor quality due to ICT education, etc. are taken into account), and was conducted by applying growth accounting analysis[23] to the 10 years ending in 2020[24]. The outcome of quantitative estimates of the contribution of ICT capital growth (based on the EU KLEMS database) on industrial growth through total factor productivity, and estimates of the impact of ICT utilization on labor productivity (based on the MIC Survey on ICT Utilization) were used in the simulation.

Figure 3-11 shows the results of the simulation. According to these results, the annualized growth rate of total real added value, by industry (real GDP) in 2020 stands at about 1.7% with the baseline scenario, and about 2.5% for the ICT utilization promotion and accelerated investment in digitalization scenario. When the two scenarios are compared, the ICT utilization promotion and accelerated investment in digitalization scenario shows a 0.8% higher rate of growth than the baseline scenario, indicating that promotion of accelerated ICT investment and utilization acts to stimulate growth in a range of industries. For Japan, which will continue to face a decline in the working-age population due to the low birth rate, it is clear that ICT investment can be an effective economic growth strategy.

[23] Growth accounting analysis is a method that breaks down growth in volume of production over a set period into that resulting from input for each production factor and contribution from growth of total factor productivity

[24] A previous study using a simulation along the same lines is the Jorgenson and Motohashi (2004) macroeconomic growth forecast for Japan over the period from 2002 to 2012. Jorgenson and Motohashi (2004) set forth multiple future scenarios related to the contribution to economic growth of various factors including labor input, capital input and total factor productivity. By totaling the various factor contributions in each scenario, an economic growth forecast for each scenario is obtained and compared with the others. The simulation in this MIC report makes reference to the Jorgenson and Motohashi (2004) simulation as appropriate. However, while the Jorgenson and Motohashi (2004) study focuses on the Japanese macro economy, the MIC simulation focuses on individual industries. It differs from the Jorgenson and Motohashi (2004) study in that it calculates the added value for each industry and adds the total added value for all industries to that of the Japanese macro economy.

Figure 3-11 Industry-specific Economic Growth due to ICT Utilization Promotion and Accelerated Investment in Digitalization Simulation (Real GDP Growth Rate and Annualized Rate)

Industry	Growth rate from 2010 to 2020	
	Baseline	Acceleration and promotion scenario
Agriculture, forestry and fisheries	−1.1%	−0.7%
Mining	0.4%	0.8%
Manufacturing	2.5%	4.1%
Construction	−3.0%	−2.7%
Electricity, gas and water	2.9%	3.4%
Wholesale and retail	0.1%	0.6%
Finance and insurance	1.2%	2.2%
Real estate	1.2%	1.5%
Transport and communications	2.2%	2.6%
Service	2.9%	3.2%
Government service producers	1.0%	1.5%
Producers of private nonprofit services to households	3.0%	3.4%
Total	1.7%	2.5%

(Source) Ministry of Internal Affairs and Communications “Survey of International Comparative Analyses of ICT capital Contributions in Industry Growth” (2010)

Section 2
Bolstering Competitiveness through Innovation and Global Deployment supported by ICT

As a mature, aging society with a low birth rate, Japan must search for new routes to economic growth, not only on a governmental and corporate level but on an individual level as well. This section will examine the necessity of innovation-led growth and the vital role of ICT in this endeavor, as well as routes to enhance international competitiveness through global deployment that harnesses the cooperation of ICT users and exploits Japan's strengths on the world stage.

1. Examination of Japan's environment for innovation

(1) Evaluation of Japan's environment for innovation based on existing international surveys

Figure 3-12 gives an overview of how Japan's environment for innovation has been evaluated in existing international surveys. All of the surveys give Japan's environment for innovation a high rank, and in the EIU survey in particular Japan is given top rank, above such advanced Western nations as the US, Switzerland, Finland, and Sweden.

