Chapter 4

Promotion of Inclusion through ICT

Entering the population decline period, Japan is facing a variety of challenges including those concerning "people." Examples are: concern of social isolation due to the increase of one-person households, especially aged single households, and; employment of women, the elderly, people with disability and other people who have found it difficult to play active roles in working environments in Japan. One of the approaches important for solving these challenges is "inclusion (*housetsu*)" that accepts diverse people. Creation of "ties" through these efforts may enable "multiple membership" that means joining multiple organizations partially for diverse social activities and working styles. This chapter will discuss potential of these efforts to contribute to inclusion.

Section 1 Social Challenges in the Era of Population Decline and ICT

1. Ties in the Era of Population Decline

(1) Increase of One-person Households

One-person households (households with one member) are increasing as a consequence of a rising percentage of unmarried people and the trend toward nuclear families. It is predicted that the ratio of one-person households will reach about 40% by 2040.The increase of elderly one-person households above 65 years old is particularly significant.

Increase of one-person households increases the risk of social isolation. According to a survey of the elderly[15] by the Cabinet Office, 7.0% of the elderly persons in one-person households answered that they have "very few" conversations with others. The rate is high compared with the rates of households with two or more members (2.2%) in Japan and one-person households in other countries (1.6% in the United States, 3.7% in Germany and 1.7% in Sweden). Increase of one-person households is thought to result in an increase of people who become socially isolated without people to rely on around them.

2. Promotion of Labor Force Participation

Japan's production-age population turned to decline in 1995. The decline of production-age population will lead to the decline of working population. Companies are also feeling a shortage of workers. There are two approaches to address the labor shortage. One is to increase production capacity through improvement of labor productivity; the other is to raise the labor force participation rate by encouraging employment of people who are currently not working.

(1) Labor Force Participation of Diverse Human Resources Including Women, Elderly persons and People with Disabilities

a. Women

The employment rate of women has been increasing year after year in Japan. The rate was about 60% in 2000 but increased to slightly under 70% in 2016. However, it is estimated that as many as 890 thousand[16] women who wish to work are not searching for jobs due to child delivery or childcare in Japan. Child delivery and childcare are thought to have a strong impact on labor force participation by women. In order to enable labor participation by more women, it may be important that women can flexibly change their way of working as their children grow.

b. Elderly persons

Labor force participation rate of the elderly (aged 65 and older) in Japan is higher compared with other countries and OECD average[17]. When working elderly citizens were asked about their willingness to work in the future, the highest percentage of respondents answered that they wished to work so long as they could in Japan. Response to the elderly who wish to work as long as they are in good health is believed to increase importance.

c. Persons with disabilities

According to "2017 Aggregate Results of Status of Employment of Persons with Disabilities"[18] of the Ministry of Health, Labour and Welfare, the number of employed people with disabilities' was about 496 thousand as of

[15] "Result of the 8th International Comparison Survey of the Daily Life and Attitudes of Elderly Persons", Cabinet Office (2015)

[16] "Labor Force Survey (detailed tabulation)" average of 2017, Statistics Bureau, MIC

[17] According to OECD stat, OECD average of labor force participation rate of people aged 65 and older is 14.5% in 2016. The rate is 22.8% in Japan

[18] "2017 Aggregate Results of Status of Employment of Persons with Disabilities", MHLW, 2017

June 1, 2017. The number has been a record-high for 14 successive years. However, only half of the companies satisfied statutory employment rate. It is hoped that more companies will be able to employ persons with disabilities.

As described above, the labor participation rates of women, elderly citizens and persons with disabilities have been rising in Japan in recent years, but there may be room for further improvements of the rates as well as labor quality.

3. Direction of Inclusion Promotion through ICT

(1) Problem-solving through Ties Created by ICT

In the era of population decline, society-wide promotion of inclusion to accept diverse people in society and workplaces will also lead to sustainable growth.

The spread of the Internet has facilitated dissemination of information by individual persons and their interchange with others through social media and other ICT services. Use of social media with family members and friends and efforts for utilization of ICT to promote cooperation in communities are also spreading.

Section 2 Current State of "Ties" through ICT

1. Personal Use of ICT

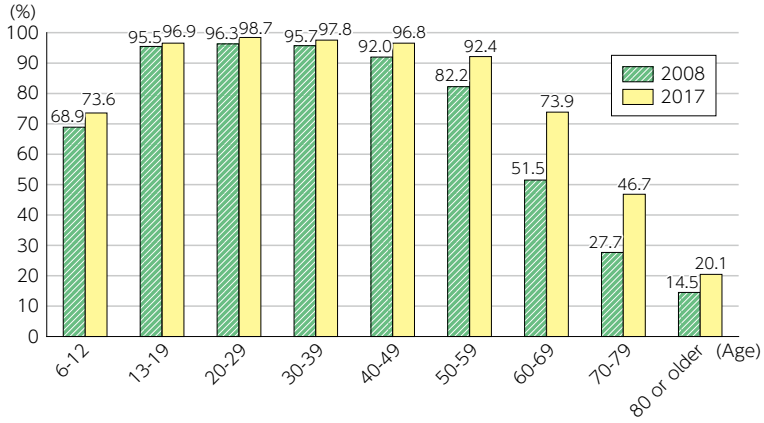
(1) Spread of Use of the Internet

Using the Communications Usage Trend Survey conducted by MIC, we compared personal use of the Internet for the period of one year after the 2017 survey with the same period of the 2008 survey when smartphone had not yet spread (Figure 4-2-1-1). The internet usage rate for the age groups from 13 to 19 year olds (junior-high students and older) up to those in their 40s exceeded 90% already in the 2008 survey and remained almost the same in 2017.

The rate of respondents in their 60s and 70s answering they have used the Internet in the past year increased more than 10% in these nine years. Because the rates of the respondents in their 50s and older at the time of the 2008 survey were at the level similar to the rates of respondents in their 60s and older in the 2017 survey, the increase of internet usage rate by the age groups may be a consequence of their becoming 10 years older.

