Survey on 2019 Individual/Household Digital Opportunity Survey in Taiwan Executive Summary

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Entrusted by: The National Development Council

Executed by: United Marketing Research Co., Ltd.

2019 Individual/Household Digital Opportunity Survey Summary

I. Purpose

Caring for the disadvantaged and implementing fair digital opportunities has always been a key focus of the government's policy in promoting Information and Communications Technology (ICT) infrastructure and government services. Since 2004, the government has been promoting “Project: Reducing Digital Divide (2005-2007)”, “Project: Creating Digital Opportunities”, “Project: Deepening Digital Care (2012-2015)”, “Project: Popularization of Digital Applications in Rural Area (2016-2019)” and other projects that are intended to use government and private resources to provide equal digital opportunities for all regions, communities and industries to share the benefits of high-quality cyber society.

In order to understand the situation of digital development in Taiwan, the National Development Council regularly conducts individual/household digital opportunity surveys every year, from the dimensions of “Enabling”, “Inclusion” and “Exclusion” to understand digital opportunities and crises arising from the information society as the basis for taking care of the disadvantaged and growing the digital care policy.

II. Methodology

1. Sample Frame

The “2019 Individual/Household Digital Opportunity Survey” is based on the survey of residential telephone numbers in Taiwan, Taipei City, New Taipei City, Taoyuan City, Taichung City, Tainan City, Kaohsiung City, Kinmen County and Lianjiang County. It’s targeting population of Taiwanese nationals aged 12 and above in the ordinary household.

2. Survey Indicator Framework

The “2019 Individual/Household Digital Opportunity Survey” is planned and conducted in accordance with the digital development indicator framework by The National Development Council's newly revised "Digital Opportunity Development Indicator Framework Adjustment Research".

Continuing with the precedent framework, the “2019 Individual/Household

Digital Opportunity Survey" still contains three dimensions: "Enabling", "Inclusion" and "Exclusion". The first section is to explore the use of information devices, use of information (access to information) and information literacy, with emphasis on information security and information screening capabilities. The second section is aimed to understand the situation and frequency of the Internet users applying information to various aspects of life in learning, social life, economy, politics, health improvement etc. The third section is about crises and infringements, to observe negative impacts of the information society. Specifically, the questionnaire consists of four parts: "Enabling", "Inclusion", "Exclusion" and basic information. The indicators are shown in Table 1.

In particular, as recommended by experts and scholars, this year, adding the questions to understand (1) forwarding or sharing unverified information under the dimension of information screening, (2) the contents of online self-learning under the dimension of learning activities, (3) behaviors of managing fans pages, communities, and groups under the dimension of social life, (4) whether Internet users obtain new job opportunities or increase income over the last one year, and the teleworking experience under the dimension of economic development and job opportunities.

Table 1 – 2019 Individual/Household Digital Opportunity Survey Indicators

Dimension	Sub-dimension	Indicator
Enabling	Access to information	Ownership of personal Internet device Years of using the Internet and the first device using to access the Internet Usage rate of wireless or mobile Internet
	Skills and literacy	Network access rights awareness Digital footprints awareness Ability of screening information Ability of identifying information Ability of programming
Inclusion	Learning activities	Information utilization and creation Enrolling online courses The contents of online self-learning
	Social life	Information acquisition Instant messaging and social media

Dimension	Sub-dimension	Indicator
		Online audio and video Online gaming VoIP calls Online content creation Managing and Cross-functional using of social media
	Economic development	Online reviews or price comparison Online shopping experience Innovative Internet business models Online payments Online sales experience Online or mobile banking experience Online job opportunities
	Civil participation	E-government initiative service participation experience E-government passive service experience E-government online application services Use of government open resources Engaging official online channels Expressing opinions on policy on the Internet Expressing different opinions from others on the Internet
	Health Improvement	Making appointments or checking the progress of appointments on the Internet Online medical records, history, and examination results Self-care for health
Exclusion	Personal crises	Internet anxiety Physiological deterioration Social skill deterioration Written expression deterioration
	Social crises	Internet freedom of speech Cyberbullying

Dimension	Sub-dimension	Indicator
	Infringements of privacy	Leakage of the personal data
	Impairment of rights	Internet fraud losses Malwares on Internet devices

3. Survey and Sampling

This survey uses a computer-assisted telephone interviewing system (CATI) for telephone survey. In order to make the sample structure reasonable, it was conducted after 6 pm from Monday to Sunday.

Sampling method is randomly selecting samples from residential telephone numbers in 22 counties and cities in Taiwan as the subgroup of population, and from these random samples, the system generates phone numbers by changing the last two digits randomly, to cover unlisted residential phone numbers.

The sample size for each county and city is based on the number of people aged 12 and over in each county and city published by the Department of Statistics of the Ministry of the Interior in July 2019, except Lianjiang County with 384 samples, each counties and cities determine the allocation of sample size by a minimum confidence interval of plus or minus 4 percent at 95 percent probability. The effective sample size for each county and city in the first stage is shown in Table 2.

Table 2 – Sample size and effective sample size in first stage of the survey

County and city	Population of 12 years and above	Estimated error	Allocation of sample size	Effective sample size
Total	21,188,089	±0.9%	12,984	13,015
New Taipei City	3,619,465	±4.0%	600	602
Taipei City	2,360,821	±4.0%	600	602
Taoyuan City	1,968,895	±4.0%	600	602
Taichung City	2,488,840	±4.0%	600	603
Tainan City	1,700,088	±4.0%	600	601
Kaohsiung City	2,512,871	±4.0%	600	603
Yilan County	412,354	±4.0%	600	601
Hsinchu County	487,541	±4.0%	600	601
Miaoli County	493,727	±4.0%	600	603
Changhua County	1,145,273	±4.0%	600	601
Nantou County	454,353	±4.0%	600	602
Yunlin County	624,073	±4.0%	600	600
Chiayi County	469,228	±4.0%	600	600
Pingtung County	754,615	±4.0%	600	600
Penghu County	96,004	±4.0%	600	600
Hualien County	296,251	±4.0%	600	601
Taitung County	198,106	±4.0%	600	601
Keelung City	339,683	±4.0%	600	602
Hsinchu City	385,275	±4.0%	600	601
Chiayi City	239,965	±4.0%	600	602
Jinmen County	128,861	±4.0%	600	601
Lianjiang County	11,800	±5.0%	384	386

Note: The population data source is from the Department of Statistics of the Ministry of the Interior.

4. Dates of interview, and contacts

The telephone survey was conducted in the evenings during July 2, 2019 to August 30, 2019. In this survey, a total of 229,500 calls were dialed, and the actual number of calls was 137,766 (the difference is for redials and rescheduling calls). Excluding the non-human factors (fax machine, non-residential telephone, telephone recording, telephone failure, empty number, suspended use, and no qualified respondents), the total effective sample size was 13,015, the response rate was 60.5%, and the refusal rate was 39.5%.

5. Data weighting

In order to infer the views of all the people over 12 years old in Taiwan, the survey samples are weighted according to the gender and age structure of the population aged 12 and above in each city and county published in July 2018 by the Ministry of the Interior. As for the inference of the overall digital development of the country, the second stage weighting is based on the proportion of the population over 12 years old in each city over that in the whole country, and the proportion over 12 years old in digital development areas over that in the whole country as the second stage of weighting to improve the rationality of statistical estimation.

6. Area definition

This survey compares the degree of digital development in different geographical areas through various classifications. The most important thing is to observe whether the digital development gap between each digital development area level 1 to 5 converges or widens.

This classification is based on the research results of the “Digital Development Classification Research Report” in 2011 by the National Development Council (formerly the Research, Development and Evaluation Commission), and also categorized by the human resources structure, social economy, education and culture development, traffic dynamics development, living environment development, and information infrastructure in each town and city, including the 6 dimensions and 25 indicators. Among all cities, 32 towns and cities are in Level 1 digital development area, 93 are in Level 2, 127 are in Level 3, 49 are in Level 4 and 67 are in Level 5, respectively, with the highest level of digital development in Level 1 areas.

III. Key indicators

Table 3 – Statistics of Key Indicators in Individual/Household Digital Opportunity Survey

Indicator	2018	2019	Comparison of 2018 and 2019
Personal Internet access rate (A)	86.5%	86.2%	The rate is similar
Mobile Internet access rate (A)	84.9%	84.4%	The rate is similar
Home Internet access rate (A)	84.9%	90.4%	Increase by 5.5 percentage points and grow by 6.5%
Instant messaging application (B)	96.8%	95.9%	The rate is similar
Online financial applications (B)	32.9%	42.5%	Increase by 9.6 percentage points and grow by 29.2%
E-government initiative services (B)	60.0%	66.7%	Increase by 6.7 percentage points and grow by 11.2%

Note: (A) The respondents are over 12 years old. (B) The respondents are Internet users over 12 years old.

IV. Summary Report

(I) Overall Digital Opportunity

1. Enabling

“Enabling” is the first dimension of digital opportunity indicator framework. It includes two sub-dimensions: “access to information” and “skills and literacy”. People must have skills and literacy to use information and have opportunities to use an information device to enter the information society, and then even talk about the further opportunity creation and risk-taking.

The first sub-dimensions of “Enabling” is “access to information”. The results of 2019 survey showed that individual Internet usage rate of people aged 12 and above in Taiwan was 86.2%, down 0.3 percentage points compared to last year's (2018) survey. From the long-term trend, the Internet usage rate has increased from 62.7% in 2005 to 86% in the last two years, increasing by more than 23 percentage points over the past 13 years.

About the mobile Internet usage rate in 2019, there was 97.9% of Internet users have used mobile or wireless Internet. Based on the population over 12 years old, there was 85 people in every 100 people have used mobile Internet, with no significant change compared to the survey in 2018.

As more and more people rely only on mobile phones to access the Internet, the study has included connecting to the Internet only via mobile phones since 2017. This year's survey showed that the Internet rate in Taiwan exceeded 90% for the first time (90.4%), an increase of 5.5 percentage points over last year (2018).

In terms of the years of using the Internet, 4.2% of Internet users started to use the Internet in last two years, accounting for 3.6% of population aged over 12 years old, showing that the Internet rate in Taiwan increased from 82.3% to 86.2% in these two years. 9.5% of Internet users have used the Internet for 3 to 6 years, 6.0% have used for 7 to 9 years, 11.6% have used for 10 to 14 years, and 30.3% of users have used the Internet for over 15 years. In contrast, there was 38.3% users were not sure when to start to use the Internet, but they knew it was more then 2 years.

For the device of connecting to the Internet for the first time, desktop computers accounted for the majority (81.0%), followed by smartphones (14.0%), laptops (2.2%),

tablets (2.1%) and TV (0.1%). From the stage of Internet access, it can be found 97.6% of the Internet users used desktop computers as the first device before 2004, and the rate dropped gradually over years as technology development. 43.8% of the late-joined users in 2012 to 2016 accessed the Internet first time via mobile phones, exceeded the desktop computers (41.3%). Newly-joined users using mobile as the first device accessing the Internet after 2017 reached to 58.4%, with 27 percentage points higher than desktop computers.

