Chapter 4

ICT Utilization Useful for Solving Social Problems

Chapter 4 surveys ICT utilization that is useful for solving social problems confronting Japan. Problems covered here are decrease in working-age population and population outflow from rural areas, which interlock with each other. The problems may lead directly to productivity decline and shrinking local economies, which can inhibit the Fourth Industrial Revolution described in Chapters 1 to 3. Therefore, they also require investigation, in this white paper, which, is called "Data-driven Economy and Social Change."

Section 1 Advent of Depopulating Society and Countermeasures

Out of social problems in Japan, this section describes effects of the advent of depopulating society on economy and lays out the direction for ICT utilization useful for solving the problems.

1. Accelerating decrease in working-age population

(1) Problems of depopulating society and future estimates

As the country's population has aged and birthrate decreased, the working age population has been dwindling from its peak in 1995 and the total population has been in decline since its peak in 2008. According to the 2015 Census, the total population in 2015 was 127.09 million and working-age population (15 to 64) was 76.29 million. The National Institute of Population and Social Security Research estimates that the total population will be 119.13 million in 2030, decline to below 100 million in 2053 and to 92.84 million by 2060. Similarly, working-age population is expected to decline to 68.75 million by 2030 and to 47.93 million by 2060. Such decline in the total population and working-age population will have a major effect on the country's socioeconomy. Population decline is anticipated to be more significant in areas other than the three major metropolitan areas ("rural areas") due to population outflow from rural areas to the three major metropolitan areas.

2. Current employment situation

Let us look at the human resource demand-supply situation of enterprises. The active opening rate has been on the increase since 2009 and reached 1.48 in April 2017, the highest since the bubble economy. Labor shortage is becoming a problem common to three major metropolitan areas and rural areas.

3. Direction of solutions

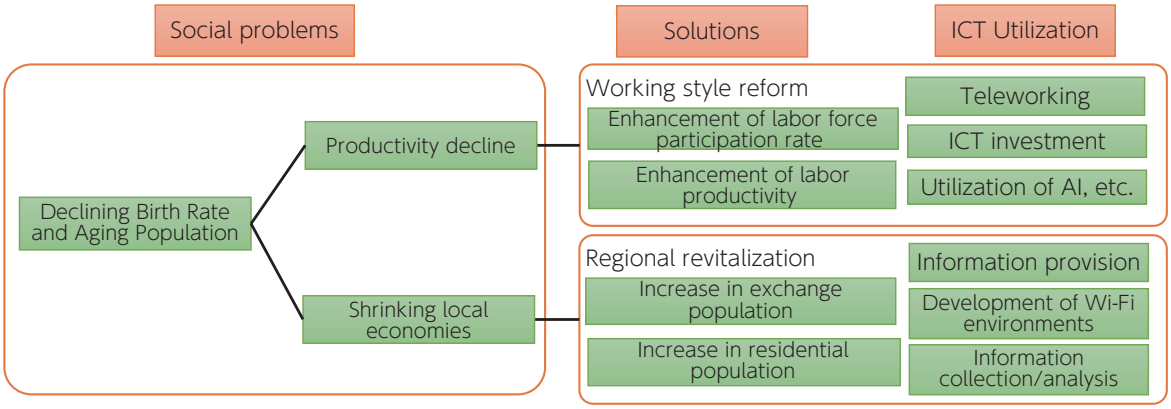
(1) Why ICT utilization?

In order to achieve medium- to long-term economic growth without being influenced by productivity decline due to the declining birth rate and aging population and accompanying decline in working-age population, we need enhancement of the labor force participation rate and labor productivity in the field of working-style reform. As a way of ICT utilization to realize "Enhancement of the labor force participation rate" we pay attention to "teleworking." To achieve "Enhancement of labor productivity" we take up "ICT investment" and "Utilization of AI, etc."

In terms of regional revitalization, we need "Increase in exchange population" and "Increase in residential population." For the former, inbound demand from tourists from overseas is expected. As measures to use ICT for this purpose, we take up "information provision" and "development of Wi-Fi environments" for tourists from overseas visiting Japan.