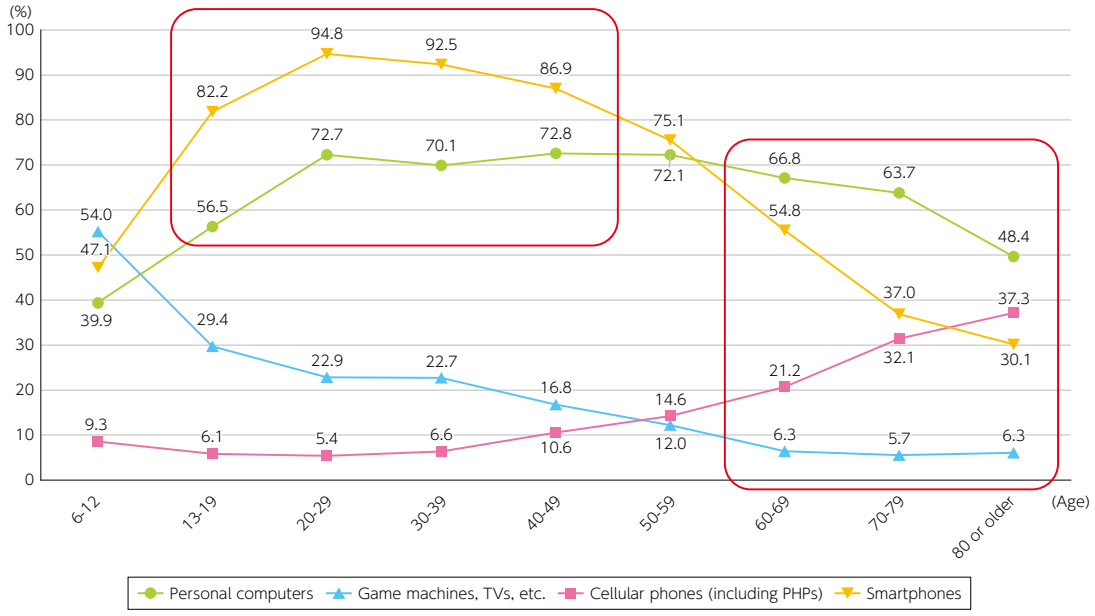
The terminals used for internet connection were different between the age group from 13 to 49 year olds and the age group in their 60s and older. 80% or more users in their teens to 40s are using smartphones as terminals for internet connection. The rate is the highest among terminals.Respondents in their 60s and older are mostly using personal computers for internet connection (Figure 4-2-1-2). Use of smartphones sharply drops to 54.8% for respondents in their 60s and 37.0% in their 70s.

Figure 4-2-1-1 Changes in the ratio of individual internet users



(Source) Prepared from "Communications Usage Trend Survey" MIC (each year)

Figure 4-2-1-2 Terminals connected to the Internet



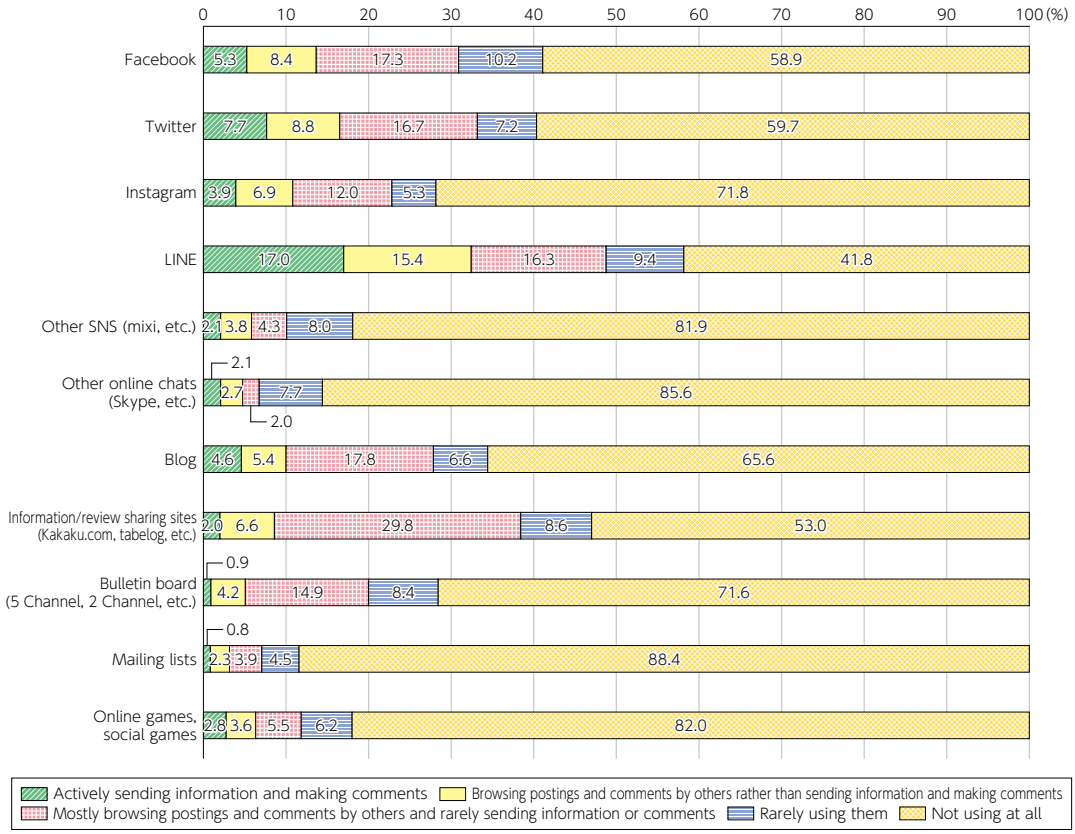
(Source) Prepared from "Communications Usage Trend Survey in 2017" MIC (2018)

2. Impact of Social Media on Personal Ties

(1) Usage Trend of Social Media

LINE has the highest usage rate among social media in Japan. Its usage rate including light users was about 60% (Figure 4-2-2-1). As an overall trend, the percentage of users answering "mostly browse postings and comments of others and rarely send information or comments" is higher than users who make postings.

Figure 4-2-2-1 Sending/browsing information through social media (Japan)



(Source) "Survey Research on Realization of Inclusion through ICT" MIC, 2018

(2) Advantages of Using Social Media

Comparing positive experiences of using social media by users in Japan, the United States, the United Kingdom and Germany, Japan is at the bottom in both (i) creation of new ties including "I made new friends" and "found a mentor" and (ii) items related to strengthening of existing ties including "deepened relationship with my family and friends" and "could contact people whom I hadn't contacted for a long period of time." Japan's rates of these items are remarkably lower than those of the other counties. The ratio of Japanese users choosing items related to (iii) collection of information is also lowest but only 5 points behind the No. 3 country, while their ratio choosing (iv) killing time is second highest following Germany (Figure 4-2-2-2).

As advantages of using social media, Japanese users are more aware of collection of information interesting to them rather than ties with others. This suggests that many users might only access information that is interesting to them. However, accessing only information that is interesting to them on social media could result in narrowing the area of their interest and communication.