Figure 3-12 Ranking of environment for innovations from existing international surveys (Top ten ranks shown)

Rank	ITIF "The Atlantic Century"Global comparison of innovation and competitiveness (2009)	EIU "A new ranking of the world's most innovative countries"Innovation (2009)	WEF "The global Competitiveness Report" (2009-2010)Environment for innovation
1	Singapore	**Japan**	The US
2	Sweden	Switzerland	**Japan**
3	Luxembourg	Finland	Switzerland
4	Denmark	The US	Sweden
5	South Korea	Sweden	Germany
6	The US	Germany	Finland
7	Finland	Taiwan	Denmark
8	The UK	The Netherlands	Taiwan
9	**Japan**	Israel	The Netherlands
10	NAFTA[25]	Denmark	Singapore

※ For the WEF "The Global Competitiveness Report", the rankings for the innovation-related index "Innovation and Sophistication Factors" are shown rather than the composite index

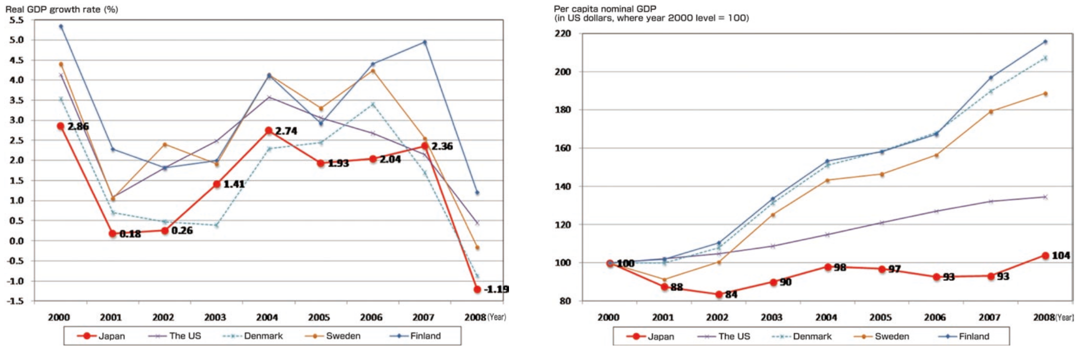
(Source) Compiled from Survey on Revitalization of Local Communities and Bolstering Competitiveness Through ICT (2010), Ministry of Internal Affairs and Communications

However, among those countries recognized as having a well-developed environment for innovation (Japan, the US, Denmark, Sweden, and Finland, all of which were in the top 10 in all three rankings), comparisons of economic growth rates (Figure 3-13, left side) since 2000 show that Japan's has been the lowest in a great number of years. Furthermore, in terms of the per capita nominal GDP (Figure 3-13, right side), while other countries' have been expanding at a good pace, Japan's alone has remained nearly stagnant. It would seem apparent that while Japan's environment for innovation is healthy, it is having a minimal effect on actual economic growth.

25 The NAFTA member states are the US, Canada and Mexico

Figure 3-13 Changes in growth rate in real GDP and per capita nominal GDP for countries recognized as having superior environment for innovation

(Growth rate in real GDP) (Per capita nominal GDP (where 2000 level = 100))



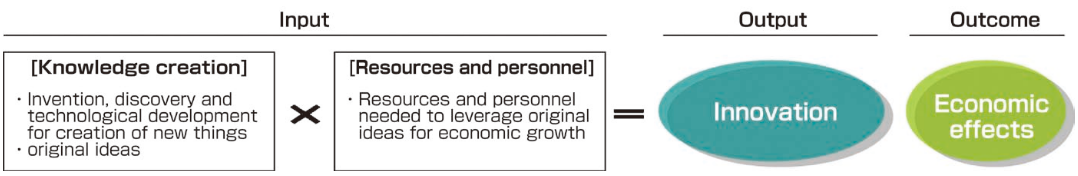
(Source) Compiled from IMF "World Economic Outlook Databases (April 2010 edition)"

(2) Evaluation of environment for innovation using original criteria

A. Environment for innovation evaluation method

With the above issues in mind, we have undertaken a quantitative evaluation using original criteria to determine the route by which Japan's environment for innovation exerts influence on the country's economy as a whole. The basic standpoint is that "for innovation to flourish, what is necessary is not only 'knowledge and creativity' such as original ideas, but also 'resources and personnel' that leverage ideas for economic growth." This evaluation evaluates environment for innovation indicators in three stages, input, output (direct effects), and outcome (final results).

Figure 3-14 Basic standpoint for evaluation of the environment for innovation in this White Paper



(Source) Compiled from Aoshima, Kusonoki "Innovation as a Means of Redefining Systems", Hitotsubashi Business Review (2008 SPR, Volume 55 No. 4), Toyo Keizai Inc.