For "Increase in residential population" it is necessary to increase local jobs while at the same time increasing income from outside. In order to plan and promote effective measures, it is essential to collect and analyze relevant information including user/visitor needs and measure effects. Therefore, we take up "Information collection/analysis" as a measure for ICT utilization to realize "Increase in residential population" (Figure 4-1-3-1).

Figure 4-1-3-1 Direction toward solving social problems and ICT utilization



Section 2 Working Style Reform and ICT Utilization

The government put together "the Action Plan for the Realization of Work Style Reform" in March 2017. ICT utilization is expected to contribute to enhancement of the labor force participation rate and labor productivity as described in Section 1. This section describes how ICT utilization is useful for working style reform based on the results of a survey of enterprises and case examples.

1. Expansion of labor force participation through promotion of teleworking

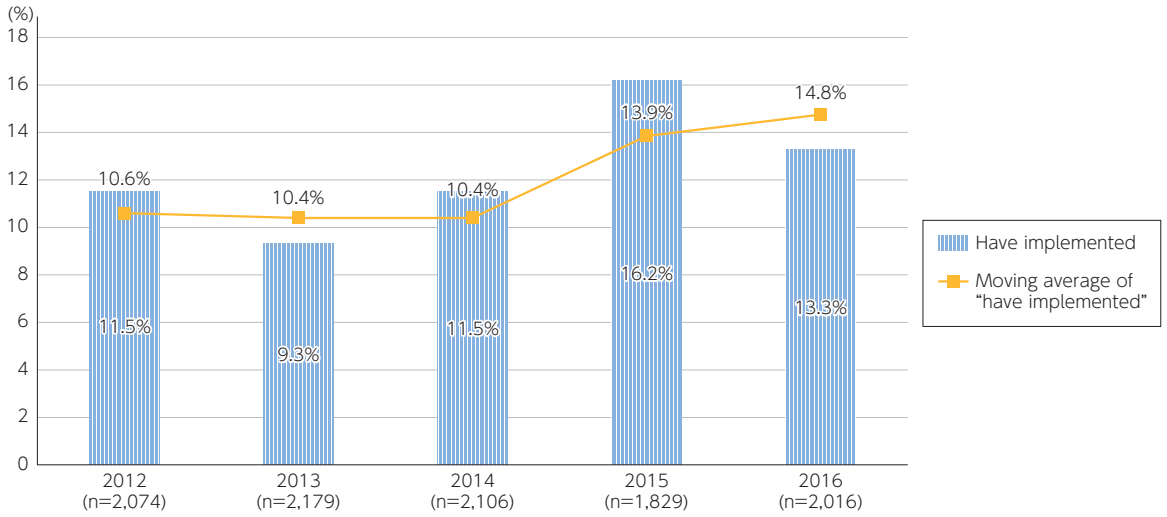
Teleworking is a flexible working style using ICT (information communication technology) for effective use of time and place. According to the Communications Usage Trend Survey, 13.3% of companies have introduced teleworking at the end of September 2016 (Figure 4-2-1-1). Looking at the moving average of teleworking implementation rate, companies implementing teleworking are on an upward trend in recent years.

(1) Why teleworking?

In order to enhance labor force participation when the working-age population is declining, Japan needs to increase women's employment. Many women withdraw from employment upon marriage, childbirth or child rearing. By using teleworking, they can increase time to spend with their family and time to use for parenting and housework.

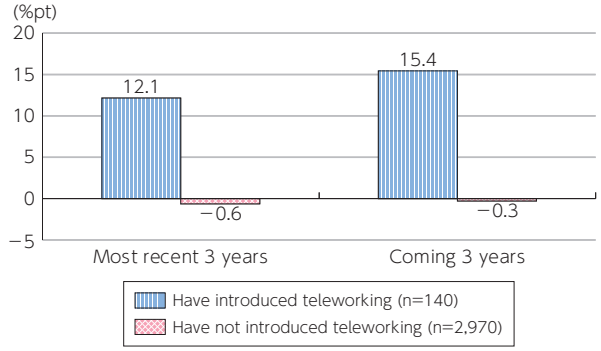
For companies, teleworking may be effective for securing employees. Looking at DI (Diffusion Index) that is the difference subtracting the percentage of companies responding that the number of employees has decreased from the percentage of companies responding that the number of employees has increased, the DI was positive by over 10 points for companies that have introduced teleworking, while the DI is negative for other companies both in the most recent and coming three years (Figure 4-2-1-2). It is thought that creation of an environment enabling flexible working styles free from location has a positive effect on enhancement of the labor force participation rate.