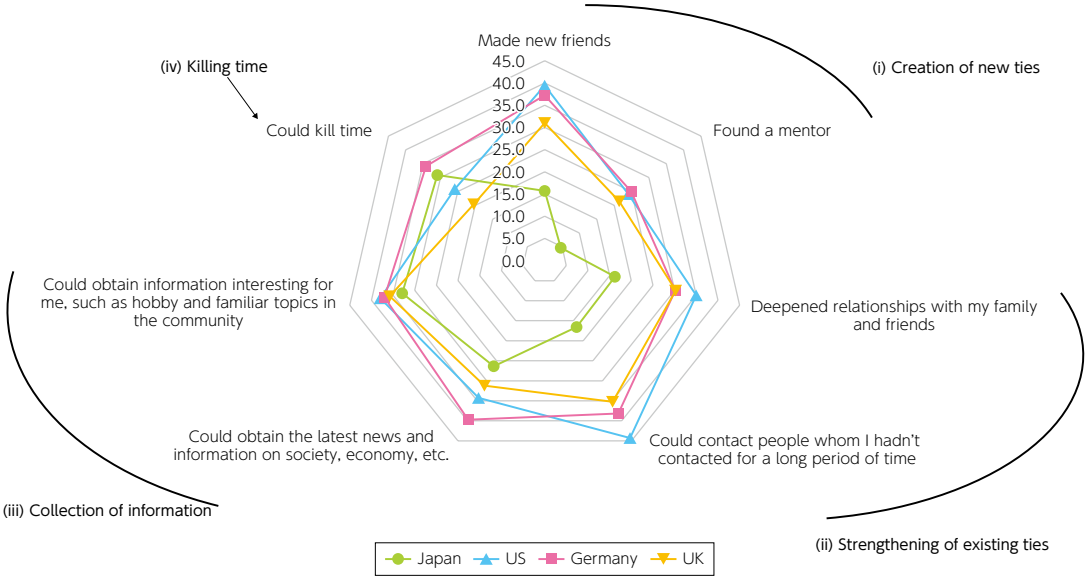
(3) Disadvantages of Using Social Media

We need to pay attention to the risk of troubles and worsening of human relationships that might be caused by easy communication with strangers using social media.

It is not infrequent that frictions are developed with others through use of social media. Percentage of users who sent information through social media and have experienced some kind of trouble is 23.2% in Japan. This is low compared to 56.9% in the United States, 49.2% in the United Kingdom and 50.0% in Germany.

The type of troubles experienced by the largest number of the users is "my words were taken by others in different meaning than I intended (misunderstanding)." The second is "I quarreled with a stranger on the Internet (quarrel)," followed by "I posted a message as a sort of joke but it hurt others." The top three troubles are a result of miscommunication caused by postings made by the user. This tendency is common to all four countries. The order from the most frequent to the third frequent trouble is the same for all countries. Troubles experienced by the largest number of users sending information through social media are the misunderstanding of their words and quarrels with the other side rather than being attacked or suffering damage. One could argue that, in the case of where face cannot be seen, anonymous communication, these troubles were caused by the difficulty of communication unique to the Internet where you cannot see the background of the other person.

Figure 4-2-2-2 Positive experiences of using social media (international comparison) (%)



*Answers of respondents in their 70s were excluded for harmonization with answers of other countries.

(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

Section 3 Communication through ICT for Promoting Social Participation of Diverse People

1. Diversification of Communication through Social Media

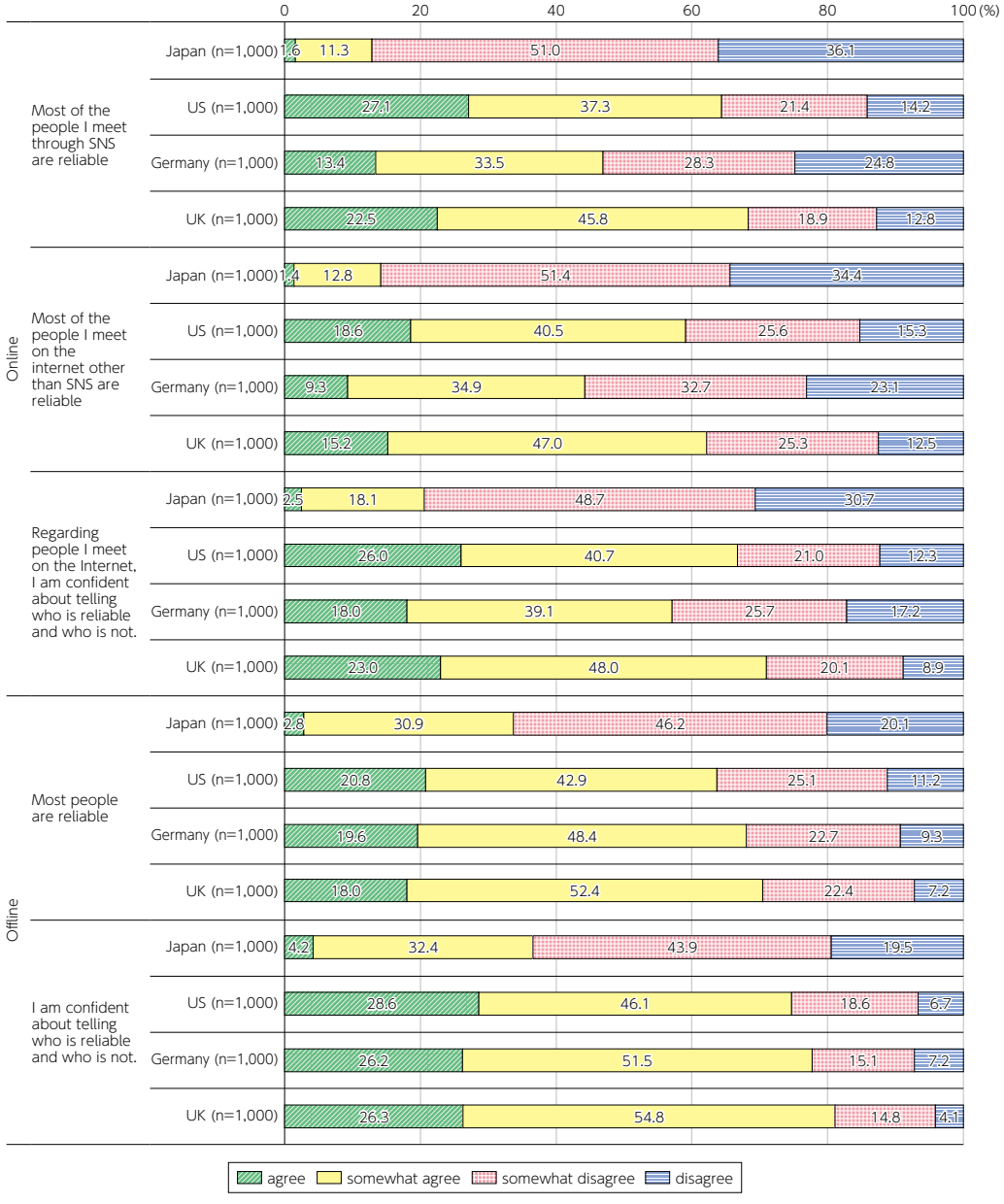
With the spread of the Internet and mobile phones, and the spread of smartphones in recent years, social media is used anytime and anywhere. As a result, online communities through social media are also recognized as components of society.

