Section 5  The shift to the third unbundling in the world

Under the third unbundling, the world will face the arrival of a “globotics upheaval (globalization + robotics),” which refers to the arrival of cross-border virtual work (remote work) using digital technology and white-collar robots. For new means of communication enabling the replacement of face-to-face communication, the use of information and communication technology (ICT) and the rapid development of key technologies such as AI (artificial intelligence) and robotics are critical. Baldwin predicts that the use of those technologies will lead to cross-border virtual work (remote work) and the automation of work, including white-collar work, thereby transforming globalization.74

As explained above, under the third unbundling, a new wave of industrial revolution is occurring not only in manufacturing industries, which were at the center of the second unbundling, but also in services industries. The COVID-19 pandemic broke out in the midst of the global shift from the second unbundling to the third unbundling. As a result, automation and remote technology are attracting growing attention as means to complement face-to-face communication. The changes brought to communication by the COVID-19 pandemic are also accelerating the third unbundling.

To respond to the globotics upheaval, it is necessary to make sufficient ICT investments, develop an environment that enables virtual work, and foster personnel with advanced skills adaptable to technological innovations such as AI and robotics. Across the world, there are initiatives to seize the wave of the third unbundling. Japan also needs to seize the wave of industrial revolution by turning the COVID-19 crisis into an opportunity.

1. The shift to the third unbundling in the world

Under the second unbundling, the development of cross-border supply chains and international division of work proceeded mainly in manufacturing industries, but in the forthcoming stage of globalization, services industries are also expected to face a new situation exemplified by international division of work and division of work between human workers and AI.

Since the shift from manufacturing industries to services industries in the 1970s, the share of services industries in overall industries has been steadily increasing, and in the future, it is expected to continue increasing (an estimate by the Japan Center for Economic Research; Figure II-2-5-1). In particular, the share of services industry workers in OECD countries, including the United States, the EU, the United Kingdom and Japan, is around 20 percentage points higher than the global average. Therefore, developed countries are expected to be considerably affected by the globotics upheaval (Figure II-2-5-2).

Figure II-2-5-1  Estimated percentages of the manufacturing and service industries in all industries

Source: Japan Center for Economic Research (JCER) (2019a)

Figure II-2-5-2  Ratios of employees engaged in services by country/region

Source: International Labour Organization.

Under the third unbundling, cross-border working arrangements are expected to be enabled by the arrival of “telemigration,” a phenomenon of freelance IT engineers with advanced skills in India and other developing countries being employed by IT companies in the United States and other developed
countries while remaining in their home countries. On the other hand, such workers are expected to
compete with workers in the United States and other developed countries, including white-collar
workers.

In the meantime, the considerable development of digital technology enhances various investments
and services. Governments across the world are supporting the wave of industrial revolution, for
example by promoting the introduction of AI and 5G as national strategies (see BOX).

<table>
<thead>
<tr>
<th>BOX: AI strategies taken by governments worldwide</th>
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</thead>
<tbody>
<tr>
<td><strong>United States:</strong> The National Artificial Intelligence Research and Development Strategic Plan: 2019 Update (June 2019)</td>
</tr>
<tr>
<td>- Make long-term investments in AI research and prioritize them to maintain US leadership in this field.</td>
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<tr>
<td>- Develop effective methods for achieving human-AI collaboration.</td>
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<tr>
<td>- Ensure the safety and security of AI systems.</td>
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<tr>
<td>- Expand public-private partnerships to accelerate advances in AI.</td>
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<tr>
<td><strong>China:</strong> Next Generation Artificial Intelligence Development Plan (July 2017)</td>
</tr>
<tr>
<td>- By 2030, China will become the number one in the world in AI theory, technology and application. It aims to expand the scale of AI key industries and that of the related industries to the level of one trillion yuan and 10 trillion yuan, respectively.</td>
</tr>
<tr>
<td>- China prioritizes the following fields in terms of development: AI, software, hardware, intelligent robots, unmanned driving, virtual reality (VR) and augmented reality (AR), intelligent terminals, and basic Internet of Things devices.</td>
</tr>
<tr>
<td><strong>European Commission:</strong> White Paper on Artificial Intelligence (February 2020)</td>
</tr>
<tr>
<td>- Europe should become a global leader in AI systems that can be used and applied in a safe manner.</td>
</tr>
<tr>
<td>- It should realize “trust” and “excellence” for development of safe AI in Europe in full respect of the values and rights of EU citizens.</td>
</tr>
<tr>
<td>- Through public-private cooperation, the entire AI value chain strives to facilitate acceleration of AI dissemination through resource distribution, including efforts for attracting human resources and encouraging them to continue their careers. Meanwhile, in terms of the complexity of and risks in AI systems, it is pointed out that the introduction of new rules for high-risk AI systems is necessary to foster trust, in addition to the existing EU rules for consumer protection, competitions and personal data.</td>
</tr>
<tr>
<td><strong>Source:</strong> Daily “Business Tanshin,” Regional and Analytical Reports (JETRO), Foundation for MultiMedia Communications.</td>
</tr>
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</table>