Figure 4-2-1-1 Teleworking implementation rate in companies



(Source) "Communications Usage Trend Survey" 2016, MIC

Figure 4-2-1-2 Introduction of teleworking and DI for increase or decrease of employees



(Source) "Survey Research on ICT Utilization and Solution of Social Problems" 2017, MIC

(2) Introduction of teleworking is still in the early stage

Teleworking has advantages including options of flexible working styles for workers and securing of employees for companies. However, not a few companies anticipate problems in its introduction. Introduction of teleworking is more advanced among companies with a larger number of employees. About several percent of companies with 100 or fewer employees have introduced telework, whereas the ratio is 20.4% for companies with 301 or more employees.

(3) Potential and challenges for spread of teleworking

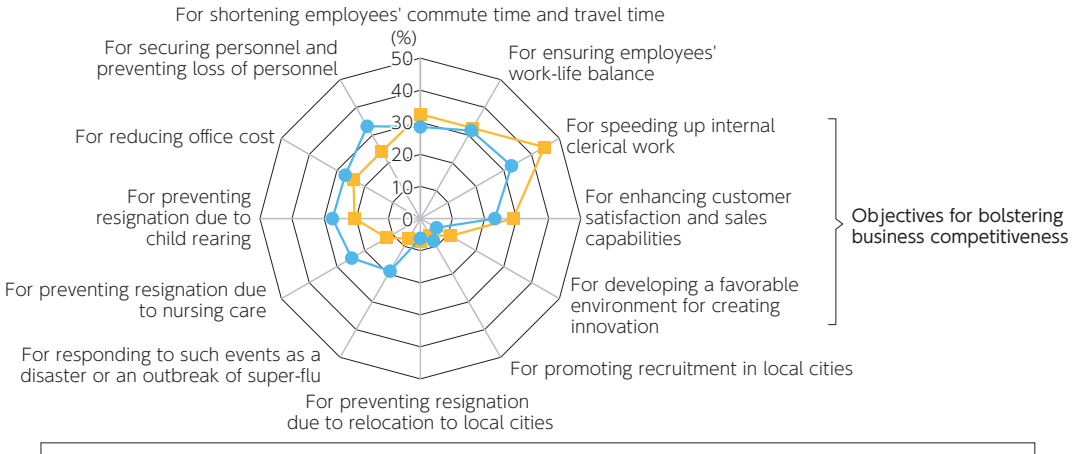
Differences in the purpose of introducing teleworking are studied between companies that have introduced teleworking and companies whose levels of internal systems for working style reform and introduction of ICT systems exceed the average of companies that have introduced teleworking, but have not yet introduced teleworking.

Companies that have introduced teleworking have a strong sense of purpose to enhance their business competitiveness, including "enhancing customer satisfaction and sales capability" and "developing a favorable environment for creating innovation." On the other hand, companies that can introduce teleworking are more focused on purposes related to welfare programs including "securing personnel and preventing loss of personnel," "preventing resignation due to child rearing" and "preventing resignation due to nursing care."(Figure 4-2-1-3). It is probable that even with the same level in terms of the environment for realizing teleworking, companies more focused on enhancement of business competitiveness as the objective are more likely to introduce teleworking than companies more focused on its use as a part of a conventional welfare package.

(4) "Aggressive" teleworking also contributes to enhancement of labor productivity.