2. Ties Created through Online Communication

(1) Trust of other People Connected Online

Because the Internet has become an important communication tool, there are not a few people who experienced troubles through the use of social media. In this context, we compared the level of trust in people whom respondents meet offline and online based on an international survey (Japan, the United States, the United Kingdom and Germany). Japan showed lower trust in others both online and offline compared with the other countries (Figure 4-3-2-1).

Figure 4-3-2-1 Level of trust in people whom you meet online/offline (international comparison)



*Answers of respondents in their 70s of Japan were excluded for harmonization with answers of other countries.

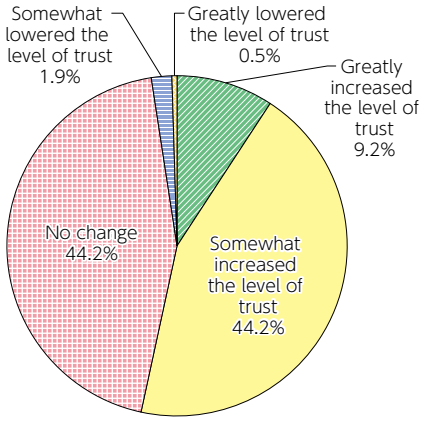
(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

(2) Changes in the Level of Trust by Meeting Persons in Real Life

The level of trust in a person you met online may change by meeting the person in real life. People who are "actively sending information through social media" were asked whether they had met people they had got to know through social media in real life at an offline meeting or other opportunities. Analysis of the results by media revealed that 40% to 50% of users of Facebook, Twitter, other online chat sites and mailing lists and about 60% of users of other SNS had experience of meeting other users in real life.

Figure 4-3-2-2 shows answers to the question whether or not meeting people you got to know through social media in real life changed your trust in them. More than half of the respondents answered their trust had increased by meeting other users in real life. The percentage of lowering of trust is under 3% in total of "Somewhat lowered the level of trust" and "Greatly lowered the level of trust."

Figure 4-3-2-2 Change in the level of trust by meeting in real life(n=208)



(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

3. Social Media Complementing Ties of the Real Society

(1) Social Media Complementing Familiar Ties

Social media is also effective as a tool to strengthen ties with family, friends and other people. The questionnaire survey revealed that Facebook, LINE, etc. have become a communication tool complementing ties with people (Figure 4-3-3-1). The tendency is remarkable especially with LINE.

Figure 4-3-3-1 Browsing state (multiple answers, Japan)

	Spouse	Parents	Children	Other kin (brothers, sisters, grandparents, grandchildren, etc.)	Friends (including classmates and alumni)	Coworkers	Other acquaintances through work (business partners, etc.)	Acquaintances outside work	People I met through social media (frequently keeping in touch)	Other (celebrities, etc.: only browsing without communication)	Don't browsing postings of others
Facebook (n=493)	5.7	2.8	4.5	8.3	49.3	9.9	15.6	18.5	13.0	28.8	13.2
Twitter (n=484)	2.9	1.7	2.3	3.3	27.5	4.1	7.2	12.2	20.2	53.5	15.3
Instagram (n=338)	4.7	1.8	3.8	5.0	33.7	5.9	8.6	12.7	13.6	47.6	12.4
LINE (n=698)	25.4	13.8	21.3	23.6	49.7	14.6	10.2	13.6	6.7	11.2	14.6
Other SNS (mixi, etc.) (n=217)	3.7	1.4	2.8	4.1	23.5	3.2	4.6	7.4	13.8	24.9	37.3
Other online chats (Skype, etc.) (n=173)	4.0	4.0	6.9	8.7	20.8	3.5	4.6	6.9	12.7	9.2	41.0
Blog (n=413)	2.4	0.5	1.0	0.5	9.9	1.7	1.9	6.8	10.2	69.2	12.6
Information / review sharing sites (Kakaku.com, tabelog, etc.) (n=564)	0.9	0.4	1.1	0.4	3.5	0.7	0.9	2.7	3.2	67.9	22.5
Bulletin board (5 Channel, 2 Channel, etc.) (n=341)	1.2	0.3	0.6	0.9	3.5	1.2	0.3	2.1	4.1	69.5	20.8
Mailing lists (n=139)	5.0	5.0	4.3	5.0	20.1	5.8	6.5	10.8	7.9	23.0	32.4
Online games, social games (n=216)	2.3	1.4	3.2	1.9	10.2	3.2	0.9	1.4	9.7	33.8	45.4

(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

4. Building Community Ties through ICT

(1) ICT Helps Mutual Assistance in Communities

You can use ICT also as a system for creating human ties in the community. Interaction of people of the community through ICT platforms including social media may be useful for building relationships of mutual assistance among residents by connecting people with solutions or ability to help with people who need them.

(2) Troubles in Communities and Intention to Use Social Media to Solve Them

We can contribute to solving troubles of everyday life in communities by using social media to connect people who need help by people who wish to help.

A questionnaire survey was conducted to ask intentions to use social media for mutual assistance between people in trouble in everyday life and people who want to help. People who want to or do not mind helping people in trouble were asked about their intention to undertake the service through social media if paid/not paid. A little less than half respondents answered they want to undertake the service (Figure 4-3-4-1).

Figure 4-3-4-1 Intention to use social media for daily life support (answers of people who want to help)

(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

5. Mutual Complementation of Online and Offline Communities

(1) State of Participation in Online and Offline Communities

A survey on the state of participation in online and offline communities was conducted in fiscal 2017. The survey is similar to the survey conducted in fiscal 2008 before the spread of smartphones ("FY2008 survey"). We will consider the current state of people's ties through ICT based on the comparison of the results of the two surveys. Answers to questions concerning participation in online and offline communities are compared with a focus on total respondents and the respondents aged 60 and older (Figure 4-3-5-1).