Infrastructure using AI and 5G, which will be fundamental technologies of future digitalization, have
the characteristics of externality and complementarity through the networking effect. As private-sector
investments alone may be insufficient, it is important to promote appropriate involvement of
governments and the development of standards when countries around the world start shifting to the third unbundling.

In addition, the COVID-19 pandemic is accelerating economic and social digitalization. Amid the introduction of lockdown and shelter-in-place measures, the needs for digital services are growing.

Chapter 1, Section 6 focused on the rapid social implementation of innovative technologies for combating COVID-19. In response to the COVID-19 crisis, social implementation of new digital technologies is proceeding rapidly as shown by the introduction of automation and remote technologies that provide services while preventing the spread of infections, automated diagnosis using AI image recognition, and health management and telework support platforms using chatbots. This may be interpreted as a social implementation initiative aimed at shifting to the third unbundling. In some respects, the possibilities of cross-border virtual work complement the slowdown in the movement of people due to the ongoing COVID-19 pandemic.

In the meantime, digitalization is accelerating around the world.

The Chinese government proposed the “New Infrastructure Construction” initiative once again at a meeting of the Standing Committee of the Political Bureau of the Communist Party of China’s Central Committee on March 4, among which 1 trillion yuan is expected to be invested by the end of the year. 5G infrastructure is one of the three fields covered by the initiative. In 5G-related sectors, a cumulative total of 3.5 trillion yuan will be invested by 2025 (see Box).

**BOX: Three fields covered by the New Infrastructure Construction initiative in China**

1. Information infrastructure
   Examples: 5G, IoT, satellite internet, AI, cloud computing, blockchain, etc.

2. Integrated infrastructure
   Examples: Intelligent Transport Systems (ITS) infrastructure, smart energy infrastructure, etc.

3. Innovative infrastructure
   Examples: Infrastructures for important science technology, science education, and industrial technology innovation (based on the explanations by Wu Hao, director of the Department of High-Tech Industry at the National Development and Reform Commission, on April 20, 2020)

Source: [http://www.xinhuanet.com/tech/2020-03/20/c_1125738742.htm](http://www.xinhuanet.com/tech/2020-03/20/c_1125738742.htm)

As explained above, in China, there are initiatives to promote medium- to long-term innovations as well as accelerating social implementation of various digital technologies in order to respond to the COVID-19 pandemic.

Likewise, Indian Prime Minister Narendra Modi announced the launch of an economic package.

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worth 20 trillion rupees, equivalent to around 10% of India’s GDP, on May 12. He stated that for India to overcome the current crisis, becoming a self-reliant country is the only way and that a self-reliant India will be based on five pillars, namely, economy, infrastructure, technology-driven system, demography, which is the area of strength for India as the world’s largest democratic country, and demand stimulation.