As for accessibility of information devices, under the condition of multiple answers, there was a slight increase in popularizing rate for all types of devices for those aged over 12 years old compared to 2018. The average number of devices for the Internet users was 2.66 in 2017, 3.12 in 2018, and increased to 3.43 in 2019. [Figure 1]

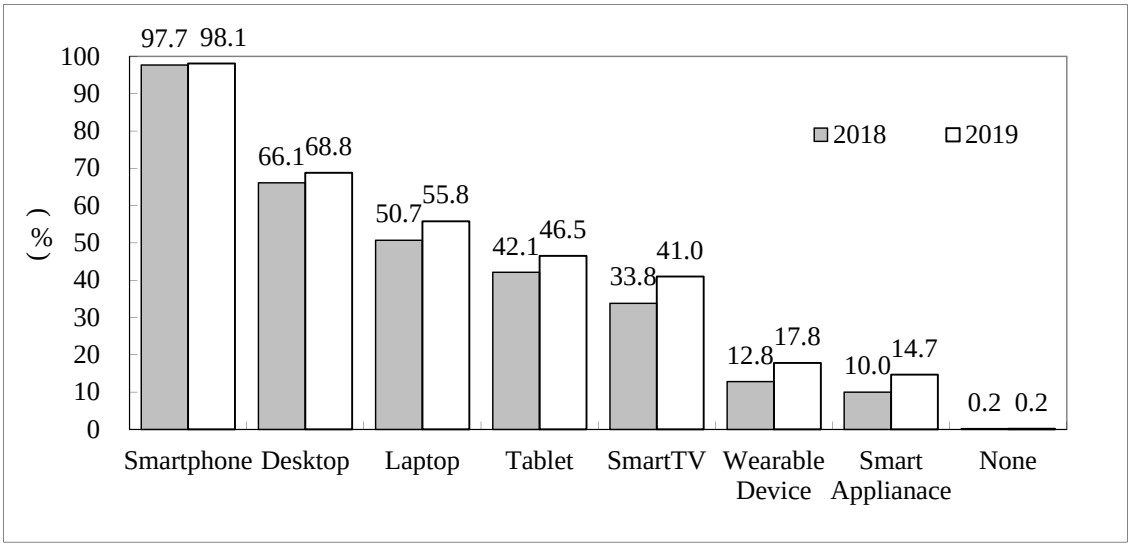

Figure 1 – Internet users' ownership of information device

From the perspective of the duration of Internet usage, the percentage of mostly using smartphones gradually increased from 66.7% in 2016 to 77.4% in 2019, and that of mostly using desktop computers gradually decreased from 22.4% in 2016 to 14.3% in 2019, meaning that there was the usage shift of information device.

From the view of "skills and literacy", the abilities to screen information and identify the value of information, although there was no significant change in the ability to collect information (travel, food and news collections) for the Internet users. The ratings of these three indicators ranged from 6.5 to 7.0. In contrast, those who rated themselves as having clear digital footprint concepts (78.0%) and aware of network access (55.9%) slightly increased by 2 to 4 percentage points from 2018. The

percentage of those who have learned programming increased from 23.9% to 26.1%. [Figure 2]

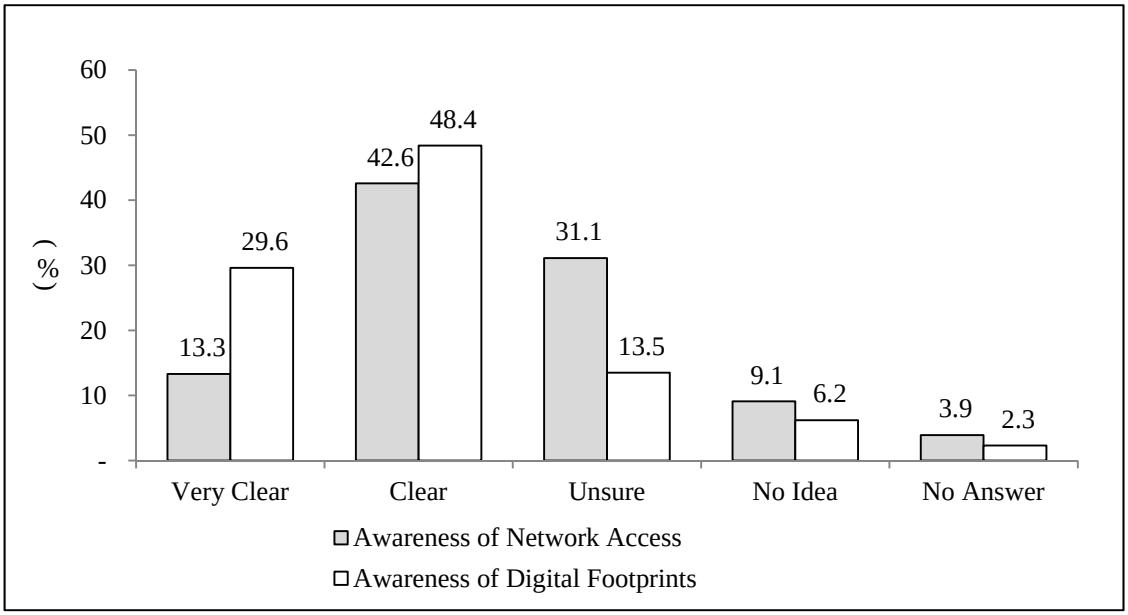

Figure 2 – Internet users' network security awareness

More noteworthy was that the survey showed that 26.8% of the internet user who aged 12 and above admitted that they forwarded unverified information or news, and 72.8% have never done so. Only 54.5% of users have verified when they received unverified information or news. The rate of never verified has increased from 34.8% in 2018 to 44.9% in 2019, meaning that the situation has worsened. [Figure 3]

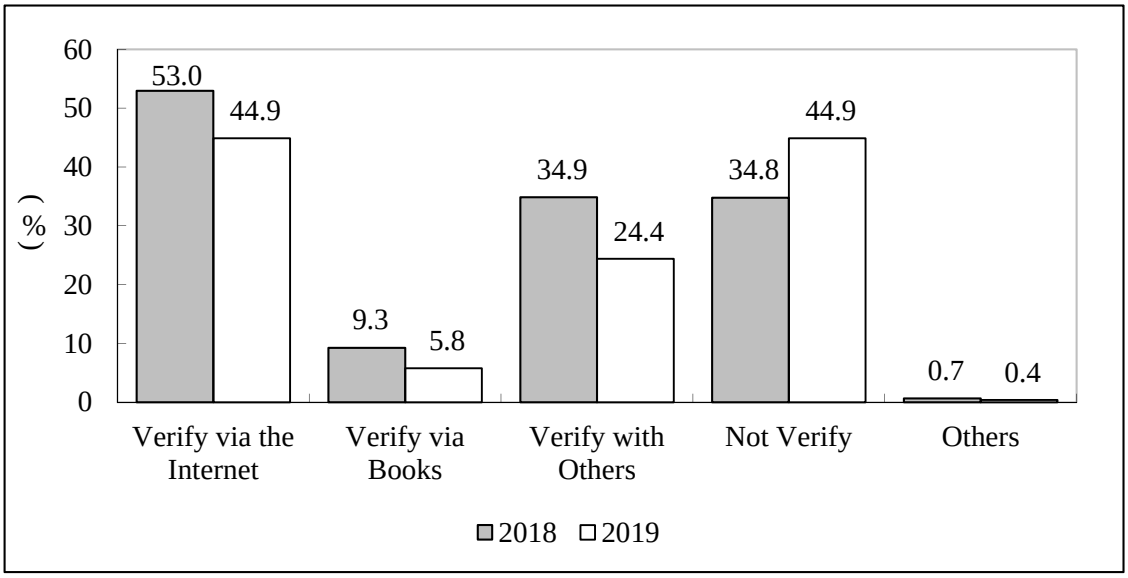

Figure 3 – The situations of verifying information on the Internet

2. Inclusion

“Inclusion” is the second dimension in digital opportunity indicator framework. It is mainly to observe Internet users' life participation by Internet applications in the last year, such as learning, social life, economy, civil participation and health improvement to understand the possible influence of using ICT on quality of life.

“Learning Activities” focuses on understanding the individual's interactive behaviors in one-way or two-way education learning through ICT, using “new skills for online learning” and “participation in online courses” as two indicators.

The survey results showed that the level of requirements for learning new skills through the Internet was not high. A total of 11.7% of Internet users searched for information or videos on the Internet every day to learn new skills as the purposes of learning (6.5% several times a day, and 5.4% once a day). Extended to the frequencies of other usage, a total of 51.0% of Internet users have participated in online self-learning. [Figure 4]

In terms of participation in the online courses, a total of 2.2% of the Internet users participated at least once a day, 5.7% once a week, 5.3% on average once a month, 5.1% less than monthly, and the total participation rate decreased to 18.4% from 22.3% in 2018. [Figure 4]

From online self-learning contents, 58.0% of users obtained life and leisure information mostly, 28.9% of them focused on improving professional skills by self-study, 13.0% were took both halves. Majority of online courses or quizzes were taken on domestic platform, and 64.8 % were taken on the domestic learning platform only.

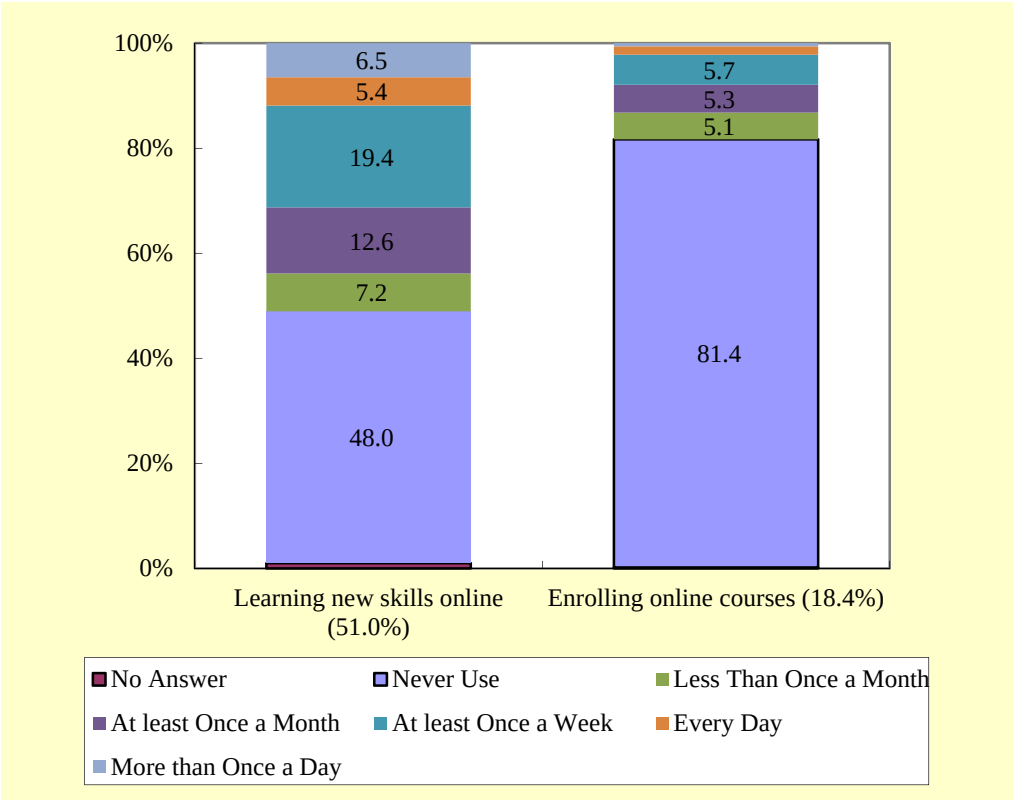

Figure 4 – The participation of the online learning activities in the past year

"Social Life Participation" focuses on understanding the individual's one-way social engagement or two-way interaction through ICT. Specific survey indicators include one-way information acquisition, audio-visual entertainment, as well as two-way interactive instant messaging, VoIP calls (Voice over Internet Protocol calls), online content creation and online games.