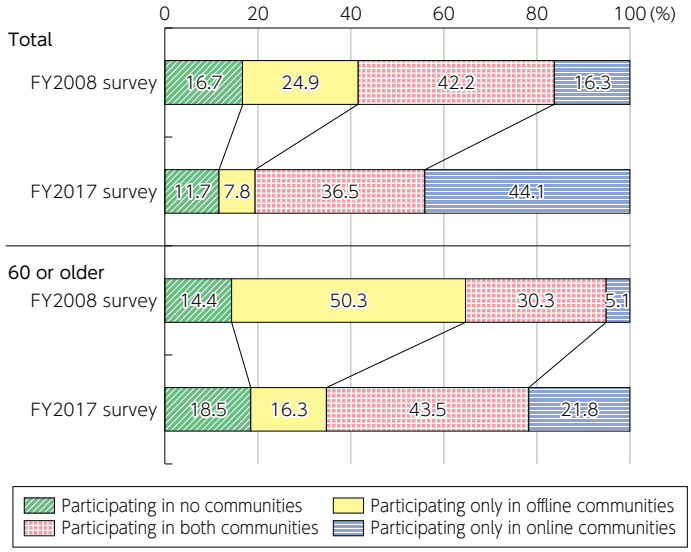
Overall, people who are not participating in any community and people participating only in offline communities decreased from 16.7% to 11.7% and from 24.9% to 7.8% respectively. Respondents participating only in online communities increased from 16.3% to 44.1%, showing the increasing trend of people connected online. We need to help people who belong only to online communities secure their ties with the offline communities. To this end ICT utilization to create ties in their surrounding and the community will increase its importance.

(2) ICT Complementing Ties in the Real World

ICT not only supports online communities but also complements offline ties and helps accumulation of social capital built by the "norm of reciprocity" that can be expressed using words such as mutual give-and-take or "trust" in others.

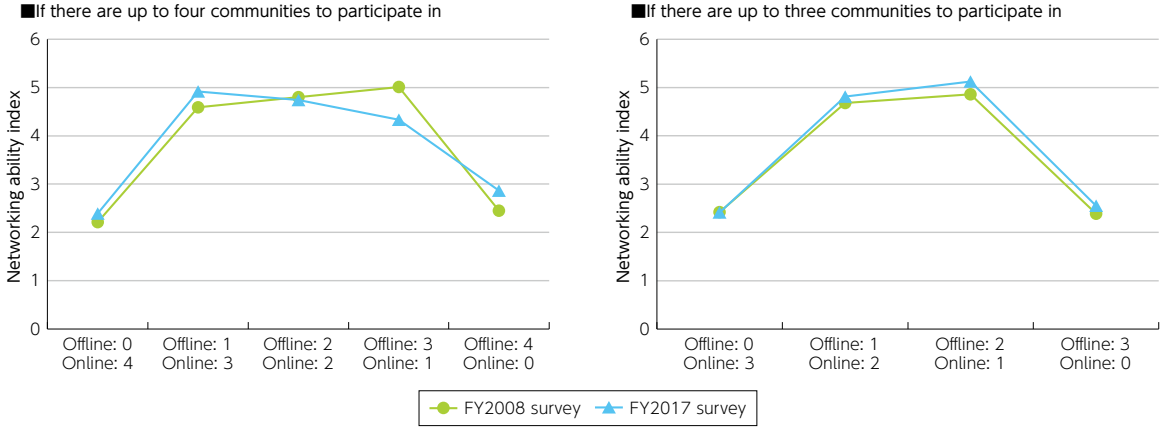
In the 2009 White Paper on Information and Communications (FY2008 survey) we created an index named "networking ability" to quantify ties of online and offline communities based on the survey results. Calculation of "networking ability" using the same method shows that people who participate in both online and offline com-

Figure 4-3-5-1 State of participation in communities (Japan)



(Source) FY2008 survey: "Survey of Safe and Secure ICT Use in Ubiquitous Net Society" MIC (2009)
FY2017 Survey: "Survey Research on Realization of Inclusion through ICT" MIC (2018)

Figure 4-3-5-2 Estimation of networking ability (Japan)



(Source) FY2008 survey: "Survey of Safe and Secure ICT Use in Ubiquitous Net Society" MIC (2009)
FY2017 survey: "Survey Research on Realization of Inclusion through ICT" MIC (2018)

munities have a higher networking ability compared with people participating only in online or offline communities (Figure 4-3-5-2).

Social capital is on a declining trend with the survey results showing that the level of trust both online and offline is declining. In order to restore mutual trust among our citizens, namely to restore our social capital, it may be important to create opportunities for people participating only in online communities to participate also in offline communities, while at the same time complementing their ties by actively encouraging utilization of social media in offline communities.

Section 4 Promotion of Labor Force Participation of Diverse People through ICT

1. Workplace Communication and ICT

(1) Usage State of ICT Tools for Business

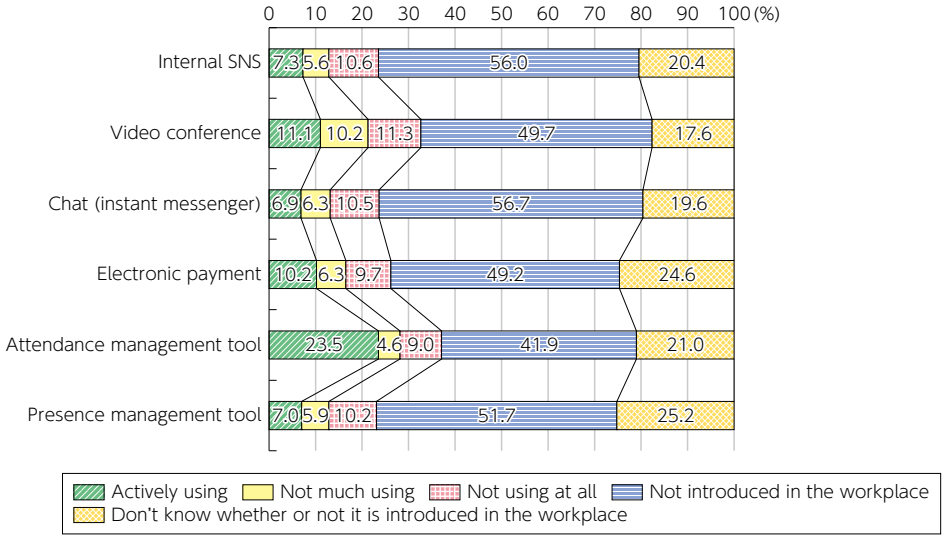
In a survey of workers on ICT tools for business in their workplace, the most frequent answer was "not introduced" for all tools surveyed (Figure 4-4-1-1).Percentage of the respondents answering "not much using" or "not using at all" though tools are introduced to the workplace is higher than those "actively using" them except attendance management tools. The result reveals that they are not actively used.