The Singapore government intends to provide assistance to small and medium-size financial institutions and Fin-Tech companies devoting efforts to the promotion of digitalization and education of employees. Specifically, it announced plans to provide subsidies for cybersecurity and introduction of AI and to cover the expenditure of professional education for employees. Regarding the digitalization of settlement, it will provide support when food stalls and fresh markets, as well as retails stores and restaurants, introduce electronic settlement. There are also other initiatives to promote digitalization, including providing support for large companies’ business alliances with big tech giants.

Under the industrial revolution that promotes the shift to the third unbundling, initiatives related to institutional systems are also important. In the EU, the General Data Protection Regulation (GDPR) was put into force in May 2018. The GDPR has a provision concerning data portability that enables individuals to receive their own personal data in a machine-readable format and to transfer such data to a different business operator. This provision is not only important for the protection of personal information but also economically significant. While the provision makes it difficult for existing companies to hold exclusive control over data, it gives individuals an incentive to provide data for convenience. Therefore, it is expected to encourage competition between companies with respect to data usage, thereby promoting innovations.

As described above, investments for accelerating the third unbundling and investments in human capital are being promoted around the world. Moreover, there are initiatives related to institutional systems that take into consideration the economic trend of further advance of digitalization.

In emerging countries as well, the weakness of their regulatory systems and the absence of existing industries are accelerating the application of new technologies in some cases, as will be mentioned in the description of the Asia Digital Transformation initiative in Chapter 3. On the other hand, when countries promote digital transformation on a nationwide basis, issues related to hard and soft infrastructure, policy environment and human resources are sometimes pointed out as challenges. Therefore, it is important that the government and the private sector complement each other’s roles.

2. Challenges for Japan in the shift to the third unbundling

This section will take a look at the current situation of and challenges for Japan amid the global shift to the third unbundling.

The first point of consideration is the status of ICT investment, which represents one of the infrastructure elements for the third unbundling. The ratio of stocks of ICT capital (total of information and communication equipment and computer software) to GDP in Japan is high but has remained flat compared with that in other countries due to the advance of economic and social digitalization (Figure II-2-5-3).
Under the third unbundling, digital services, unlike existing face-to-face services, enable consumption in remote locations due to the removal of physical constraints. In some industries, physical constraints are already being overcome, leading to the expansion of digital and services trade. In the future, trade in services sectors is expected to expand further amid the acceleration of the third unbundling.

Next, this section focuses on the trends in trade in services sectors in recent years. Services trade has been expanding worldwide. In particular, the expansion has been significant in such sectors as telecommunication, IT, and business services in recent years (Figure II-2-5-4).

Figure II-2-5-4 Expansion of trade in services
However, Japan is facing export-related challenges in services markets, including digital services. A country-by-country comparison of trends shows that IT service exports have grown significantly in China, the United States, and India. India has served as an offshoring service provider, receiving contracts for business processes at low cost from developed countries and implementing the processes in English. The United States is superior in professional services because of its strength in the consulting industry. In all sectors, Japan’s services exports have remained flat (Japan Center for Economic Research; Figure II-2-5-5).

Figure II-2-5-5  Growth of trade in services by field and country (2000 and 2014)

Notes: These values are based on value added, including indirect effects triggered by exports in other industries. Source: JCER (2019a).

(1) Introduction and usage of ICT

What are the challenges that Japan is facing in the shift to the third unbundling? First, this section focuses on the status of introduction of digital technology.

According to the results of a questionnaire survey with Japanese companies, the ICT introduction rate is 70%, lower than that of the United States, the United Kingdom and Germany (Figure II-2-5-6). In addition, while ICT usage is relatively active at large Japanese companies, the usage rate at small and medium-size enterprises remains low (Figure II-2-5-7).
**Figure II-2-5-6** Current situations of ICT introduction into companies by country

![Bar chart showing current situations of ICT introduction into companies by country]

Japan: 70.2% already introduced, 29.8% not yet introduced.
U.S.: 80.8% already introduced, 19.2% not yet introduced.
U.K.: 94.4% already introduced, 5.6% not yet introduced.
Germany: 93.8% already introduced, 6.2% not yet introduced.