The survey results showed that the Internet users were keen to engage in one-way and two-way online social life. The highest participation rate in last year was instant messaging and social media (95.9%), followed by Internet phone (89.8%), online audio and video (87.1%), and new information acquisition (82.8%). 50.8% of the Internet users in the past year have posted articles, photos or videos on the Internet to participated in online content creation, while 47.5% have participated in mobile or online games, all the usages of applications slightly increased from 2018.

In terms of the frequency of usage, instant messaging had the highest usage rate and it was also the most frequently used item among the all social life indicators. 77.1% of the Internet users used it several times a day, and 11.9% used it at least once a day, for a total daily usage rate at 89.0%, followed by the use of watching videos or listening to music on mobile phones or computers (54.7%), higher than making

Internet calls every day (46.2%), playing online games every day (34.2) and getting new information online every day (31.9%). The frequency of publishing articles was relatively low in social life indicators, most users posting once a week (17.7%), and followed by once a month (16.1%). [Figure 5]

Further to observe the patterns of using the instant messaging or social media, the survey found that 81.9% of users watching the news provided by social platforms, 56.5% watching the live stream, 42.7% shopping on social community platforms, and 3.5% of users became a live broadcaster. Compared with 2018, all cross-functional using of social media increased 5 to 7 percentage points, except live broadcasters remaining the same.

From managing social media perspective, more than 80% of instant message or social media users did not manage their own social communities, only 10 in every hundred people managed groups, 6 had their fan page, and 5 managed communities.

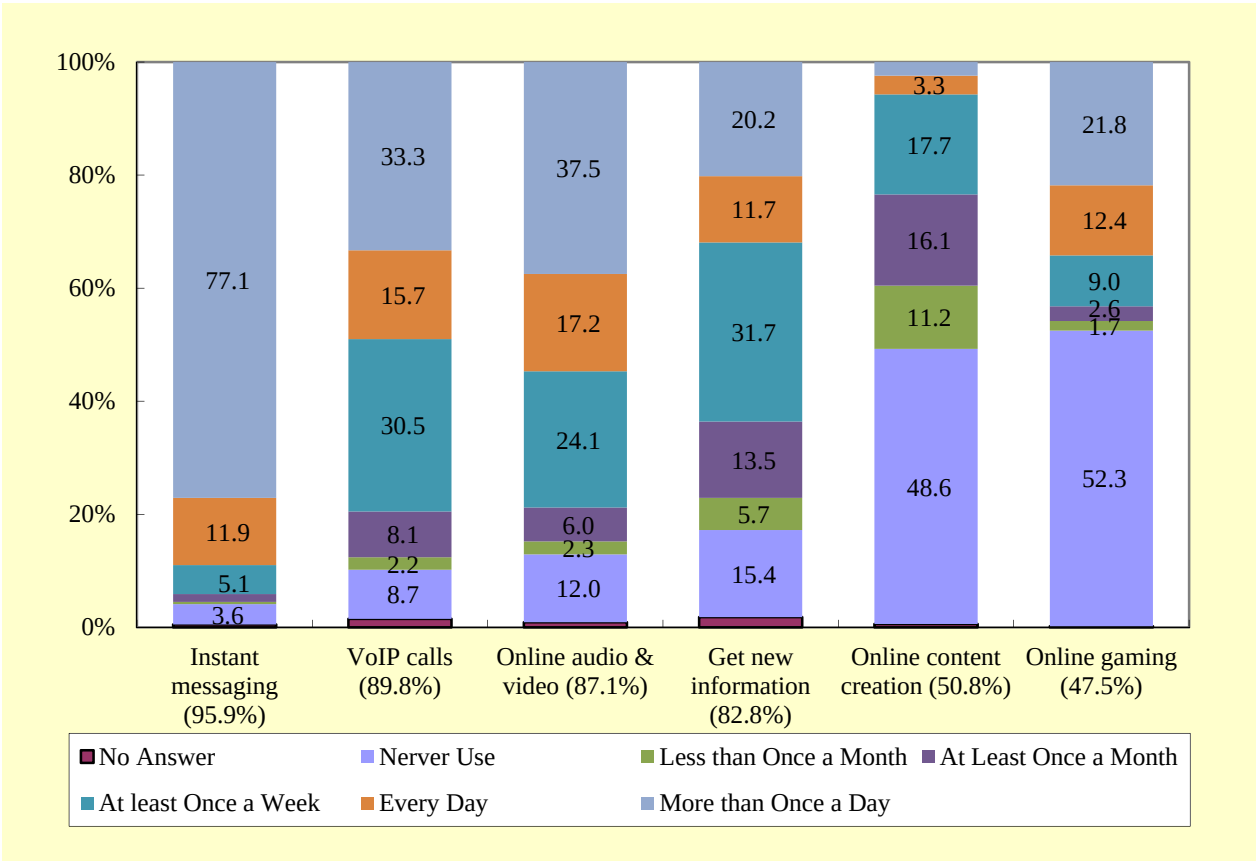

Figure 5 – The participation of the social activities in the past year

"Economic Activity Participation" focuses on understanding how individuals use ICT for online buying, selling, investment and employment/entrepreneurship. Specific

six survey indicators include product price comparison, online shopping, online innovation services, online banking, online sales and job opportunities.

The survey results showed that 2019 was a very active year in the online economy, online shopping rate exceeded 60% (64.2%) for the first time, an increase of 5.7 percentage points over 2018. The usage of online banking, nearly no changed over years, increased from 32.9% in 2018 to 42.6% in 2019, which became the fastest growing digital opportunity indicator this year. 18.4% of users used innovative services such as Airbnb and Uber in the last year, an increase of 7.3 percentage points. In addition, 10.5% of Internet users stated that they used online resources to get a new job or increased their income, and 11.2% had teleworking experience.

In terms of the frequency of use, a total of 9.8% of the Internet users checked the prices of products they interested in every day, 26.7% once a week, which is the most frequently used economic activity; the Internet users purchased products online mostly once a month (30.6%); a total of 18.9% of the Internet users were frequent users of online banking (5.8% once a day, and 13.1% once a week). The frequent users of online innovation services or online sales were very few, accounting for less than 0.6%. [Figure 6]

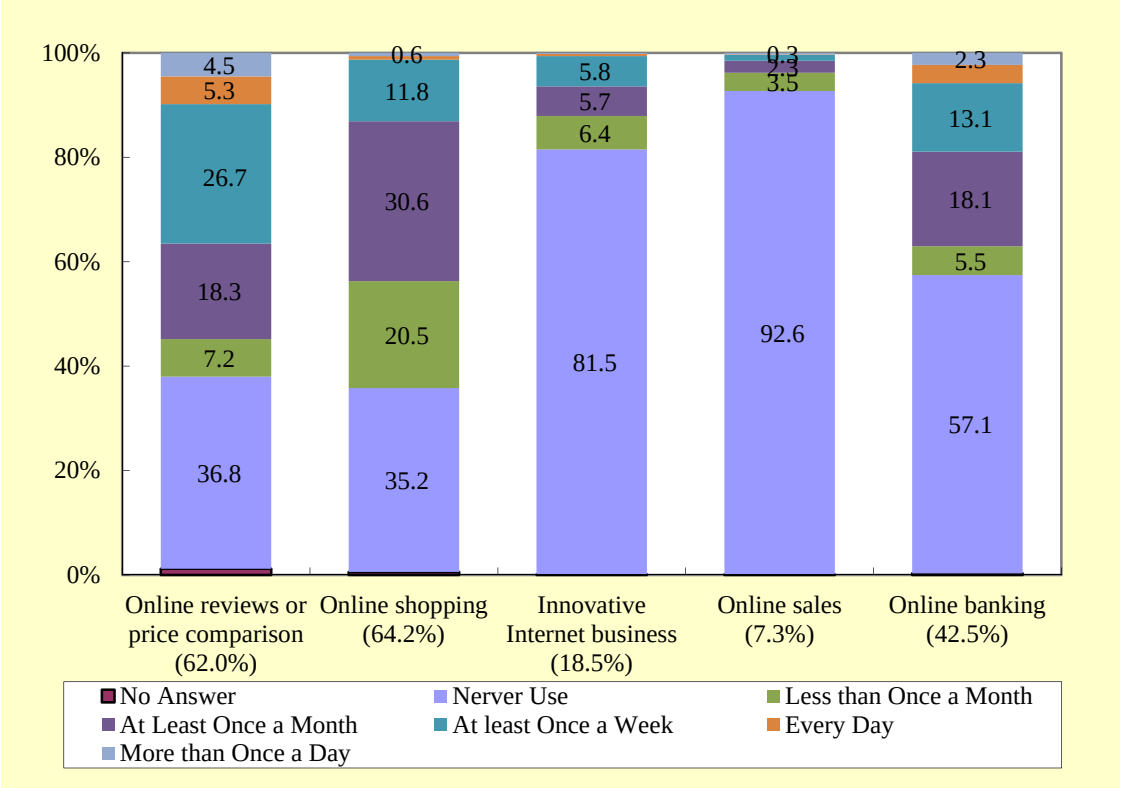

Figure 6 – The participation of economics activities in the past year

“Civil Participation” explores the use of e-government resources and engaging in public issues through ICT. There are three indicators of use of e-government resources including receiving government information, accessing government open resources online, and using government online application services. Online civil participation includes expressing opinions on public issues through official channels and unofficial channels.

In terms of the use of e-government resources, government initiative Internet-based information providing in the past year increased by nearly 7 percentage points over 2018, and 66.8% of Internet users received disaster prevention alerts or electronic reports from the government, which was higher than that of other e-government services. The percentage of searching government information increased from 32.7% to 37.3%. In addition, 34.0% of users used online application services such as tax returns, an increase of 6.2 percentage points over 2018.