We analyzed the relationship of introduction and utilization state of ICT tools for business with worker-friendliness of the workplace. No statistically significant difference was found between introduction of ICT tools for business and worker-friendliness, which shows that simply introducing them has little to do with worker-friendliness (Figure 4-4-1-2).

Respondents who are actively using ICT tools for business in their workplace evaluate worker-friendliness higher compared with respondents who are not using them (Figure 4-4-1-3).

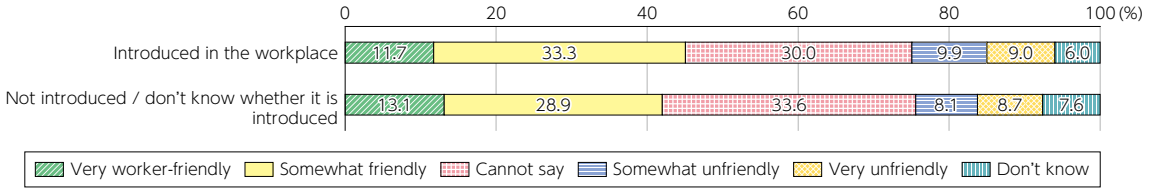
The results above suggest possibilities that usingICT tools for business rather than simply introducing them has a relationship with worker-friendliness of the workplace.

Figure 4-4-1-1 Usage state of ICT tools for business (Japan)



(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

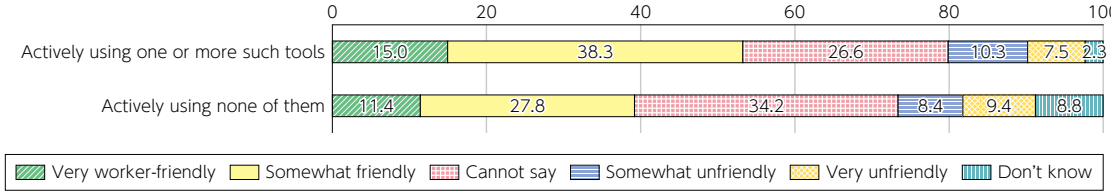
Figure 4-4-1-2 Relationship between introduction state of ICT tools for business and worker friendliness of the workplace (Japan)



*Result of Wilcoxon rank sum test by setting "very friendly at 1" and "very unfriendly at 5" was p = 0.993 showing no significant difference.

(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

Figure 4-4-1-3 Relationship between utilization state of ICT tools for business and worker friendliness of the workplace (Japan)



*Result of Wilcoxon rank sum test setting "very friendly at 1" and "very unfriendly at 5" was p = 0.027. The difference is significant at 5% significance level.
(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

2. Use of Telework by Companies

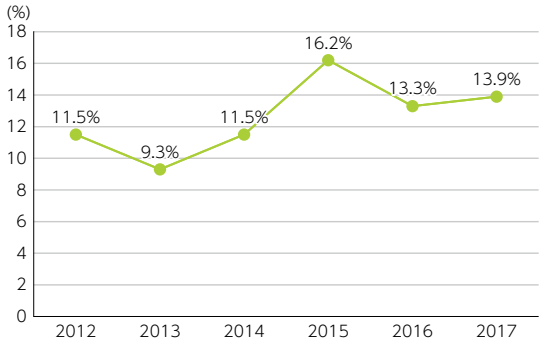
(1) Spreading Use of Telework

a. Classification of Telework

Telework refers to a flexible working style for effective utilization of time and space through the use of ICT.

Telework is implemented in various forms.Based on the type of employment, it can be divided broadly into "telework by employees" and "telework by self-employed" Telework by employees can be further divided into "working at home," "mobile work" and "working in a satellite office" based on the place of work. According to the 2017 Communications Usage Trend Survey by MIC, the telework dissemination rate for Japanese companies was 13.9% (Figure4-4-2-1).

Figure 4-4-2-1 Telework dissemination rate among companies



*Counted with exclusion of non-respondents
(Source) Prepared from "Communications Usage Trend Survey" MIC (each year)

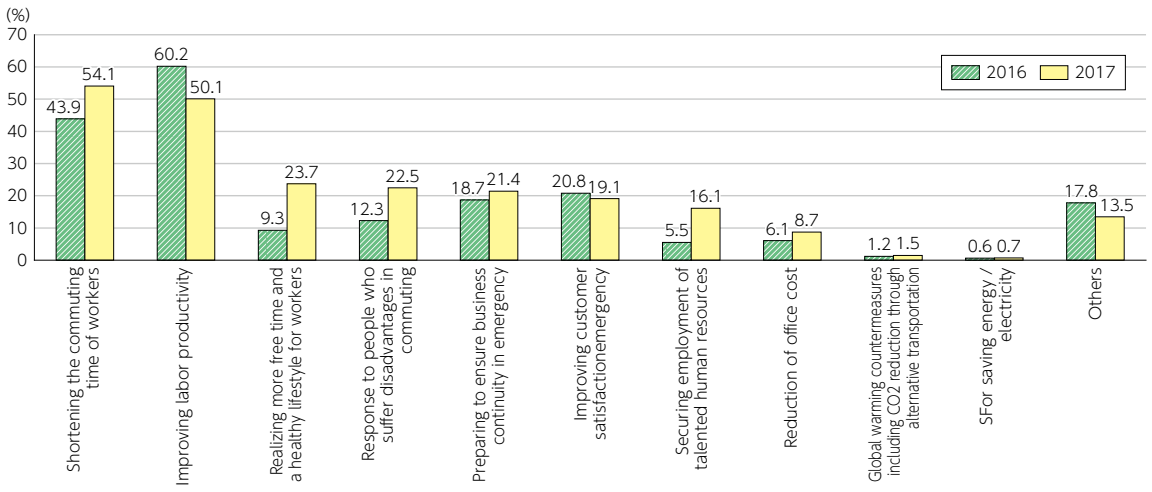
(2) Creation of Worker-friendly Workplaces through Telework

a. Introduction of Telework and Creation of Worker-friendly Workplaces

As a flexible working style for effective utilization of time and space, telework has a variety of advantages both for companies and employees. According to the 2017 Communications Usage Trend Survey, the most frequently cited purpose for introducing telework by companies was "shortening the commuting time of workers" (54.1%) (Figure 4-4-2-2). This may be because an increasing number of companies are introducing telework to improve worker-friendliness as part of their work-style reform, and retain employees in the context of the expected labor shortage.