**Figure II-2-5-7** Current situations of ICT introduction and utilization by Japanese companies (those of ICT utilization for companies’ internal services)

- Internally-shared groupware: Large companies (n=443) 84%, SMEs (n=1,051) 40%
- Internal portal website: Large companies (n=443) 61%, SMEs (n=1,051) 18%
- Access by mobile terminals from outside: Large companies (n=443) 37%, SMEs (n=1,051) 13%

Source: *Survey and research on the present state of ICT in Japan* (MIC) (2017).
While many workers, mainly those who engage in services industries, are expected to be required to perform jobs using ICT as a result of the industrial revolution under the third unbundling, it is important to foster personnel with ICT skills adaptable to the change.

According to the OECD’s Survey of Adult Skills under the Programme for the International Assessment of Adult Competencies (PIAAC), Japan was ranked first among the participating countries in terms of the average score in problem-solving using ICT. Therefore, it may be said that on average, Japanese adults have a high level of ICT skills (Figure II-2-5-8).

**Figure II-2-5-8  Proficiency in problem solving in technology-rich environments among adults**

Notes: The figures represent the average scores of part of respondents (scores only for those who have responded using computers) in the PIAAC survey.
Source: Programme for the International Assessment of Adult Competencies (PIAAC) (OECD).

According to the most recent 2018 version of a survey of academic achievement of pupils and students in primary and secondary education (Programme for International Student Assessment; PISA), also conducted by the OECD, the length of time digital devices are used during classroom lessons in a week in Japan is far shorter than the OECD average, which means that Japan is not advanced in introducing ICT in school education (Figure II-2-5-9). Under the FY2019 supplementary budget, the government is supporting efforts to promote digitalization in education. For example, it allocated funds for expenditure on the development of high-speed, large-volume communication networks intended to create an environment that gives one digital device per student and to promote the shift to ICT. In the future, the improved educational ICT environment will provide broad access to ICT education, starting
at the primary education stage.

**Figure II-2-5-9  Average length of time digital devices are used during classroom lessons in elementary and secondary schools**

![Table of Average Length of Time Digital Devices Used](image)


(2) **Challenges for Japan in the shift to the third unbundling: intangible assets, competitiveness, governance, and innovation**

Amid the COVID-19 pandemic, activities of companies using digital services and possessing intangible assets have increased, as shown by the concentration of market power in the hands of big tech firms. Under the third unbundling, which promotes the expansion of digital services, big tech firms are expected to maintain their superiority.

Japan, which is facing challenges related to investment in and use of ICT as shown in (1), is also confronted with challenges in the accumulation of intangible assets. Intangible assets include computer software, data, technologies and patents obtained through research and development (R&D), and corporate and product brands.

Comparing investment in tangible assets to investment in intangible assets, in many countries, intangible assets investments are on an uptrend, and in the United States, the size of intangible asset investments has surpassed the size of tangible asset investments. On the other hand, in Japan, although the ratio of tangible asset investments to GDP is decreasing and the ratio of intangible asset investments is increasing, the size of tangible asset investments is still larger (Figure II-2-5-10).
As for the breakdown of intangible asset investments in Japan, innovative property investment accounts for the bulk of the total. The ratio of investments in computer software and science and engineering R&D to GDP is similar to the ratios in other developed countries. Innovative property investment includes investments in science and engineering R&D, mineral exploration, copyrights and license costs, and other product development, design and research expenses. On the other hand, the size of investments related to economic competencies, such as brand equity, organizational structure, and firm-specific human capital, is smaller than those in other countries (Figure II-2-5-11).
Jonathan Haskel et al.\textsuperscript{77} divides intangible assets into three categories: computerized information, innovative property and economic competencies. This corresponds to the abovementioned classification. There may be challenges related to investments for taking advantage of newly introduced technology to develop brands and cultivate economic competitiveness.