As to the specific evaluation method used, after selecting 21 indicators from the indexes used in previous international surveys of environment for innovation, factor analysis[26] is used to extract the factors that have an influence on the environment for innovation, which are then taken as the input. At the same time, principal component analysis[27] is used to extract one indicator from the 21 indicators, which is then taken as the "output" that gives a boost to the environment for innovation as "total innovation strength." Finally, the per capita GDP and labor productivity are defined as the "outcome" summing up the overall economic impact of the nation as a whole. With consideration given to regional balance and availability of relevant data, etc., 29 countries were selected for evaluation[28].

B. Environment for innovation evaluation results

Based on the above-described evaluation method, concrete values are given for input, output, and outcome respectively, and the correlations between them analyzed. For "input," the 21 environment for innovation indicators for the 29 evaluated countries were analyzed and five factors extracted: Factor 1, sustainable adaptability

[26] A statistical method used to describe unobserved factors based on variability among a large number of observed variables

[27] A statistical method that transforms a number of possibly correlated variables into one, or a smaller number of uncorrelated variables called principal components

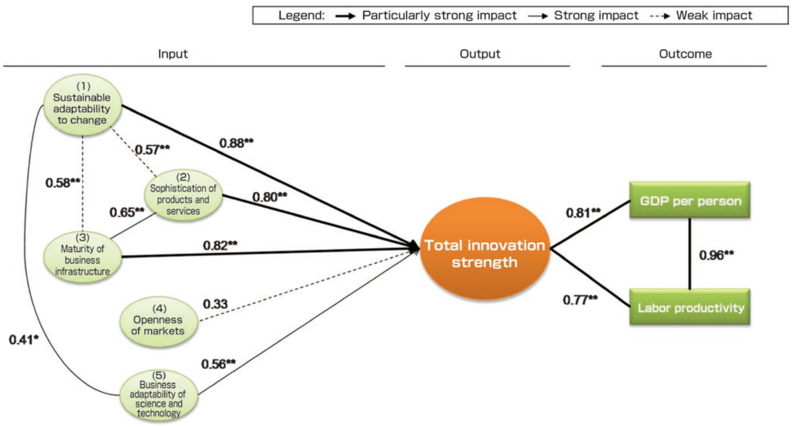
[28] 1) Japan 2) the US 3) The UK 4) South Korea 5) Singapore 6) Sweden 7) Denmark 8) Italy 9) India 10) Australia 11) Austria 12) The Netherlands 13) Canada 14) Belgium 15) Spain 16) Germany 17) Greece 18) Finland 19) Ireland 20) France 21) Poland 22) Portugal 23) Slovakia 24) Czech Republic 25) Hungary 26) Russia 27) China 28) Mexico and 29) Brazil.

to change; Factor 2, sophistication of products and services; Factor 3, maturity of business infrastructure; Factor 4, openness of markets; Factor 5, business adaptability of science and technology.

C. Analysis of the relationships between input, output and outcome for the environment for innovation

Examining the correlations between "total innovation strength" and input and outcome (Figure 3-15), the strongest correlation can be seen with three factors, Factor 1, sustainable adaptability to change; Factor 2, sophistication of products and services; and Factor 3, maturity of business infrastructure, with a strong correlation also seen with Factor 5, business adaptability of science and technology. There is also a notable correlation between "total innovation strength" and both "outcome" indicators, per capita GDP and labor productivity.

Figure 3-15 Relationships between input, output and outcome for the environment for innovation



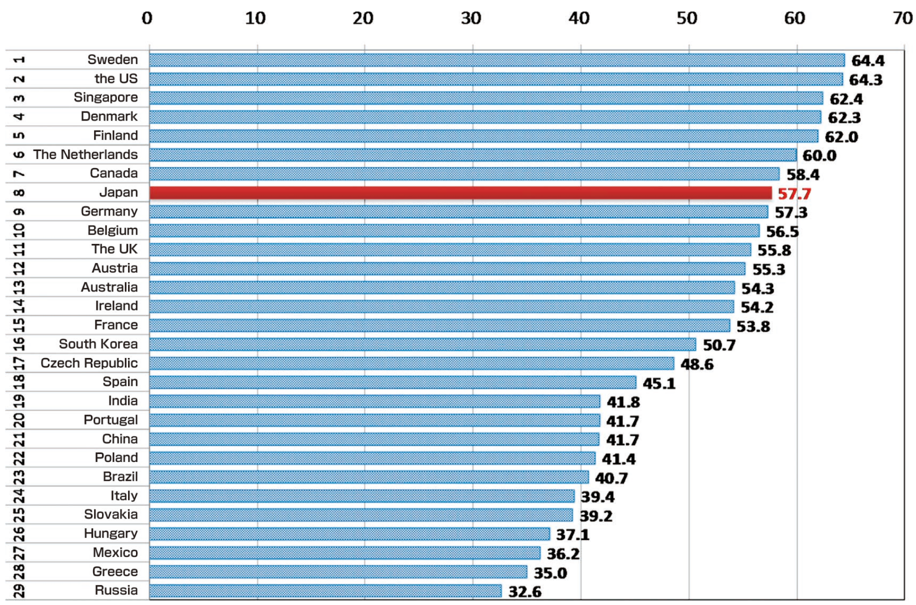
※ Values are correlation coefficients. ** indicates significance level of 1%, * indicates significance level of 5%