In terms of frequency of use, the percentage of Internet users received notifications from government in the past year was 66%, but the frequency was relatively very low. It only reaches 5.7% of Internet users every week, which was lower than the percentage of users browsed government’s websites to search information they need (9.5%). [Figure 7]

In the online civil participation, the percentage of Internet users expressing their opinions on public policy on the Internet was still low, but it was more active in unofficial channels compared to 2018. There was 13.0% of Internet users stated that they expressed their opinions via unofficial channels in the past year, an increase of 5.1 percentage points over 2018. 10.7% of users expressed different opinions from others, an increase of 2.1 percentage points over 2018 as well. However, the percentage of voicing in official channels remained 5.6%, which was similar to 2018. . [Figure 8]

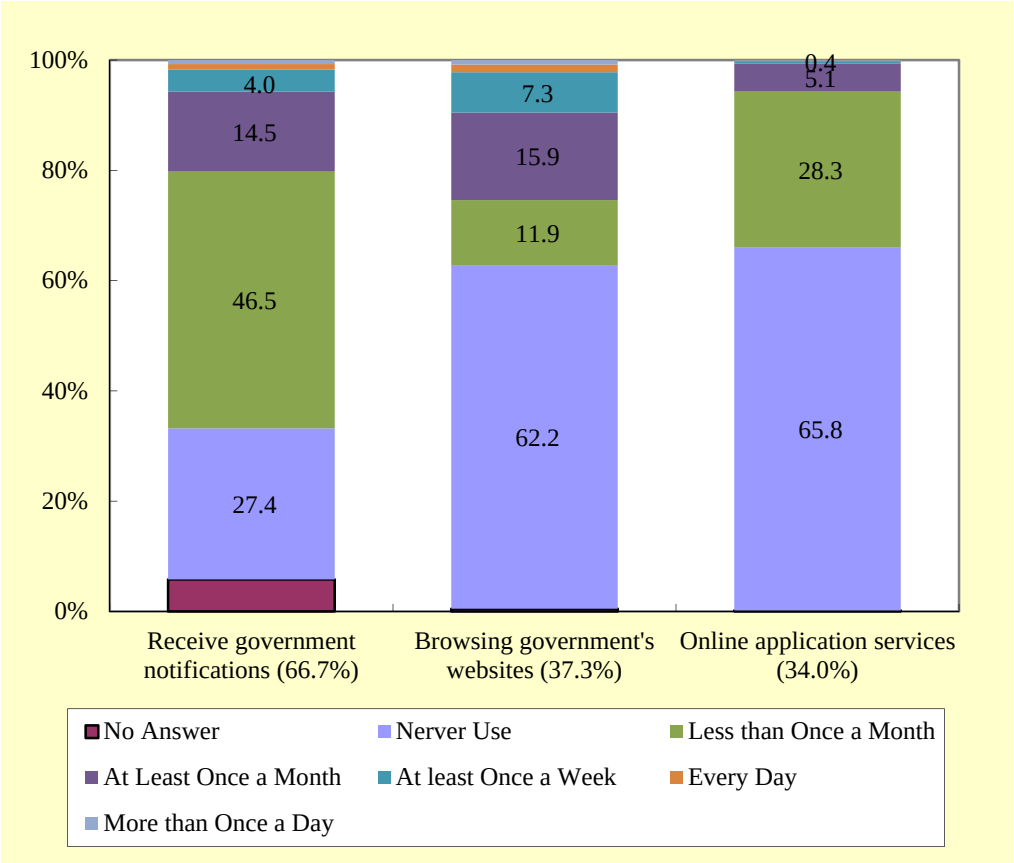

Figure 7 – The participation of using e-government resources in the past year

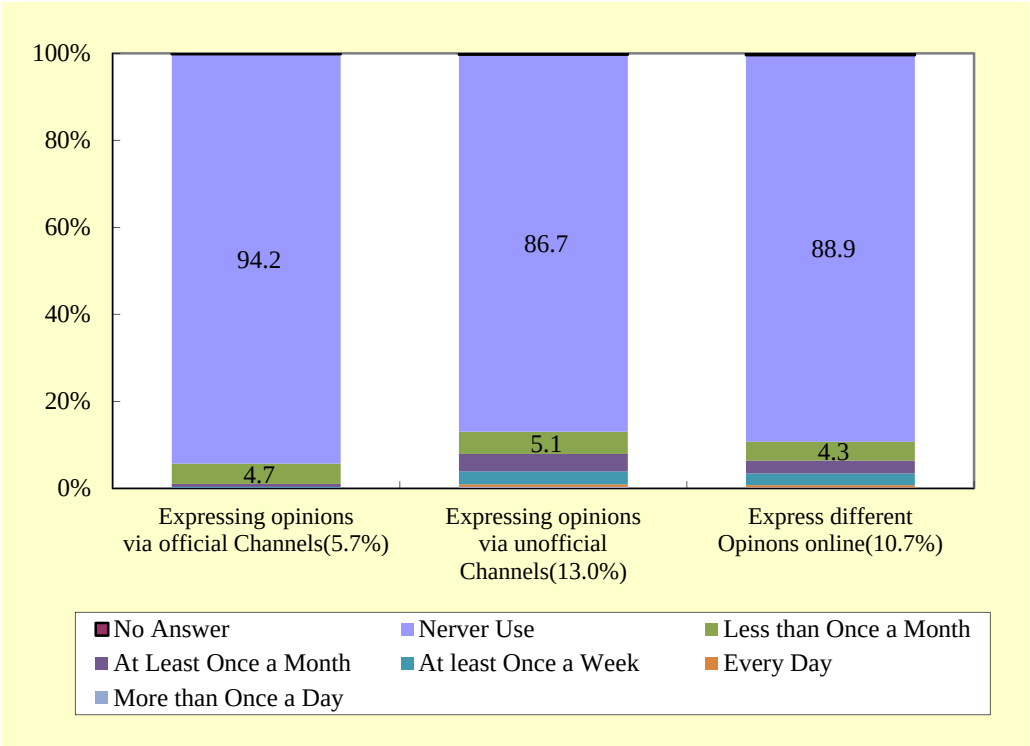

Figure 8 – The participation of public issues in the past year

"Participation in health improvement" focuses on the behaviors of individuals who received relevant medical resources or medical cares through ICT. Specific indicators include "making appointments on the Internet or checking the progress of appointments", "checking appointments history, medical records or examination results" and "using mobile health applications or wearing a health bracelet for self-care".

Survey showed that 50.3% of Internet users made a doctor's appointment or checked the progress of appointments on the Internet over the past year, 18.4% used mobile applications or health bracelets for self-care, while 10.9% checked appointment history, medical records or examination results on the Internet.

In terms of the frequency of use, mobile health applications for self-care had the highest frequency of use, with 9.6% of users using and viewing on a daily basis. The frequency of making an appointment online or checking progress is related to the frequency of seeing a doctor, with 13.5% once a month, and 35.5% once over a month. [Figure 9]

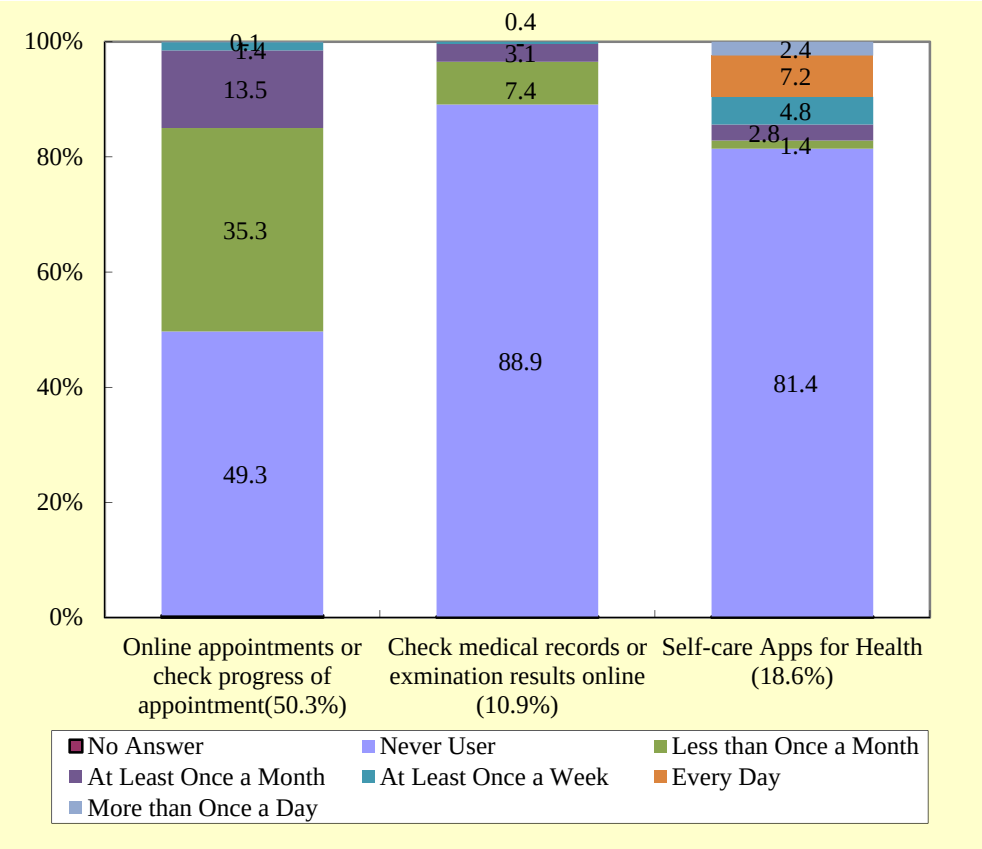

Figure 9 – The participation of health improvement in the past year

3. Exclusion

“Exclusion” is the third dimension of digital opportunity survey indicator framework. It mainly discusses whether using ICT caused a crisis or an infringement of rights. Among them, the personal crises include four indicators: Internet anxiety, social skill, physiological conditions and written expression ability. The social crisis refers to the Internet freedom of speech and cyberbullying issues arising from anonymity. The infringement of rights can be divided into infringement of privacy and impairment of rights. The former discusses whether using the Internet to cause leakage of the personal data or account stolen. The latter explores the situation in which individuals experienced frauds on the Internet or whose Internet device got a virus.

Regarding personal crises, 57.6% of Internet users self-rated themselves not feeling anxious if going offline for more than a certain period of time, increasing from 52.0% in 2018. From the impacts of using the Internet on physiological conditions, physical social skill, and written expression ability, there were 31.0%, 12.0% and 17.0% of users rated themselves negatively affected respectively. [Figure 10]

With regard to social crises, Internet trolls and cyberbullying arise from high degree of anonymity, which is an issue that the society needs to deal with. According to the survey, 81.2% of the Internet users thought their speeches in the Internet world were similar to that in the real world, combined the figures of those who were unwilling to speak on the Internet, while 4.0% of Internet users admitted that their online speech was more intense than that in the real world. On the other hand, 4.1% of Internet users experienced cyberbullying in the past year.

In terms of impairment of rights, 9.3% of Internet users experienced leakage of personal data in the last year, similar to the results in 2018. But on the other hand, 2.9% of users experienced online frauds and 10.3% experienced malwares on computers or mobiles, both of these two indicators had a decrease over last year, showing that the situations is getting slighter better. [Figure 11]

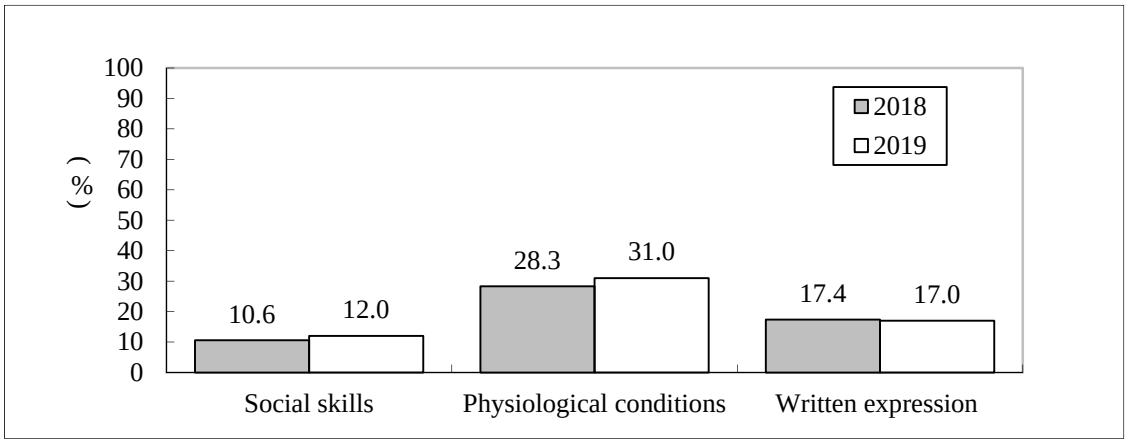

Figure 10 – The Internet users self-rated abilities deterioration due to the use of the Internet