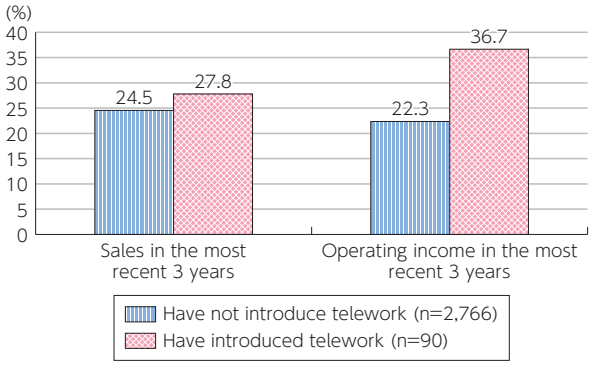
Differences are studied in performances (sales and ordinary income) between companies that have introduced teleworking and companies that have not. Among the companies that have introduced teleworking, the ratio of companies with improving performance in the most recent 3 years is higher compared with the companies that have not introduced it, while the ratio of the companies with falling performance is lower. Difference in performance by state of introduction of teleworking is more noticeable for ordinary income than sales (Figure 4-2-1-4). It is believed that introduction of teleworking created a virtuous cycle of improved labor productivity, efficient business activities and sales increase. Actually, about 60% of the companies that have introduced teleworking did so for the purpose of enhancement of labor productivity, of which more than 80% answered that the introduction generated the effect that they had expected (Figure 4-2-1-5).

Figure 4-2-1-3 Objectives of introducing teleworking (multiple answers)



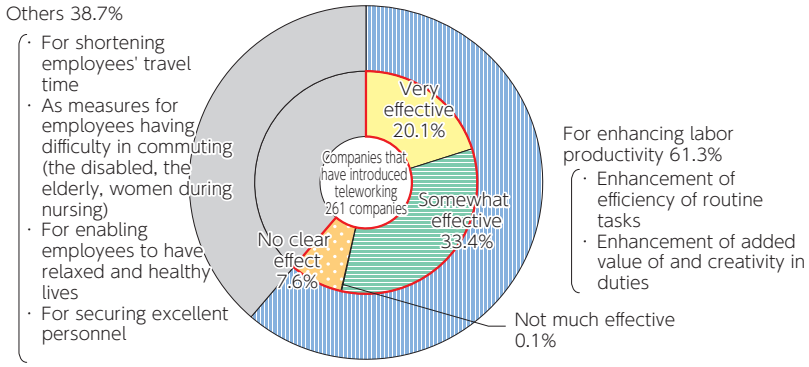
(Source) "Survey Research on ICT Utilization and Solution of Social Problems" 2017, MIC

Figure 4-2-1-4 Introduction of teleworking and the ratio of companies whose sales/operating income are on the increase in the most recent 3 years (companies with 300 or fewer employees)



(Source) "Survey Research on ICT Utilization and Solution of Social Problems" 2017, MIC

Figure 4-2-1-5 Objectives of companies' introduction of teleworking and enhancement of labor productivity



(Source) "Communications Usage Trend Survey," MIC

Section 3 Regional Revitalization and ICT Utilization

1. ICT utilization supports the tourism nation

The number of tourists from overseas visiting Japan was 24.04 million in 2016, exceeding 20 million for the first time in history. Expenditure by tourists from overseas visiting Japan was about 3.7 trillion yen ((Sources) Expenditure by tourists from overseas visiting Japan: "Consumption Trend Survey for Foreigners Visiting Japan" Japan Tourism Agency, Number of tourists from overseas visiting Japan: "Statistics of Visitors to Japan from Overseas" Japan National Tourist Organization). Regions visited by tourists also need to make efforts to attract foreign and domestic tourists and enhance convenience for them.

(1) Local governments' measures to enhance convenience for tourists

A survey of local governments across Japan was carried out to know the current status of measures using ICT pertaining to inbound tourism (for attraction of tourists from overseas visiting Japan and enhancement of their convenience). The relationship between the implementation status of measures and increase of tourists from overseas was also analyzed.

A. Local governments' ICT-related measures

Nearly 40% of the local governments are promoting measures for inbound tourism utilizing ICT (Figure 4-3-1-1). While over 90% of prefectures are implementing measures, many cities, special wards, towns and villages are not. In order to become an "advanced tourism nation," it is important that each municipality implements measures utilizing its locality in addition to measures by prefectures.