(Source) Compiled from: Ministry of Internal Affairs and Communications "Research on Community Revitalization and International Competitiveness through the Application of ICT" (2010)

D. Evaluation of output indicator "total innovation strength"

In a comparison (Figure 3-16) of the deviation values for output indicator "total innovation strength," extracted through principal component analysis from the 21 indicators related to the environment for innovation for 29 countries, Japan is ranked eighth. The numerical value for Japan was 57.7, whereas all of the five top-ranked countries had values over 60: Sweden (64.4), the US (64.3), Singapore (62.4), Denmark (62.3), Finland (62.0).

Figure 3-16 29-country comparison of output indicator "total innovation strength"



※ Values shown are deviation values

(Source) Compiled from Ministry of Internal Affairs and Communications "Research on Community Revitalization and International Competitiveness through the Application of ICT" (2010)

E. Issues Japan faces in developing an effective environment for innovation

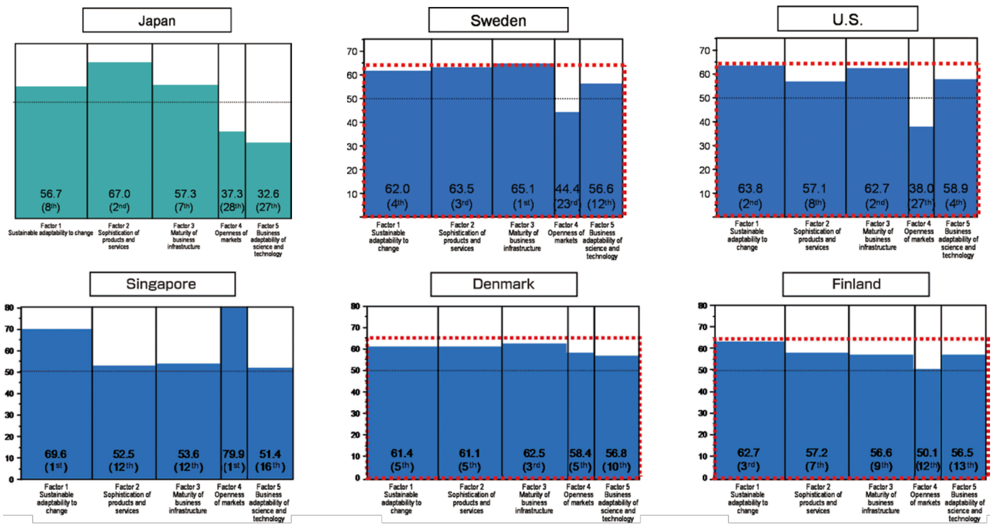
We may surmise that exerting efforts toward the improvement of Factors 1, 2, 3, and 5, which have a large horizontal axis width in the Figure below, in other words a large impact on "total innovation strength," is an effective means of developing the environment for innovation. Further, regarding the correlation between input and output, a detailed comparison between Japan and the five countries with highest rankings for "total innovation strength" is shown in the upper part Figure 3-17, with the extent of influence of the various input factors on the output indictor "total innovation strength" as horizontal axis and the factor score deviation values for each factor for the 29 countries as vertical axis.

Sweden, the US, Denmark, and Finland all show high values for Factor 1, sustainable adaptability to change; Factor 2, sophistication of products and services; Factor 3, maturity of business infrastructure, and Factor 5, business adaptability of science and technology, with a good balance between them. Japan, on the other hand, while strong in Factor 2, sophistication of products and services, is one rank below the others for Factor 1, sustainable adaptability to change, and Factor 3, maturity of business infrastructure, and in terms of Factor 5, business adaptability of science and technology, is well below the average for the 29 countries surveyed.