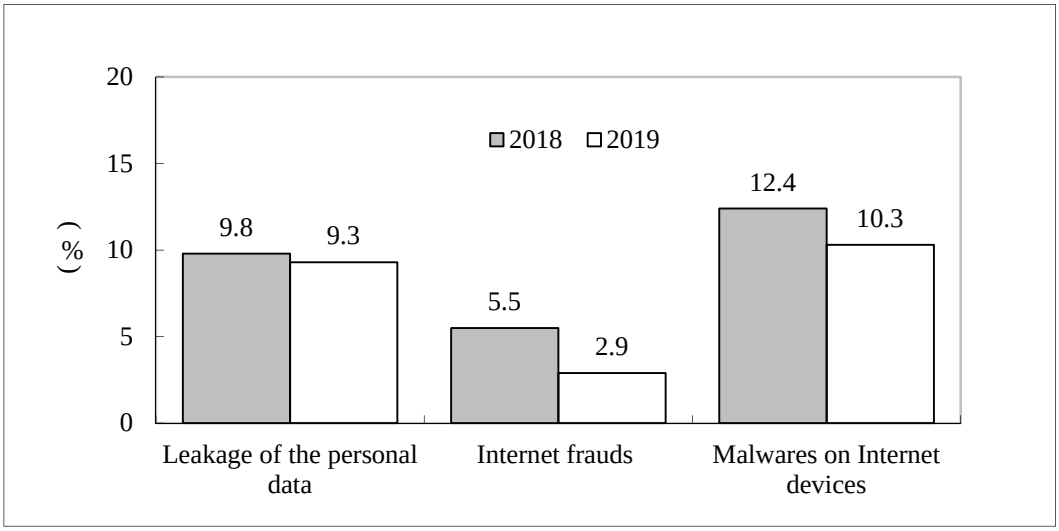

Figure 11 – The Impairment of rights due to the use of the Internet

(II) Digital Opportunities in Segments

1. Enabling

(1) Gender Divide in Digital Opportunities

Gender is an important variable used by scholars to explain the digital opportunity gap. The 2019 survey showed that the female's Internet access rate was 4.8 percentage points behind male's, and percentage of using mobile phone and mobile Internet were also slightly behind. After entering the online world, both genders had strengths in different areas. Females were more confident in gathering food information. There was

no significant difference between both genders in the number of online devices they owned, awareness of digital footprints and self-rated abilities of gathering new information. In contrast, the female's ratings of awareness of access rights, gathering travel information, programming learning experiences, and not posting or sharing unverified information were less than male's. [Table 4]

Table 4 – Gender Differences and Similarities in "Enabling"

Sub-dimension	Indicator	**Overall**	Male	Female
Access to information	Internet access rate	86.2%	88.6%	83.8%
	Mobile phone use rate	91.3%	93.7%	89.0%
	Wireless or mobile Internet use rate	84.4%	86.7%	82.0%
	Personal Internet device ownership (items)	3.43	3.42	3.44
Skills and literacy	Network access rights awareness (clear %)	55.9%	58.9%	52.8%
	Digital footprints awareness (clear %)	78.0%	78.9%	77.1%
	Self-rated ability for collecting travel information (points)	6.5	6.6	6.4
	Self-rated ability for collecting food information (points)	6.9	6.8	7.1
	Self-rated ability for searching a certain topic of new information	7.0	7.0	7.0
	Not forwarding or sharing unverified information	72.8%	75.2%	70.3%
	Verifying Internet news or news	54.5%	53.3%	55.8%
	Programming learning experience	26.1%	32.0%	20.0%

Note: ☐ Indicates higher than or equal to the overall average; ▒ Indicates lower than the overall average.

(2) Generation Divide in Digital Opportunities

The digital opportunities gap between generations is very obvious. Apart from the access to information, those aged 65 and above are significantly lagging behind (43.5% Internet access rate and only 63.2% of them used mobile phones in nearly three months). For those internet users aged 60 and above entered the Internet world, their ratings for the number of Internet devices they owned, awareness of network security,

the abilities of information screening and identifying were significantly lower than others. As for the programming learning experience for Internet users, those aged between 15 to 29 had better performance than other generations, which was about 40%. [Table 5]

Table 5 – Generation Differences and Similarities in " Enabling"

Sub-dimension	Indicator	Ages 12-14	Ages 15-19	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50-59	Ages 60-64	Ages 65and above	**Overall**
Access to information	Internet access rate (%)	100.0	99.2	99.7	99.0	97.7	89.3	74.6	43.5	86.2%
	Mobile phone use rate (%)	97.7	97.9	99.2	99.3	97.9	94.7	89.9	63.2	91.3%
	Wireless or mobile Internet use rate (%)	93.4	98.2	99.2	98.6	96.9	86.9	70.7	39.7	84.4%
	Personal Internet device ownership (items)	2.88	3.11	3.55	3.74	3.71	3.28	3.08	2.84	3.43
Skills and literacy	Network access rights awareness (clear %)	55.6	74.9	77.3	64.3	53.9	40.5	35.6	29.6	55.9%
	Digital footprints awareness (clear %)	74.0	94.6	90.9	88.2	79.5	65.6	60.3	52.0	78.0%
	Self-rated ability for collecting travel information (points)	5.5	6.7	7.4	7.1	6.7	5.6	5.0	4.8	6.5 分
	Self-rated ability for collecting food information (points)	6.0	7.1	7.7	7.5	7.2	6.4	6.0	5.5	6.9 分
	Self-rated ability for searching a certain topic of new information (%)	6.2	7.2	7.6	7.6	7.3	6.4	6.0	5.7	7.0 分
	Not forwarding or sharing unverified information (%)	85.2	74.2	71.2	69.7	73.7	73.8	76.3	69.7	72.8%
	Verifying Internet news or news (%)	55.6	59.9	59.2	65.8	56.6	46.2	39.3	38.0	54.5%
	Programming learning experience (%)	33.9	42.2	39.1	26.4	24.4	18.5	13.5	12.1	26.1%

Note: ☐ Indicates higher than or equal to the overall average; ☐ Indicates lower than the overall average.

2. Inclusion

(1) Gender Divide in Digital Opportunities

From the perspectives of participation in the five areas of learning, social life, economy, civil participation and health improvement, Tables 6 and 7 showed that female Internet users were more active than male counterparts in posting in non-public domains, enrolling online courses, reviewing products, doing online shopping, making a doctor's appointment online, and health improvement. Male Internet users had a higher interest in online gaming and higher willingness to express personal opinions and even different opinions from others on policies in public sphere.

Table 6 – Gender Differences and Similarities in "Inclusion"

Sub-dimension	Indicator	Every day		Last year		**Overall**
		Male	Female	Male	Female	
Learning	Information utilization and creation (%)	12.4	11.5	49.7	52.3	51.0
	Enrolling online courses (%)	2.0	2.4	16.4	20.3	18.4
Society life	Information acquisition (%)	30.8	33.1	82.1	83.6	82.8
	Instant messaging and social media (%)	87.5	90.6	95.6	96.2	95.9
	Online audio and video (%)	56.7	52.5	87.4	86.7	87.1
	Online gaming (%)	39.1	29.1	51.4	43.3	47.5
	VoIP calls (%)	51.9	46.1	89.0	90.5	89.8
	Online content creation (%)	6.4	5.0	47.1	54.5	50.8
	Cross-functional using of social media (items)			1.70	1.85	1.77
Economic activity	Online reviews or price comparison (%)	9.8	9.9	60.0	64.1	62.0
	Online shopping experience (weekly) (%)	9.4	16.9	59.1	69.6	64.2
	Internet innovative business model (weekly) (%)	6.6	6.0	16.9	19.9	18.4
	Online sales experience (weekly) (%)	1.0	2.0	7.1	7.7	7.3
	Internet or mobile banking experience (%)	6.6	5.2	41.5	43.8	42.6

Note: ☐ Indicates higher than or equal to the overall average; ▒ Indicates lower than the overall average.

Table 7 – Gender Differences and Similarities in " Inclusion "

Unit: %

Sub-dimension	Indicator	Per month		Last year		**Overall**
		Male	Female	Male	Female	
Civil participate	E-government initiative	22.1	18.5	69.6	63.9	66.8
	E-government passive service	26.6	24.1	37.6	36.9	37.3
	Electronic government service application	6.6	4.9	33.8	34.3	34.0
	Engaging official online channels	1.2	0.7	6.2	5.0	5.6
	Expressing opinions on policy on the Internet	9.5	6.2	14.4	11.6	13.0
	Expressing different opinions from others on the Internet	8.6	4.2	13.6	7.8	10.7
Health Improvement	Making appointments online checking the progress of appointments on the Internet	13.5	16.5	44.9	55.9	50.3
	Checking appointments history, medical records, and examination results	3.4	3.7	10.3	11.6	10.9
	Self-care for health (every day)	15.0	19.4	15.7	21.4	18.4

Note: ☐ Indicates higher than or equal to the overall average; ☐ Indicates lower than the overall average.

(2) Generation Divide in Digital Opportunities

Compared with different generations of Internet users engaging online activities "everyday", it showed that 20 to 39 years old users were most active in all applications. Those aged 12 to 19 were more active in learning and entertainments (online audios and videos, and online games), while those aged 40 to 49 were more active in information acquirement, social communications, online shopping, and online finance. [Table 8]

Table 8 – Generation Differences and Similarities in “Inclusion” (at least once a day)

Unit: %

Sub-dimension	Indicator	Ages 12-14	Ages 15-19	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50-59	Ages 60-64	Ages 65and above	**Overall**
Learning	Information utilization and creation	9.9	17.8	15.4	14.2	11.1	9.4	7.3	6.1	11.9
	Enrolling online courses	5.2	3.3	4.4	2.7	1.0	1.1	0.7	0.4	2.2
Social life	Information acquisition	23.7	39.3	39.1	42.5	33.9	23.9	16.4	14.3	31.9
	Instant messaging and social media	66.5	91.4	95.5	93.8	91.5	86.5	79.0	79.4	89.0
	Online audio and video	67.2	86.0	79.8	60.2	48.0	37.1	31.9	29.6	54.7
	Online gaming	65.2	62.5	50.4	37.9	30.4	19.8	15.4	10.3	34.2
	VoIP calls	18.1	35.9	53.1	59.4	52.4	49.9	42.4	35.3	49.0
	Online content creation	1.5	3.8	8.8	8.6	5.2	4.0	2.3	3.8	5.7
Economic development	Online reviews or price comparison	3.4	7.8	16.1	15.0	9.3	6.4	3.2	3.1	9.8
	Online shopping experience (every week)	4.0	3.7	16.7	22.5	16.1	9.8	4.1	2.8	13.1
	Innovative Internet business models (every week)	4.2	8.0	13.7	9.5	4.4	2.3	0.8	0.6	6.4
	Online sales experience (every week)	0.0	1.0	2.4	2.8	1.3	1.2	0.1	0.6	1.5
	Online or mobile banking experience	0.0	0.2	7.3	8.0	6.2	5.3	6.9	4.9	5.8

Note: ☐ Indicates higher than or equal to the overall average; ☐ Indicates lower than the overall average.