B. Relationship between changes in the number of tourists from overseas visiting Japan and local governments' measures

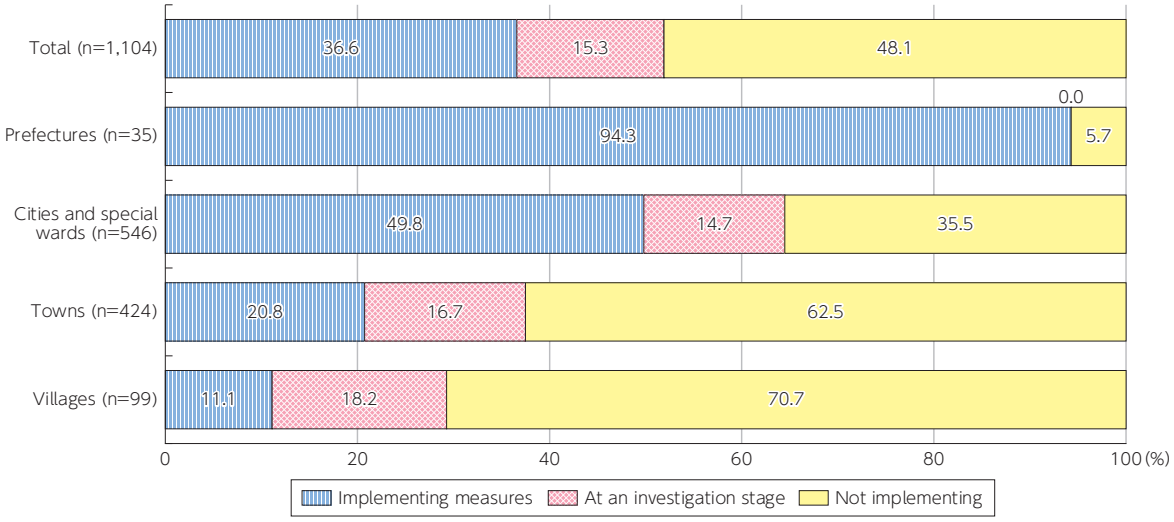
We analyzed the relationship between the implementation status of measures related to inbound tourism and the changes in the number of tourists from overseas visiting Japan/overnight visitors for the last two years.

Local governments promoting such measures are more likely to answer that the number of tourists from abroad has increased. Increase in the number of tourists is more significant when the local government is actively taking measures (Figure 4-3-1-2). The number of overnight visitors from overseas shows a similar pattern.

(2) ICT utilization is effective for attraction of tourists and enhancement of their convenience

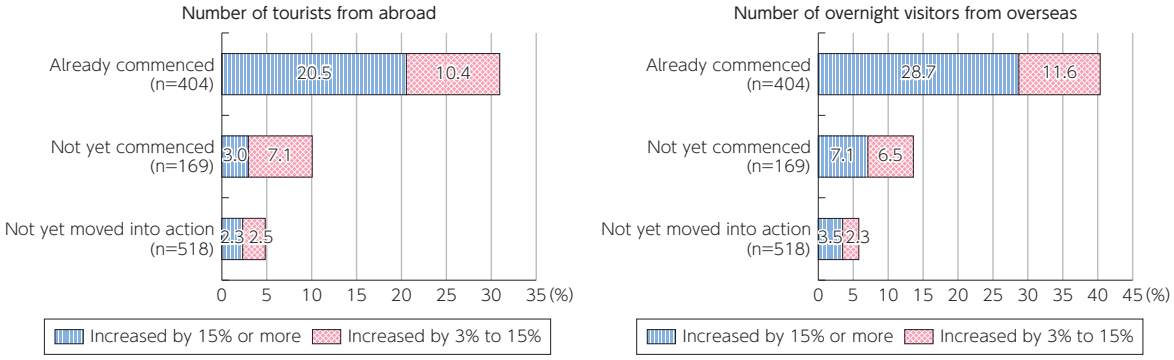
According to the survey of local governments, over 30% of them have implemented or plan to commence de-

Figure 4-3-1-1 Implementation status of measures related to inbound tourism



(Source) "Survey Research on Current State of ICT Utilization in Each Region" 2017, MIC

Figure 4-3-1-2 Relationship between measures by local governments and the number of tourists from overseas visiting Japan



(Source) "Survey Research on the Current State of Regional ICT Utilization" 2017, MIC

velopment of Wi-Fi environments and multilingual information provision through the Internet among measures related to inbound tourism. Local governments appreciate the two measures as relatively effective for increasing tourists visiting Japan.