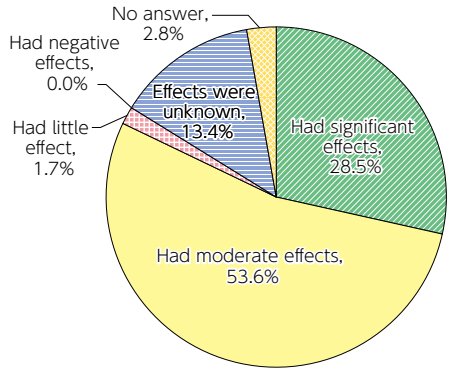
50.1% of companies cited "improving labor productivity" as a purpose for introduction of telework. 82.1% of the companies introducing telework for improvement of labor productivity answered that they could get the intended effect. This indicates that introduction of telework is effective for improving labor productivity (Figure 4-4-2-3).

Figure 4-4-2-2 Purpose of introducing telework (companies)



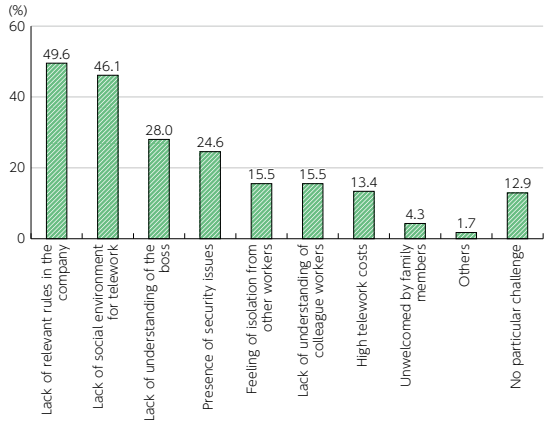
(Source) Prepared from "Communications Usage Trend Survey" MIC (each year)

Figure 4-4-2-3 Effects perceived by the companies that introduced telework for improving labor productivity



(Source) Prepared from "Communications Usage Trend Survey in 2017" MIC (2018)

Figure 4-4-2-4 Challenges facing implementation of telework (workers desiring telework, multiple answers)



*Answers excluding self-employed respondents

(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

b. Challenges Facing Implementation of Telework

Telework is expected to improve worker-friendliness and productivity, but there are challenges for its implementation. Workers who are not using but desiring to use telework were asked about challenges facing implementation. The most frequent answers were related to environmental arrangement, namely "lack of relevant rules in the company" (49.6%) followed by "lack of social environment for telework" (Figure 4-4-2-4).

Workers desiring to telework are not teleworking for reasons such as lack of social environment including satellite office, no adaptation by the company, or telework rules of the company that do not suit user needs, making telework hard to use.

c. Satellite Office

A satellite office is a place for telework other than home. Compared with working at home, it has different characteristics including better communication through the presence of other employees of the company and higher levels of concentration due to working in a dedicated place. The introduction rate of satellite offices is low compared with that of working at home and mobile working. According to the needs survey of private sector companies setting up satellite offices[19], 850 companies have already introduced satellite offices (7.8% of the 10,955 respondents), 459 companies (4.2%) are considering introduction, and 1,721 companies (15.7%) are not considering but interested in introduction. The fact that 19.9% of the companies are positive about their introduction suggests a possibility of rapid introduction in the future.

3. Working Based on Crowdsourcing

(1) Self-employed Telework

Self-employed teleworkers who contract for work via the Internet can work anywhere with a suitable ICT environment, but most of them use their home or a coworking space. Because self-employed teleworkers can choose the place and time to work on their own, it is easier for them to work in accordance with their lifestyle.

(2) Spread of Crowdsourcing

Crowdsourcing is attracting attention as one of the means for self-employed teleworkers to obtain orders for work. Crowdsourcing is a coined word meaning outsourcing to unspecified people (crowd). This is a system to procure human resources you need when needed using ICT. Orderers are mostly corporations who publicly post jobs to outsource on matching sites that serve as platforms.

a. Trend of Use of Crowdsourcing

In the survey of freelancers[20] conducted by Lancers, Inc. in a form of a web questionnaire, it is estimated[21] that there were 11.19 million freelancers who are contracting jobs including side jobs as of February 2018. Because 12% of them answered they were using crowdsourcing, the number of crowdsourcing users is estimated to be about 1.34 million.

Because the number of registered members of CrowdWorks Inc. was 1.52 million at the end of September 2017, it is estimated that about 1.5 million people are re-

[19] "Needs survey of private sector companies setting up satellite offices" (2017), MIC. The survey was conducted by mail, etc. targeting 60,000 companies in the three major metropolitan areas for the period from January to February 2017 and received valid response from 10,955 companies.

[20] Survey of Freelancers, 2018 edition, Lancers (2018)

[21] Estimated based on the result of a survey of 3,096 men and women aged 20 to 69 across Japan who obtained rewards for their service in the past 12 months.

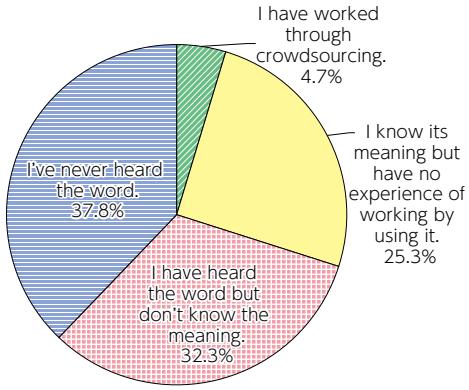
ceiving orders for work through crowdsourcing in Japan.

b. Recognition of and Intention to Use Crowdsourcing

A survey was conducted on recognition of and intention to use crowdsourcing. 62.2% of respondents have heard the word, 30.0% knew its meaning and 4.7% actually have worked through crowdsourcing (Figure 4-4-3-1).

Respondents who have no experience of working through crowdsourcing but know its general meaning were asked whether they want to contract for work through crowdsourcing. 32.7% of them answered they want to contract for works through crowdsourcing. By current employment condition, 51.5% of part-time workers, 19.6% of housewives, 60.0% of students and 27.9% of unemployed people answered that they desired to do so.

Figure 4-4-3-1 Recognition and implementation state of crowdsourcing



(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)

(3) Creating Opportunities to Work in Rural Areas through Crowdsourcing

One of the causes of population outflow from rural areas is lack of diversity in employment opportunities in rural communities. Sometimes people have no choice but to move to cities because they cannot get a job they desire. In order to change the trend, we can use crowdsourcing as a means to create job opportunities in rural areas.