In comparison with the “monthly” participation of different generations of Internet users in various applications, receiving notifications from government was the highest reach rate among the Internet users aged 15-19. Regarding actively searching information, using online applications services and open resources, those aged 20-49 had the highest rates. As for the online engagements, expressing opinions via unofficial channels, those aged 15-39 were most active. [Table 9]

Table 9 – Generation Differences and Similarities in “Inclusion”
(at least once a month)

Unit: %

Sub-dimension	Indicator	Ages 12-14	Ages 15-19	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50-59	Ages 60-64	Ages 65and above	**Overall**
Civil participate	E-government initiative	17.4	29.3	22.5	21.9	17.6	19.1	17.2	17..5	20.2
	E-government passive service	11.4	17.7	31.8	35.0	27.9	19.6	18.3	13.2	25.4
	Electronic government service application	0.5	3.8	6.5	8.1	6.9	5.4	2.3	2.8	5.7
	Engaging official online channels	0.2	0.2	1.0	1.9	0.5	1.0	1.1	0.7	1.0
	Policy opinions on the Internet	0.2	0.2	1.0	1.9	0.5	1.0	1.1	0.7	1.0
	Comments on the Internet	4.1	13.8	11.3	9.4	6.3	5.8	4.3	5.0	7.9
	E-government initiative	4.1	6.9	7.5	7.8	6.6	5.3	5.3	4.2	6.4
Health Improvement	Making appointments online checking the progress of appointments on the Internet	7.9	9.6	13.9	18.4	16.6	16.1	11.1	13.7	15.0
	Checking appointments history, medical records, and examination results	0.5	4.4	4.2	4.5	4.1	2.6	2.3	2.0	3.5
	Self-care for health (every day)	12.8	8.0	8.7	10.4	10.0	9.2	8.6	10.0	9.6

Note: ☐ Indicates higher than or equal to the overall average; ☐ Indicates lower than the overall average.

Extended the duration of using the applications throughout the year, 15 to 29

years old Internet users were more enthusiastic in learning. In terms of social life and economic activities, except that there was no significant differences in the use of social media among generations, aged 12 to 19 was the most passionate about online games (the usage rate was over 85%), and aged 20 to 39 has the highest ratings in the other applications. [Table 10]

In terms of civil participation and health improvement, e-government services were used by the Internet users aged 30 to 49 most. As for expressing opinions on policy in unofficial channels, those aged 15 to 29 were most active, while aged 12 to 49 had higher rates in self-care than those over 50 years old. [Table 10]

Table 10 – Gender Differences and Similarities in "Inclusion" (the use rate of last year)

Unit: %

Sub-dimension	Indicator	Ages 12-14	Ages 15-19	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50-59	Ages 60-64	Ages 65and above	Overall
Learning	Information utilization and creation	66.1	73.0	65.6	55.7	48.5	39.9	32.7	29.3	51.0
	Online courses	31.6	35.5	27.2	17.4	17.2	12.9	7.7	5.2	18.3
Social life	Information acquisition	77.8	91.0	91.2	88.3	86.4	79.0	68.8	58.8	82.8
	Instant messaging and social media	92.9	99.1	99.1	97.9	96.8	93.8	90.4	90.4	95.9
	Online audio and video	97.4	98.0	96.3	92.0	88.6	79.3	71.6	68.1	87.1
	Online gaming	87.2	85.4	68.9	50.9	42.7	29.2	22.6	16.7	47.5
	VoIP calls	71.1	88.1	92.9	91.8	91.8	91.7	84.8	82.8	89.8
	Online content creation	45.3	60.9	69.8	63.7	51.2	36.2	26.4	24.4	50.8
	Cross-functional using of social media (items)	1.11	1.62	1.96	2.06	1.83	1.66	1.45	1.45	1.77
Economic development	Online reviews or price comparison	34.1	65.3	79.2	77.4	68.1	50.3	35.0	31.4	62.0
	Online shopping experience	29.2	59.5	82.2	80.4	74.1	53.7	35.5	30.0	64.2
	Internet innovative business model	6.3	19.9	34.1	26.6	15.9	9.5	5.8	5.4	18.4

	Online sales experience	1.9	7.4	11.7	10.6	7.1	5.6	2.0	1.9	7.3
	Internet or mobile banking experience	3.5	14.9	51.2	57.3	55.4	37.5	27.8	22.1	42.6
Civil participate	E-government initiative	42.6	71.0	66.7	69.0	68.0	68.6	63.9	63.9	66.8
	E-government passive service	15.3	25.6	42.4	46.9	43.8	33.3	28.2	22.9	37.3
	Electronic government service application	1.6	8.4	33.3	47.6	46.8	32.3	25.0	18.8	34.0
	Engaging official online channels	0.5	1.9	5.5	7.0	5.5	5.5	7.6	6.9	5.6
	Expressing opinions on policy on the Internet	9.2	18.8	18.1	14.6	11.7	9.8	7.1	9.9	13.0
	Expressing different opinions from others on the Internet	5.6	10.6	10.6	12.4	11.3	10.3	9.8	9.9	10.7
Health Improvement	Making appointments online checking the progress of appointments on the Internet	15.8	26.1	46.1	59.4	61.5	52.9	47.1	42.4	50.3
	Checking appointments history, medical records,	1.9	8.5	12.1	16.5	12.5	8.3	7.0	6.1	10.9
	Self-care for health	21.7	19.5	20.6	20.2	19.4	16.0	14.6	14.2	18.4

Note: ☐ Indicates higher than or equal to the overall average; ☐ Indicates lower than the overall average.

3. Exclusion

(1) Gender Divide in Digital Opportunities

Evaluating the difference in risk of Internet use between genders, the results showed that the female Internet users reflected a higher rate of deterioration in their physiological conditions due to the use of the Internet than the male, while the male

Internet users had higher rates admitting their Internet speech is more intense than in the real life, and also had higher rates experiencing online trolls and malwares on their devices than females.

Table 11 – Gender Differences and Similarities in “Exclusion”

Unit:%

Sub-dimension	indicator	male	female	**overall**
Personal crisis	Internet anxiety	55.9	59.2	57.6
	Physiological deterioration	27.4	34.8	31.0
	Social ability deterioration	12.1	11.7	12.0
	Written expression ability deteriorates	16.6	17.3	17.0
Social crisis	Online speech scale (% intense)	5.1	2.9	4.0
	Cyberbullying	5.0	3.2	4.1
Infringements of privacy	Personal data leakage or account stolen	9.0	9.6	9.3
Impairment of rights	Internet fraud losses	2.4	3.4	2.9
	Malwares on Internet devices	12.0	8.5	10.3

Note: ☐ Indicates higher than or equal to the overall average; ▒ Indicates lower than the overall average.

(2) Generation Divide in Digital Opportunities

In terms of generation gap, 70% of users aged 15 to 29 said that they feel anxious if going offline for a period of time, which was obviously higher than other generations. Those aged 20 to 39 had more impacts on the social skills deterioration, while those aged 30 to 49 had more impacts on the written expression ability. As for the impacts of using the Internet on physiological conditions, those aged 40 to 59 rated highest. [Table 12]

With regard to online speech, 20-29 years old Internet users had higher percentages of admitting their speech was more intense on the Internet than that in the real world. Young generation, aged 12 to 14, had higher percentages of experiencing cyberbullying. In terms of leakage of personal data and malwares on devices, it was most common for those aged 65 and above. [Table 12]

Table 12 – Generation Differences and Similarities in " Exclusion"

Unit: %

Sub-dimension	Indicator	Ages 12-14	Ages 15-19	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50-59	Ages 60-64	Ages 65and above	Overall
personal crisis	Internet anxiety	65.0	71.8	74.4	69.8	60.6	42.0	32.1	25.2	57.6
	Physiological deterioration	21.6	24.1	28.2	30.3	40.0	35.5	26.3	21.1	31.0
	Social ability deterioration	6.3	11.7	15.0	15.7	12.0	10.0	7.9	6.6	12.0
	Written expression ability deteriorates	2.7	13.7	16.0	19.4	20.4	17.7	15.2	13.5	17.0
Social crisis	Online speech scale (% intense)	5.2	3.7	6.9	5.0	3.2	2.8	1.7	2.1	4.0
	Cyberbullying	6.8	6.1	5.6	4.4	3.1	2.9	3.2	3.3	4.1
Invasion of privacy	Personal data leakage or account stolen	3.1	3.4	13.3	12.9	10.0	7.1	8.0	4.6	9.3
Impairment of rights	Internet fraud losses	1.6	1.4	2.7	4.4	2.8	2.7	2.3	2.9	2.9
	Malwares on Internet devices	6.2	3.9	8.1	9.9	12.3	12.5	11.3	12.6	10.3

Note: ☐ Indicates higher than or equal to the overall average; ☐ Indicates lower than the overall average.

V. Trends in the results of the annual survey

1. Enabling

(1) Opportunities for Individuals Access to Information

The results of 2019 survey showed that 86.2% of population aged 12 and above had used the Internet, which was similar to the results in last year (2018). The Internet population remained the same, not continuously growing. As for long-term trend, the rate of Internet use increased from 62.7% in 2005 to 86.2% in 2019, an increase of 23 percentage points over 13 years. The significant increase occurred in 2010, 2013, and 2018, which corresponded to the three important progresses, the popularity of tablets, the popularity of smartphone, and mobile networks charges reduction. [Figure 12]

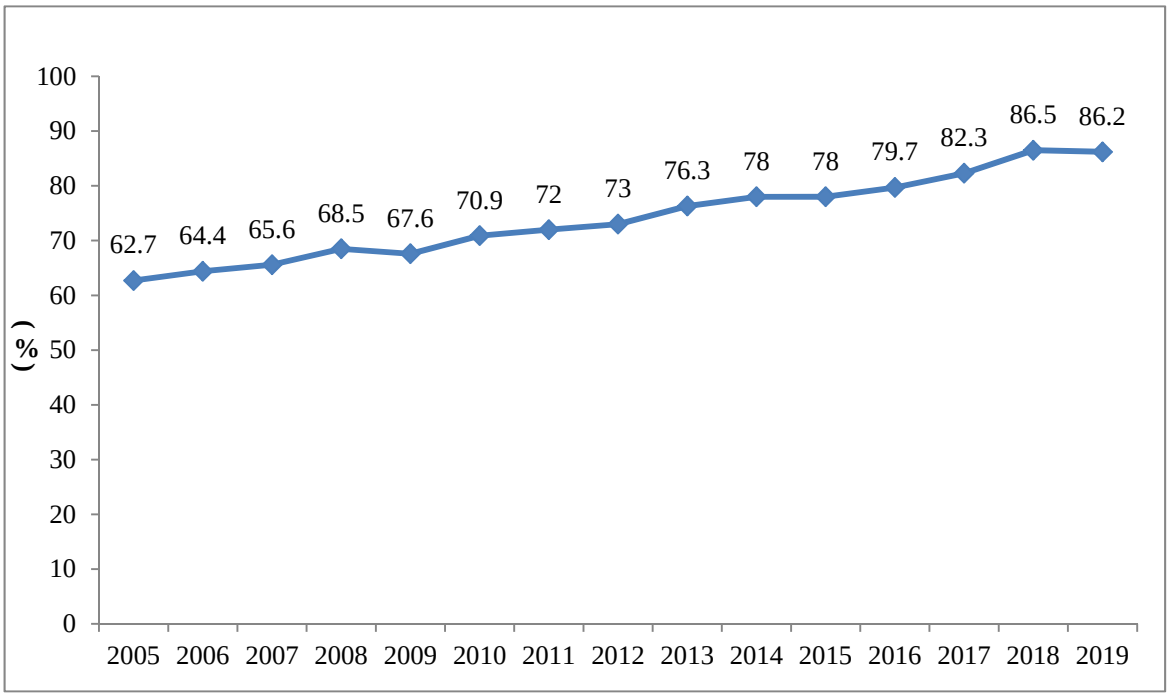

Figure 12 – Cross-year comparison of individual use of the Internet

Based on the change of network usage rate in each county and city, compared with the results of the 2018 survey, the rate of Internet access was estimated to be slightly increased or decreased, but the changes were small (within ± 2.8 percentage points), which was less than the sampling errors among cities and countries (within ± 4 percentage points). It showed that the estimated Internet population in each county and city was same as the pollution of the whole country, with no significant change. [Table 13]