A. Expansion of Wi-Fi environments

According to "the survey on the current situation of domestic environments for accepting tourists from overseas visiting Japan (2014)[27]" conducted by the Japan Tourism Agency, "Free Wi-Fi environments" was the top "Inconvenience during their stay in Japan" at 44.6%, which shows strong need for free Wi-Fi spots among tourists from overseas visiting Japan. In order to promote the development of free Wi-Fi environments, MIC in cooperation with the Japan Tourism Agency set up a council to promote development of free Wi-Fi environments. The council is discussing further promotion of free Wi-Fi development, publication of free Wi-Fi spots, simplification of usage procedure and other related matters.

Partly as a result of the progress of these efforts to develop free Wi-Fi environments, certain improvement is found. In the survey on environments for accepting tourists from overseas visiting Japan published by the Japan Tourist Agency in February 2017; "Free Wi-Fi environment" fell to second (28.7%) as "Inconvenience during your stay in Japan".

Section 4 Potential of Expanding ICT Utilization

This section first describes the progress of ICT utilization in Japan and then mentions the potential of further solutions by sharing experiences of solving social problems using ICT. It also considers potential international contributions by spreading our experience of solving social problems together with our high-quality ICT infrastructure.

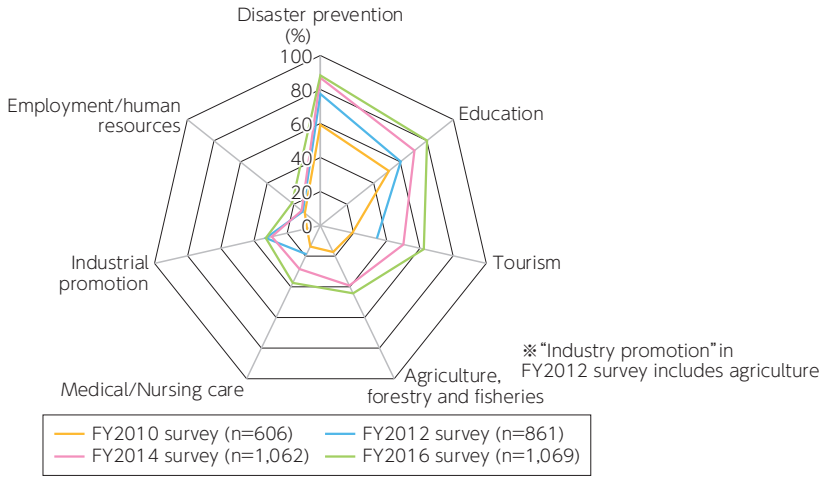
[27] "Survey on the current situation of development of environments for accepting tourists from overseas visiting Japan" material for the third board meeting of the council to promote development of free Wi-Fi environments, MIC and JTA (implemented in fiscal 2014 and published in January 2016) http://www.mlit.go.jp/common/001115689.pdf

1. ICT spreading in our daily life

(1) Progress of ICT utilization in communities

The results of a survey on the situation of regional ICT utilization conducted by MIC for local governments across the country shows that ICT utilization by local governments has progressed in all fields (Figure 4-4-1-1). The fields where ICT utilization is especially progressing in recent years are education[28], medical care/nursing care[29] and tourism[30], where the introduction rate increased about 10% from the 2014 level. On the other hand, the rate of ICT utilization is below 20% in medical/nursing care, industrial promotion, employment/human resource and other fields. It is hoped that ICT utilization will further progress through efforts by local governments.

Figure 4-4-1-1 ICT utilization rate by field (cross-year comparison)



(Source) "Survey Research on Current State of Regional ICT Utilization" 2017, MIC

2. ICT utilization spreading to the world

(1) Japan's ICT infrastructure export

Positioning overseas expansion in the field of ICT as an important measure, MIC is actively promoting public-private sector joint efforts. Here, we introduce cases of overseas expansion with focus on Japan's standard of terrestrial digital broadcasting (TDB) and demonstration projects.