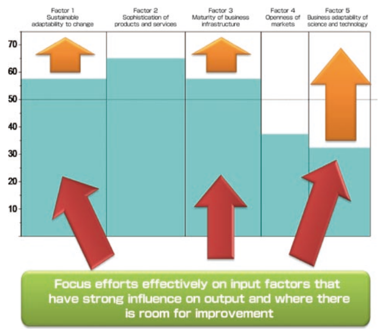
It follows that henceforth Japan must make concerted efforts towards improving Factor 1, sustainable adaptability to change; Factor 2, sophistication of products and services; Factor 3, maturity of business infrastructure, and Factor 5, business adaptability of science and technology, so as to boost "total innovation strength" and, consequently, achieve economic impact or "outcome," (Figure 3-17, bottom part.)

With regards to these efforts, the indicators "maturity level of e-government" and "Internet utilization rate," which have strong correlations with Factor 3, maturity of business infrastructure, can benefit directly from the promotion of ICT utilization. Also, indicators such as "rate of acquisition of talented human resources by corporations," "corporate training and education," and "quality of educational systems," strongly correlated to Factor 1, sustainable adaptability to change, there is room for the positive benefits of ICT and a possibility of ICT making contributions in the future.

Figure 3-17 Six-country comparison of correlation between input and output of environment for innovation and issues faced by Japan



(Issues related to Japan's environment for innovation)



(Source) Compiled from Ministry of Internal Affairs and Communications "Research on Community Revitalization and International Competitiveness through the Application of ICT" (2010)

2. Global expansion and development of products and services in cooperation with users

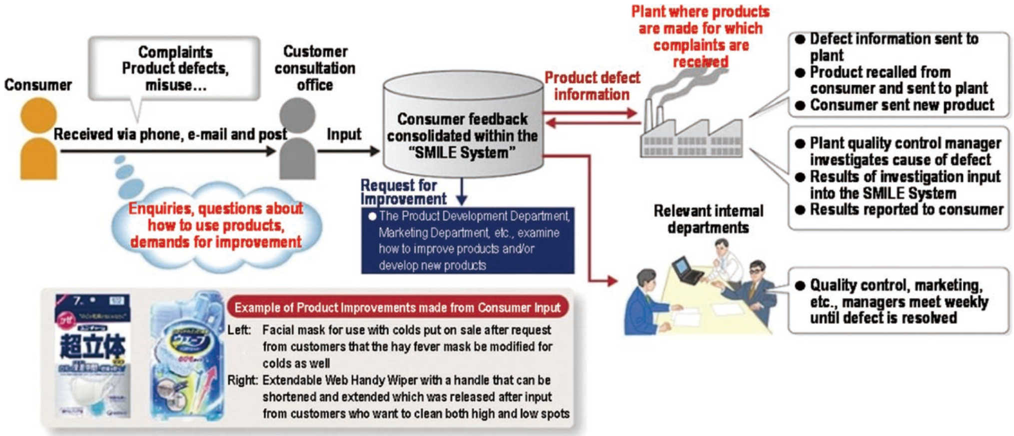
The creation of assets, services and innovations with uniquely Japanese high added value is vital not only for stimulating domestic demand, but overseas demand as well (in other words, global deployment). In terms of global markets, however, the key issue is to develop and supply products and services that bring high added value to users in other countries. Enhancement of communication with said users through ICT is seen as being an effective means of achieving this goal.

Let us examine the “SMILE System” of Unicharm Corporation (Figure 3-18) as an example of a Japanese corporate initiative that makes effective use of ICT, and makes effective use of UGD (User Generated Devices)[29] in collaboration with users for global deployment. Unicharm Corp. launched the SMILE System in April 2008 to consolidate the management of all phone calls, e-mails and letters, etc. the company receives from consumers including inquiries and complaints, and share this data not only with the customer service division but with all related divisions including plants and the marketing and research and development (R&D) divisions, putting them to use for product development. Many of the company’s products, such as diapers and surgical masks, come into direct contact with the skin, and product defects can cause customers to feel unpleasant and lead to product recalls and downgrading of the brand’s image. As a result, Unicharm adopts the philosophy that customer relations directly impact the company’s competitive power, and appropriate handling of all input from customers, be it complaints or requests, etc., is indispensable. The SMILE System is used to react immediately when a product defect occurs, and to share information with the R&D division that can help to generate product ideas. In some cases, products are updated at three-month intervals based on customer feedback. As 35% of Unicharm’s sales are overseas, the company has already expanded the SMILE System to China and Thailand and has plans to introduce it to Taiwan and Indonesia, aiming to achieve the “best customer service in all of Asia,” and to leverage this effective means of reflecting customer feedback in product development, and pursue further global deployment.