There are two approaches to creating job opportunities in rural areas through utilization of crowdsourcing. One is a system where self-employed teleworkers in rural areas take jobs ordered by companies in other areas including Tokyo. Businesses operating crowdsourcing matching sites are advancing cooperation with local governments, companies and NPOs to create jobs in rural areas. The other is the creation of opportunities based on local production for local consumption, where local governments and companies place orders with local sole proprietors.

Section 5 Future Jobs with Evolution of ICT

1. Progress of Automation through AI and IoT

(1) Current State of Operational Efficiency Improvement

With the accelerated progress in processing speed of computers, technologies of Artificial Intelligence, Internet of Things and automation of operations using robots are rapidly advancing. Various companies are already introducing AI for automation of operations, visualization/analysis of the current state and other purposes. Their efforts are producing certain results such as improvement of operational efficiency.

2. Changes in the Roles of Humans that Introduction of AI and IoT will Bring About

(1) Changes in Occupations

It is very difficult to predict what tasks will be automated to what extent and what occupations will change in what ways through AI. However, piecing together the content of preceding studies, we can predict that, as a result of improvement of operational efficiency and productivity through introduction of AI, the volume of tasks will decrease in occupations where routine work will be further automated. On the other hand, task volume will increase due to increase of business volume for development and operation of systems necessary for AI introduction and operation, and emergence of new occupations including services using AI. As a result of the progress of AI introduction, the number of people engaging in occupations with high potential for automation will decrease, whereas people engaging in occupations to introduce or operate AI and occupations that will emerge with the arrival of AI will increase.

(2) Changes in Individuals' Tasks (Jobs)

With the changing employment environment, the content and role of tasks of workers will also change.

First, workers doing tasks such as routine work where mechanization will advance may be relocated to other tasks.

Even if tasks are not eliminated through introduction of AI, their procedures for the task could change. Visualization and analysis of information using AI might require drawing a conclusion based on the characteristics of the analysis results by AI, which may bring about a need to acquire knowledge on AI.

This way, it is anticipated that human jobs will change

in various ways with the introduction of AI.

3. Recurrent Education to Respond to Changes in the Employment Environment

(1) Abilities Required in the Era of AI

a. Abilities that Companies Expect From their Employees

According to the 2017 Communications Usage Trend Survey, the ability that the largest number of companies expect from their employees in order to respond to the spread of AI is "ability to accomplish work including logical thinking" (Figure 4-5-3-1). Similarly, more than 40% of companies cite "Planning ability, power to generate ideas and creativity" and "human qualities" as abilities they expect from employees. Because ability to accomplish work, creativity and human qualities are expected for any job, the importance of these basic abilities may not change in society where AI will have spread and automation of operations will have advanced.

b. Development of Skills in Response to the Spread of AI

The need for basic abilities including ability to accomplish work expected by companies may not change in society where commercialization of AI has advanced. However, it is expected that skills for individual operations will change with the advance of improvement of operational efficiency and creation of new occupations. For example, if AI is introduced in a company, the company will need human resources who can use the AI. If AI is introduced and operational efficiency and productivity are improved, task volume of the occupations with high mechanization potential will decrease. Workers in charge of the tasks may be required to develop skills to handle other tasks. It will be also necessary to develop skills necessary for occupations newly created by AI.

(2) Need for Recurrent Education

In order to respond to these changes in the employment environment due to the progress of commercialization of AI, IoT and Robotics, it will become important to relearn and develop abilities necessary for this purpose. In Japan, abilities necessary to carry out work have been mostly developed through corporate education for many years. However, education by companies may not be enough to respond to unpredictable employment changes.

Education and training after employment other than those provided by the company have been promoted under the concept of recurrent education. According to a survey of working adults (men and women aged 25 to 50) conducted by MEXT in fiscal 2015, respondents most frequently cited the cost and scant time for leaning due to long working hours as challenges of recurrent education. To address these challenges, it is also important to effectively use various ICT tools.

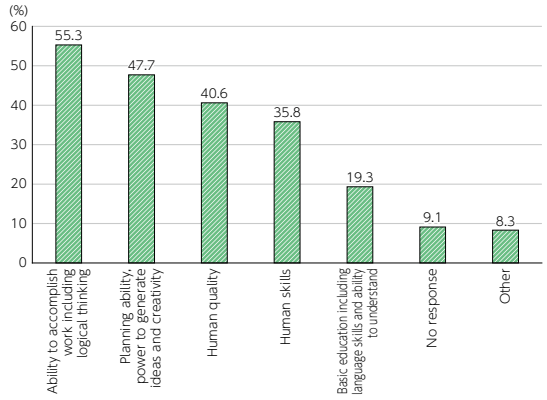
(3) ICT Useful for Recurrent Education

In recent years, various ICTs have been developed in the field of education as known with the coinage "EdTech" formed by Education and Technology.

EdTech provides participants with access to inexpensive education whenever convenient for them. In particular, improved transmission speed, development of various communication tools and inventions on user interfaces facilitate bi-directional communication between teachers and students beyond just listening to lectures. The learning effect is expected to further improve in the future.

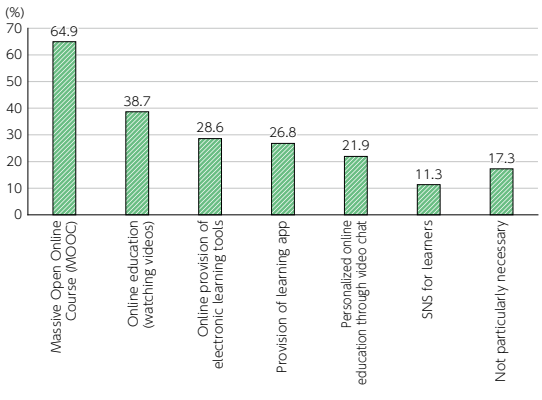
According to the survey, 82.7% of the respondents feeling the need for relearning or vocational training had intention to use ICT. As regards the ICT they want to use for this purpose, Massive Open Online Course (MOOC) was cited by 64.9% (Figure 4-5-3-2). Their intention to use MOOC is high.

Figure 4-5-3-1 Abilities companies expect from their employees in response to the spread of AI



(Source) "2017 Communications Usage Trend Survey" MIC (2018)

Figure 4-5-3-2 Intention to use ICT tools for relearning and vocational training (multiple answers)



(Source) "Survey Research on Realization of Inclusion through ICT" MIC (2018)