A. Overseas deployment of the ICT infrastructure centered on TDB

Since 2006 when Brazil became the first foreign country to adopt Japan's standard of terrestrial digital broadcasting, Japan's standard of TDB has been adopted by 19 countries (including Japan) as of March 2017, as a result of Japan's approach in public-private partnerships. In the "Infrastructure Systems Export Strategy (revised in FY2017)" in May 2017, the government states "for countries that adopted Japan's standard of terrestrial digital broadcasting (ISDB-T) in 2016, we will implement education, cooperation and other activities toward international dissemination of our ICT and services (disaster prevention ICT, optical fiber, etc.) centered on TDB." Taking advantage of the cooperative relationship with the countries that adopted Japan's standard of TDB, Japan is making public-private sector joint efforts to promote overseas expansion of ICT utilization that will contribute to solution of social problems.

(a) Terrestrial digital broadcasting in a road traffic information distribution system: Philippines

The Philippines adopted a Japanese TDB in November 2013. The country, where traffic congestion is intensifying in urban areas every year, has a strong need for use of an ICT system to grasp the latest congestion state. The Japanese TDB has a data broadcasting function to convey information to a broad area. Japan and the Philippines will cooperate to develop a road traffic information distribution system using the data broadcasting.

(b) Terrestrial digital broadcasting in a wide-area disaster prevention system: Peru

In April 2009, Peru adopted the Japanese TDB as the second country following Brazil. In Peru, a broad-area disaster prevention system equipped with an Emergency Warning Broadcast System (EWBS), which is one of the advantages of the Japanese TDB, was put into practical use. By installing the Japanese TDB facilities in seven disaster prevention centers, the country enhances disaster-related communication capacity to reduce personal damage. Peru is the second country after Japan to put a broad-area disaster prevention system equipped with EWBS into practical use. It is hoped that the system will spread to the neighboring countries adopting the

[28] Including electronic blackboards, digital textbooks, support for school affairs (management of roster, attendance state and performance, curriculum, contact office, etc.)

[29] Including cooperation for electronic health records, radiograph analysis and remote diagnosis

[30] Including provision of tourism information using a leading website, etc., creation and provision of tourism information using multi-function terminal

Japanese TDB[31,32].

B. Demonstration project, support for human resource development, etc. as cases of overseas expansion of ICT infrastructure

(a) Disaster prevention system using one-segment broadcasting: Indonesia

In Indonesia, the Hitachi, Ltd. group implemented a demonstration project pertaining to disaster information provision using community 1-segment broadcasting and confirmed that it is effective for closing the digital divide. Based on the result, MIC is actively supporting initiatives for full-scale introduction/commercialization of the system in the country.

(b) Precision farming using a quasi-zenith satellite system: Australia

Hitachi, Ltd., Hitachi Zosen and Yanmar implemented a project for precision farming using altitude positioning signals distributed from a quasi-zenith satellite system in Australia. Positioning accuracy using a conventional GPS satellite is limited to about 10 to 20cm but a new positioning method using a quasi-zenith satellite has improved the accuracy to 6cm. The new method enables highly efficient farming including farm work using autonomous travelling tractors. In fiscal 2016, the companies implemented demonstration experiments for improvement of farm work efficiency, which include creation of 3D maps by collecting data of farmland and elevation using tractors/drones, and collection of crop vegetation information based on autonomous drone flights[33].

[31] "Reduce disaster risk in Peru with Japan's TDB technology – the first foreign country introducing Japan's Emergency Warning Broadcast System" JICA (January 28, 2016) https://www.jica.go.jp/topics/2015/20160128_01.html

[32] "Broad-area disaster prevention system development plan" donation ceremony, Japanese Embassy in Peru http://www.pe.emb-japan.go.jp/jp/Ceremonia_entrega_equipos_EWBS.html

[33] "Success of unmanned operation using autonomous traveling type robot tractor during standing period of rice – toward realization of precision farming – entrusted with survey of usability of a quasi-zenith satellite system for precision farming in Australia" Hitachi, Ltd., Hitachi Zosen and Yanmar, January 14, 2015 http://www.hitachi.co.jp/New/cnews/month/2015/01/0114.html