In the past, Japanese corporations pursued global deployment by putting down roots in other countries, putting in hard work and making every effort to localize. Exhibiting at international trade fairs was also an effective method, but in recent years the growing presence from Chinese, South Korean and other corporations has diminished that of Japanese corporations. Henceforth, these strategies will continue to be effective means of gauging the needs of overseas consumers and markets, and implementing timely product development, sales and marketing, but UGD cooperation with users using ICT is also an effective means, and in future will increase in importance not only for corporations’ domestic development, but for overseas expansion as well.

Figure 3-18 The Unicharm SMILE System

Unicharm is expanding the SMILE System, which shares input from consumers on products company-wide, in various Asian countries



(Source) Nikkei Computer (August 15, 2008)

[29] The following links to the first edition of “Nikkei Electronics (March 23, 2009)”: http://techon.nikkeibp.co.jp/article/HONSHI/20090316/167277/.
Users participate in the development of devices and services and build digital devices to their own specifications using functional hardware modules and software provided by manufacturers.

3. Global expansion utilizing Japan's strengths

In addition to tracking the preferences of local markets and reflecting them in product and service development, it is also essential to aim for global deployment in sectors and services in which Japan has strength.

Japan has experience and know-how in solving and overcoming various social issues, as an "issues leader" that has faced such problems as striking a balance between economic development and environmental protection / energy efficiency, construction of systems to deal with damage from natural disasters such as earthquakes, a low birth rate and an aging society. Other nations face similar problems, and Japan has the opportunity to incorporate ICT into the societal infrastructure built up in response to these issues and develop it into projects that can be pursued overseas, making a contribution to problem solving at a national level in Asia and elsewhere in the world. This entails not merely selling single technologies and products, but also marketing Japanese operation and management experience and know-how as part of a package, so as to secure a stable source of revenue over the long term.

One promising example of an area where Japan's problem-solving experience and know-how can be marketed overseas is the technology 1,100 kilovolt (kV) ultra-high voltage (UHV) technology used in smart grids.

The 1,100 kV UHV technology usable in smart grids developed in Japan over 30 years with the participation of electric power companies, manufacturers, etc., was adopted as an international standard by the International Electrotechnical Commission (IEC) in May 2009, making 1,100 kV one of the standard voltage values for international use.

1,100 kV UHV allows for bulk power transmission three to four times that of the 550 kV transmission lines currently in use in Japan, and makes it possible to reduce costs and boost energy efficiency through reduction of transmission routes and transmission loss. In addition, it is thought that UHV technology could have applications in smart grids, and that such applications, along with expansion in countries with massive energy demand such as China and India, could lead to further adoption as a standard and a share of a market said to be worth as much as one quadrillion yen over the next 20 years.

Furthermore, Japanese electric power companies have been lending technical cooperation to China, where energy demand is soaring and there is an urgent need for greater energy efficiency. Such ties with the massive Chinese market have helped influence the standardization process, helping to obtain the support of Germany and Sweden which had previously stood in opposition to Japan's 1,100 kV UHV transmission technology.

For Japan to boost its international competitiveness, it is vital to harness the nation's strengths, such as high technological development capabilities and accumulated technological achievements, experience in tackling issues such as environmental preservation, energy efficiency and disaster prevention, and geographical proximity to mainland Asia, which will henceforth take an increasingly central role on the world stage and has a strong need for such problem-solving experience as Japan possesses. It is clear that Japan must reappraise its geographical advantage in having close proximity to mainland Asia, which is exerting a growing global presence (particularly China and India), and make effective use of ICT and Japan's technology and experience to expand in these regions, cooperating with these Asian nations to overcome the problems they face and contribute to their growth. In this process, Japan as well can achieve sustainable growth over the long term.