Table 13 – Cross-year comparison of household information environment in counties and cities

unit: %

County/City	2009	2010	2011	2012	2014	2015	2016	2017	2018 (A)	2019 (B)	Diff. % (B-A)
Total	67.6	70.9	72.0	73.0	78.0	78.0	79.7	82.3	86.5	86.2	-0.3
New Taipei City	71.7	74.6	77.0	77.0	81.6	79.8	82.4	85.8	90.6	88.7	-1.9
Taipei City	73.0	77.6	80.1	78.5	85.0	82.6	85.4	87.0	90.6	90.5	-0.1
Taoyuan City	72.3	75.9	74.4	76.9	80.4	82.0	84.3	87.1	90.0	89.6	-0.4
Taichung City	71.2	74.1	73.7	74.3	79.1	81.7	82.4	83.3	88.0	88.0	0.0
Tainan City	64.5	66.7	66.8	68.5	75.5	74.4	74.4	80.2	83.5	83.1	-0.4
Kaohsiung City	66.4	70.3	71.3	70.3	76.8	76.6	77.8	79.3	85.4	85.3	-0.1
Ilan County	61.4	66.6	65.0	68.6	74.9	77.0	78.3	78.9	83.6	81.6	-2.0
Hsinchu County	68.9	72.0	74.4	74.2	81.3	80.9	82.3	83.4	87.9	89.1	1.2
Miaoli County	66.2	67.1	69.9	71.4	72.3	75.3	76.9	81.1	85.9	85.1	-0.8
Changhua County	59.4	63.0	64.9	69.2	76.0	73.6	74.1	79.1	82.9	82.0	-0.9
Nantou County	63.1	64.6	65.3	68.3	71.1	73.2	74.4	77.3	82.8	82.6	-0.2
Yunlin County	53.1	58.7	61.0	65.4	67.1	68.7	71.3	73.5	78.7	76.7	-2.0
Chiayi County	54.5	56.8	59.5	63.1	64.2	65.4	68.5	70.0	77.9	75.6	-2.3
Pingtung County	58.0	59.5	61.9	66.1	69.4	69.3	72.0	77.4	82.6	80.3	-2.3
Penghu County	55.4	62.9	61.2	64.9	68.3	74.4	75.0	76.7	81.2	78.4	-2.8
Hualien County	65.5	68.8	69.4	71.5	74.9	75.0	78.1	81.8	85.4	85.0	-0.4
Taitung County	64.4	67.3	66.3	68.9	71.0	73.1	75.5	78.2	84.0	82.2	-1.8
Keelung City	69.1	73.8	72.8	72.8	77.6	83.1	83.2	83.5	87.9	88.0	0.1
Hsinchu City	76.0	76.6	78.0	79.7	84.0	84.7	86.1	89.3	90.9	89.3	-1.6
Chiayi City	67.9	72.1	74.5	75.3	81.0	80.0	81.9	82.6	86.7	86.7	0.0
Kinmen County	62.0	67.5	66.6	69.4	75.5	77.7	77.7	83.8	85.6	85.5	-0.1
Lianjiang County	66.8	72.6	75.8	76.3	77.8	78.8	83.3	84.3	85.7	86.5	0.8

Note: the results of survey in 2013 was excluded due to small sample size

From the experience of mobile Internet users, the percentage of Internet users who have used any mobile device to access the Internet gradually increased from 53.0% in 2010 over years and reached the plateau at 98% in the past two years. Base on population aged 12 and above, about 84.4% to 84.9% population have used mobile Internet in the past two years, with no significant change. [Figure 13]

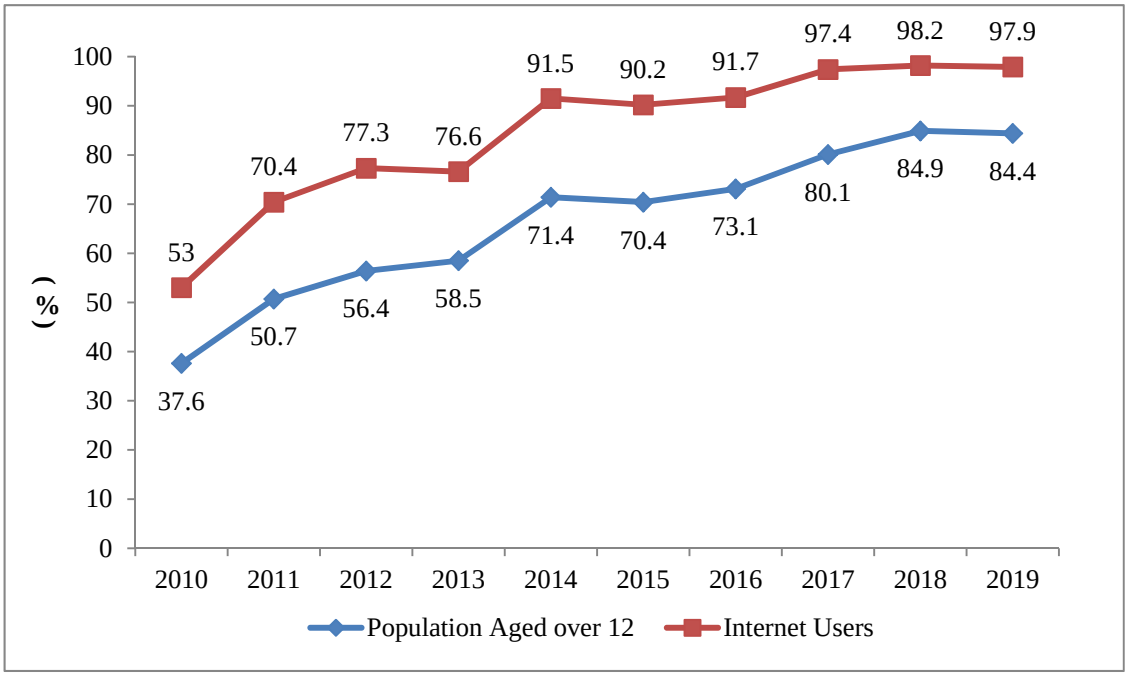

Figure 13 – Cross-year comparison of the use of Internet for individuals aged 12 and above

(2) Opportunities for Households Access to Information

As more and more people rely only on mobile phones to access the Internet, the study listed mobile Internet as one of the ways to connect to the Internet for households in 2017, and listed “an unknown way to connect to the Internet for households” in 2019. The results showed that the household Internet use rate in Taiwan exceeded 90% for the first time (90.4%), up 5.5 percentage points from last year (2018). [Figure 14]

Regarding Internet environment improvement for households in counties and cities, 22 counties and cities increased, among them, Taichung City, Changhua County, Kaohsiung City, Pingtung County, Keelung City, Yilan County, Kinmen County and Lianjiang County with higher improvements, more than 6 percentage points. [Table 14]

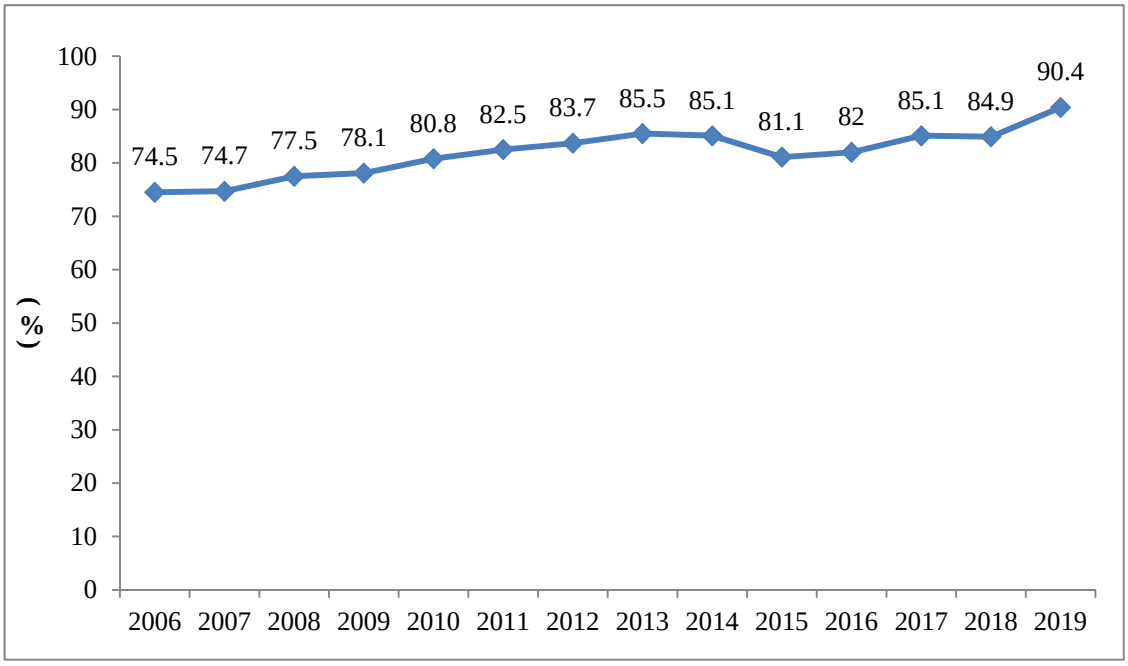

Figure14 – Cross-year comparison of household information environment

Table 14 – Cross-year comparison of the Internet usage rate in each county and city

Unit：%

	2015	2016	2017	2018 (A)	2019 (B)	Diff. % (B-A)
Total	**82.0**	**81.1**	**85.1**	**84.9**	**90.4**	**5.5**
New Taipei City	85.5	84.6	87.6	88.1	93.6	5.5
Taipei City	86.4	87.1	90.7	91.1	93.8	2.7
Taoyuan City	84.2	83.8	88.8	89.1	92.8	3.7
Taichung City	83.5	82.5	88.7	84.0	90.8	6.8
Tainan City	79.5	76.1	81.3	82.8	87.7	4.9
Kaohsiung City	79.9	80.3	82.8	83.8	89.8	6.0
Ilan County	79.0	79.2	80.7	80.2	87.9	7.7
Hsinchu County	84.1	83.2	87.7	89.5	92.9	3.4
Miaoli County	79.9	78.3	83.6	84.3	88.8	4.5
Changhua County	80.8	75.8	81.9	79.7	87.7	8.0
Nantou County	76.9	75.2	80.3	81.7	85.9	4.2
Yunlin County	73.7	73.3	75.6	78.2	81.4	3.2
Chiayi County	70.9	71.0	73.6	76.7	81.0	4.3
Pingtung County	74.6	73.2	79.8	79.7	86.9	7.2
Penghu County	71.8	76.0	78.1	78.4	81.6	3.2
Hualien County	79.0	78.9	84.8	85.2	87.3	2.1
Taitung County	72.7	75.4	79.8	83.5	86.2	2.7
Keelung City	85.3	83.9	85.6	85.4	92.5	7.1
Hsinchu City	88.7	88.2	90.1	90.5	93.1	2.6
Chiayi City	81.0	81.3	85.2	85.9	91.1	5.2
Kinmen County	80.6	79.5	85.6	83.9	90.3	6.4
Lianjiang County	77.9	82.9	85.6	84.1	90.4	6.3