<table>
<thead>
<tr>
<th>Name</th>
<th>Category of investments</th>
<th>Intellectual property expected to be created</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computerized information</td>
<td>Development of software and databases</td>
<td>Patents, copyrights, etc.</td>
</tr>
<tr>
<td>Innovative property</td>
<td>R&amp;D, designs, and entertainments and artistic original works</td>
<td>Patents, trademarks, copyrights, etc.</td>
</tr>
<tr>
<td>Economic competencies</td>
<td>Trainings, market research, and branding</td>
<td>Copyrights, trademarks, patents, etc.</td>
</tr>
</tbody>
</table>

Why does the use of intangible assets and ICT in Japan fail to make sufficient progress and cultivate competitiveness? That arises from challenges related to investments for enhancing IT literacy and organizational and labor rigidity. It is also said that there are some problems in the use of ICT as a cost reduction tool rather than as a tool for more positive purposes and a shortfall of investments in human capital and intangible assets, which should complement the introduction of ICT.\textsuperscript{78}

In short, there is room for improving Japanese companies’ organizational structure and business environment, which prevent them from making quick decisions. As for human capital investment, amid the downtrend in Japanese companies’ expenditure on employee education and training, it is important to promote learning on an individual basis, in addition to focusing on corporate investments in training.

Moreover, it is also important to focus on the externality of intangible assets. According to Haskel et al., one property of intangible assets is that they have significant spillover effects that bring benefits to other companies. It is because intangible assets lack rivalness, which means that they can be simultaneously used by multiple users, while tangible assets possess rivalness and excludability. In that respect, intangible assets are similar in nature to public goods. In addition, ideas do not wear away with usage, so idea sharing is expected to have spillover effects.

The rise of intangible assets indicates the increasing importance of enhancing economic competencies in terms of individuals and organizations in accordance with the new global trend of digitalization that will continue to accelerate.


\textsuperscript{78} Kim Younggak (Senshu University) “Investments in Intangible Asset Investments (e.g., R&D and ICT),” November 25, 2016, a report submitted to the Policy Research Institute, Ministry of Finance.
In addition to promoting investments in and use of intangible assets, it is also important to develop an institutional framework that encourages the use of intangible assets. One characteristic of the EU’s GDPR is the portability of personal information. At the time of the G20 Osaka Summit in June 2019, Japan exercised leadership in launching the Osaka Track, which promotes the development of international rules on data flow based on the concept of Data Free Flow with Trust (DFFT). Such cooperation in rule-making is also important for adapting to the third unbundling and the wave of industrial revolution while taking advantage of digital technology based on international data flow.

To put DFFT into practice, negotiations on e-commerce are ongoing at the WTO with the participation of 84 WTO members, including Japan, the United States, the European Union, and China. Also important is promoting multilateral cooperation concerning institutional frameworks. In January 2019, a framework of mutual certification concerning personal data was established between Japan and the EU.

Moreover, governance innovation suited to this digital era is important.\textsuperscript{79} A ministerial statement issued at the G20 Ministerial Meeting on Trade and Digital Economy in June 2019 emphasized the need for governance innovation. The need is growing for a new governance model that promotes innovation and realizes social values at the same time amid the technological innovation in recent years. In other words, at a time when cyberspace is critical for technology and service innovations, it is necessary to introduce an innovative governance method for controlling the risks involved in such technologies and services. To realize that, active involvement of companies that play a central role in innovation and individuals who create and uphold diverse values is indispensable. Therefore, it is necessary not only for governments but also for businesses, communities and individuals to work together on fundamental regulatory reform and governance innovation. In addition, as there is no national border in cyberspace, developing a new risk control method using digital technology is an internationally common agenda item. Therefore, it is important to cooperate with various stakeholders inside and outside of Japan in putting a new governance model into practical use.

As described above, the COVID-19 pandemic brings the potential to change the future of work and government at the same time as promoting the ongoing industrial revolution under the third unbundling.

On the other hand, in Japan, there is awareness about the challenge of connecting ICT and its use to economic competencies and about the importance of developing institutional frameworks. Japan is required to use the global crisis caused by the COVID-19 pandemic as an opportunity to prepare for the shift to the third unbundling by utilizing digital transformation.

\textsuperscript{79} METI, “GOVERNANCE INNOVATION: Redesigning Law and Architecture in the Age of Society 5.0.”