(3) ICT skills and literacy

From the Internet participation of people ages over 12, there has been no significant change in the opportunity of access to information from 2018 to 2019 (including Internet access rate, mobile phone usage rate and mobile Internet rate), but the amount of Internet devices available to individuals continues to grow from 3.13 to 3.43. [Table 15]

In terms of “Skills and Literacy”, although Internet users have not significantly changed their self-rated ability to gather information (travel, food and new information collation), their aware rate of the concept of network access and digital footprint were slightly higher than last year (2018), and the number of those who studied

programming increased from 23.9% to 26.1%. [Table 15]

Table 15 – Cross-year comparison in “Enabling” of digital opportunity

Sub-dimension	Indicator	2018	2019	Diff.
Access to information	Internet access rate (%)	86.5	86.2	-0.3
	Mobile phone use rate (%)	91.1	91.3	+0.2
	Wireless or mobile Internet use rate (%)	84.9	84.4	-0.5
	Personal Internet device ownership (items)	3.13	3.43	+0.3
Skills and literacy	Network access rights awareness (clear %)	51.7	55.9	+4.2
	Digital footprints awareness (clear %)	75.5	78.0	+2.5
	Self-rated ability for collecting travel information (points)	6.3	6.5	+0.2
	Self-rated ability for collecting food information (points)	6.8	6.9	+0.1
	Self-rated ability for searching a certain topic of new information (points)	6.9	7.0	+0.1
	Not forwarding or sharing unverified information (%)	23.9	26.1	+2.2

2. Inclusion

Observing the trends of learning, social participation, economic participation, civil participation and health improvement aspects, most ICT applications in life increased significantly from 2018 to 2019. [Table 16]

In terms of participation in learning, searching information or videos for self-learning increased from 47.9% in 2018 to 51.1% in 2019, an increase of 3.2 percentage points. However, the percentage of enrolling formal online courses, studies or examinations decreased from 22.3% to 18.3%.

In terms of social participation, except social media with 95.9% high use rate,

there was no significant change in others, including Internet information searching, online audio and video, online games, VoIP calls and Online content creation, which increased by 2.1 to 4.7 percentage points.

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From economic development aspect, online and mobile banking was the most growing indicator, from 32.9% in 2018 to 42.5% in 2019. Using Uber or the online deliveries applications increased by 7.3 percentage points and online shopping rates exceeded 60% in the past year, an increase of 5.7 percentage points over 2018.

In terms of civil participation, the use of government services has also shown higher engagements. The receive rate of government broadcasting information and the use of online application services increased by 6.8 and 6.2 percentage points respectively over last year. Browsing government's websites or receiving information from government's channels also increased by 4.6 percentage points. As for expressing opinions on politics or policy in official channels, there was no significant change. But expressing opinions in unofficial channels (13.0%) is exceeded 10% for the first time in the past year, with an increase of 5.1 percentage points compared to 2018.

In the health improvement, there was no significant change in the use of online appointment, but the rate of using health application for self-care and searching medical information increased by 3.9 and 2.6 percentage points respectively over 2018.

Table 16 – Cross-year comparison in “Inclusion” of digital opportunity

Unit: %

Dimension	Sub-dimension	Indicator	2018	2019	Diff.
Inclusion	Learning activities	Information utilization and creation	47.9	51.0	+3.1
		Enrolling online courses	22.3	18.4	-3.9
	Social life	Information acquisition	79.7	82.8	+3.1
		Instant messaging and social media	96.8	95.9	-0.9
		Online audio and video	83.1	87.1	+4.0
		Online gaming	45.4	47.5	+2.1
		VoIP calls	85.7	89.8	+4.1
		Online content creation	46.0	50.8	+4.8
		Cross-functional using of social media	1.66	1.77	0.11
	Economic development	Online reviews or price comparison	59.8	62.0	+2.2
		Online shopping experience	58.5	64.2	+5.7
		Innovative Internet business models	11.2	18.4	+7.2
		Online sales experience	7.1	7.3	+0.2
		Online or mobile banking experience	32.9	42.6	+9.7
	Civil participation	E-government initiative	60.0	66.8	+6.8
		E-government passive service	32.7	37.3	+4.6
		Electronic government service application	27.8	34.0	+6.2
		Engaging official online channels	5.8	5.6	-0.2
		Policy opinions on the Internet	7.9	13.0	+5.1
		Comments on the Internet	8.2	10.7	+2.5
	Health Improvement	Making appointments online checking the progress of appointments on the Internet	50.1	50.3	+0.2
		Checking appointments history, medical records and examination results	8.3	10.9	+2.6
		Self-care for health	14.5	18.4	+3.9

3. Exclusion

From impairment of rights perspectives, the study observed the negative impacts of the information society from the Internet crises and infringements. Among the dimensions, the negative risk of personal crisis increased the most, 57.6% of Internet users will be anxious if they are unable to access the Internet, an increase of 5.6 percentage points from 2018, and a slight increase of 2.7 percentage points in feeling physiological impacts. [Table 17]

In contrast, the rate of fraud or experiencing malwares on Internet devices in the

past year decreased by 2.6 and 2.1 percentage points respectively over last year, showing that the situation of impairment of rights was better than in previous years. [Table 17]

Table 17 – Cross-year comparison of the Exclusion indicators of digital opportunity

Unit: %

Dimension	Sub-dimension	Indicator	2018	2019	Diff.
Exclusion	Personal crises	Internet anxiety	52.0	57.6	+5.6
		Physiological deterioration	28.3	31.0	+2.7
		Social skill deterioration	10.6	12.0	+1.4
		Written expression deteriorates	17.4	17.0	-0.4
	Social crises	Internet freedom of speech (more intense%)	2.8	4.0	+1.2
		Cyberbullying	3.5	4.1	+0.6
	Privacy	Leakage of the personal data	9.8	9.3	-0.5
	Impairment of rights	Internet fraud losses	5.5	2.9	-2.6
		Malwares on Internet devices	12.4	10.3	-2.1

VI. Suggestions

Based on the results of the 2019 Individual/Household Digital Opportunity Survey, the following are suggestions from research and policy aspects for the future directions.

1.Inviting government departments, experts and scholars to have forums to turn the survey results into specific and feasible policies

The National Development Council's Individual/Household Digital Opportunity Survey, which has been regularly conducted every year since 1991, has accumulated a lot of valuable information on the digital vulnerable groups and the evolution of their capabilities. However, after our Internet access rate has reached a high of 86%, follow-up policies obviously need to be guided by higher national strategic goals. Consider whether the goal is to increase the Internet access rate of the elderly, or whether resources should be invested in the learning, economy, citizen participation, or even health applications of the Internet users.

The government hopes to form a policy reference through conducting investigations, but the results of investigations are obviously the only basis for policy resources. The research team believes that in order for the survey results to be translated into specific and feasible policies, it actually depends on the frontline policy facilitators of government departments, experts and scholars to discuss plans by the results of the survey, the current policy outcomes and dilemmas, follow-up investable resources and future national strategic goals. Therefore, it is recommended that the commissioned unit should organize several seminars or panel discussions after the completion of the annual survey report, and invite digital opportunity related departments, county and city governments, experts and scholars to discuss the policy directions which are suitable for Taiwan's digital opportunity development in the future.

2.Veteran Internet users have the best ability to adopt new technology. The more advanced information skills they have, the more advantages in adoption.

According to the addition question of first time using the Internet in 2019 Individual/Household Digital Opportunity Survey, the study concluded the corresponding Internet adoption lifecycle. The respondents are segmented based on their years of using the Internet: veteran Internet users (with 15 years above on the Internet), early-joined users (with 10 to 14 years on the Internet), middle-joined users

(with 7 to 9 years on the Internet), late-joined users (with 3 to 6 years on the Internet), and newly-joined users (with less 2 years on the Internet).

The results showed that the average age of veteran Internet users is 43 years old, and they are 5 to 10 years older than early-joined, middle-joined, and newly-joined users. However, it is not difficult to observe "the years of using Internet" has a significant impact on the ability to "adapt" the online world. In addition to the more aware of data privacy, those with longer years' experience of using the Internet have more confident to gather information, higher percentage of learning programming. And the rate of participating online activities, no matter using traditional or innovation services, is the highest ratings among all Internet users. The analysis results above partially changed the first impression that "the younger generation is the most widely used Internet". In fact, the longer years of using the Internet may reflect the better opportunities or capabilities in the early stages of information development, and this advantage allows them to adopt new applications such as online innovation activities, cross-functional using of social media, online sales, teleworking, etc. It is worth further study whether the unequal opportunities continuing and replicating.

3.**Establish tracking database in advance and establish a regular online investigation mechanism**

Our company has conducted digital opportunity surveys over years and suggested to establish regular online surveys several times in order to track behavior changes of using applications. Another online digital opportunity survey this year showed that higher response rate with providing incentives. It can achieve 60% response rate in three days along with sending reminders. The characteristics of samples are also closed to the targeted population. It could be the best choice for the transformation of digital opportunity research.

However, a further comparison of the tracking samples between residential telephones and mobile phones in 2018 and 2019 survey in each indictor, it showed that there was an abnormal increase in the usage rate of the tracking residential telephone samples, while the tracking mobile samples were very stable. It is suspected that tracking residential telephones users provided their mobile phone numbers the next year, making it difficult to ensure that respondents provide the numbers for their own use (maybe providing young family member's number). In contrast, there is no such issue for mobile phone tracking samples.

Therefore, the research team recommended that the relevant digital opportunity survey should be conducted simultaneously to ask respondents to provide their personal mobile number according to their willingness to establish a tracking database in advance in order to save time and cost to contract them next year and ensure the consistency between residential telephone tracking samples and respondents.

4. Rethinking the transformation direction of the indicator framework

Reviewing the process of building digital opportunity development indicator framework, the Internet access rate was only 72% in that time. Understanding individual's needs and abilities to fully participate in the information society was the first priority. Therefore, the study focused on 5 areas, including learning, society, economy, overall participation and health improvement.

However, as the Internet access rate exceeded 86 percent, the study suggested a transformation for the further indicator framework or considering to study from a national perspective, referring to the OECD Digital Well-being measurement, which focuses on the measurement of inequality of opportunity in the country and applications that contribute to the overall quality of life or productivity improvement of society.

Ⅶ.Research limitations

First, the Individual/Household Digital Opportunity Surveys have been targeted at people over the age of 12 and asked about behaviors in the past year. Since there is no intention of matching data with specific international surveys, it is not appropriate to compare investigation data directly with international comparisons. This is one of the limitations of the research

Second, although the survey is conducted regularly in July and August every year, the survey is a cross-sectional survey and it is not easy to clarify the causal relation. The survey results may be affected by the cut-in time point and cause fluctuations. For example, the 2019 WBSC Premier12™ may bring a rapid increase in the cross-border ratio of the community (using Line to watch TV). This kind of situation that highly influences the use or response results is not what the research team can grasp. This is the other limitation of the research.