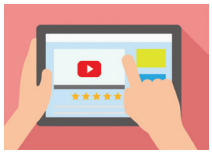
2023 Taiwan Digital Development
Summary Report

Ministry of Digital Affairs | December 2023



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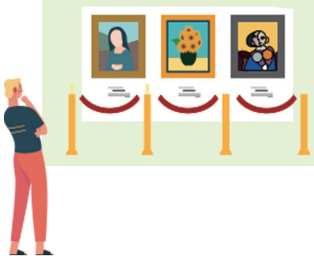

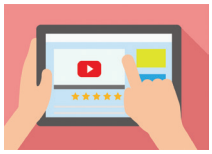

Preface

The information technology industry is constantly evolving, and its development has not only changed the economy, industries, and social systems of countries, but also affected the lifestyles and interpersonal interactions of individuals. In the face of global competition and the rapid development of the digital economy, the Organisation for Economic Cooperation and Development (OECD) proposed the concept of digital well-being in 2019, examining the impact of digital transformation on individual's well-being from the perspectives of opportunities and risks.

Due to correspondence between the OECD concept of digital well-being and national "Digital Opportunity Development Index Framework" [1] with its three dimensions (enabling, inclusion, exclusion), the National Development Council (NDC) redefined the "Digital Development Index Framework" in 2020, covering 12 dimensions and 74 indicators. In 2022, the relevant responsibilities were transferred to the newly established Ministry of Digital Affairs (moda), which further refined the "Digital Development Index Framework" through the "Enhancing Digital Development IndexFramework" project, adjusting the incomplete aspects of the framework. The revised indicator framework, named "Digital Development Index Framework 2.0," maintains the 12 dimensions with a total of 70 indicators. The framework and indicator definitions are detailed in Table 4.

In terms of data sources, the "Digital Development Index Framework" utilizes various types of indicators, with relevant data obtained from government-published statistics [2] . It mainly references the "Digital Development Survey," "Digital Development Subsurvey," and "Internet Addiction Survey" conducted by the moda. The following is a brief overview of the survey dates and methods for each survey. For more detailed information, please refer to the respective reports.

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1 Research, Development and Evaluation Commission, Executive Yuan.(2012). Construction of the Research Framework for Digital Opportunity Development in Taiwan.

2 8 items are from relevant ministries by request from the National Development Council, and 4 items are from the official websites of the respective ministries. Please refer to the official websites of each indicator.

Table 1. Comparison of Digital Development Surveys over the Years

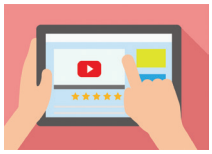
Survey Year	2020	2022	2023
Organizer	NDC	moda	moda
Survey Target	Residents aged 12 and above in 22 cities and counties in Taiwan		
Sampling Method	Dual-frame probability sampling of mobile and landline phone numbers (random selection of last 5 digits for mobile, last 2 digits for landline)		
Survey Method	Telephone interviews		
Survey Dates	November 2 to December 18, 2020	September 5 to October 31, 2022	March 1 to April 19, 2023
Sample Size	15,196 individuals aged 12 and above	15,142 individuals aged 12 and above	15,081 individuals aged 12 and above
Sampling Error	The margin of error is ±0.8 percentage points with a 95% level of confidence		
Report Source	Full report available at https://moda.gov.tw		

Table 2. Comparison of Digital Development Subsurveys over the Years

Survey Year	2020	2023	2023
Organizer	NDC	moda	moda
Survey Target	Residents aged 12 and above in 22 cities and counties in Taiwan		
Sampling Method	National probability sampling of residential phone numbers in 22 cities and counties (random selection of last 2 digits)		
Survey Method	Telephone interviews		
Survey Dates	November 12 to November 17, 2020	February 9 to February 11, 2023	February 6 to February 11, 2023
Sample Size	1,070 internet users aged 12 and above	1,069 individuals aged 12 and above	1,069 individuals aged 12 and above
Sampling Error	The margin of error is ±3 percentage points with a 95% level of confidence		
Report Source	Please refer to the Appendix of the Digital Development Survey Report 2020	Full report available at https://moda.gov.tw	

Table 3. Comparison of Internet Addiction Research Surveys over the Years

Survey Year	2021	2022
Organizer	NDC	moda
Survey Target	Residents aged 12 and above in 22 cities and counties in Taiwan	
Sampling Method	Dual-frame probability sampling of mobile and landline phone numbers (random selection of last 5 digits for mobile, last 2 digits for landline)	
Survey Method	Telephone interviews	
Survey Dates	January 14 to January 19, 2021	December 1 to December 8, 2022
Sample Size	1,450 individuals aged 12 and above	1,975 individuals aged 12 and above
Sampling Error	The margin of error for internet users is ±2.9 percentage points with a 95% level of confidence	The margin of error for internet users is ±2.5 percentage points with a 95% level of confidence
Report Source	Full report available at https://moda.gov.tw	



It should be noted that the above report focuses on internet users, which is different from the "Digital Development Index Framework" that includes the entire population aged 12 and above. Table 4 presents the main and sub-dimensions, indicator names, indicator definitions/formulas, data types, sources, and years. Indicators marked with a shaded background indicate that they are defined the same as OECD, allowing for cross-country comparisons, while indicators without a shaded background are specific to Taiwan. [3]

Regarding subsequent interpretation or citation of this report, it is important to understand the related research limitations, including: (1) inconsistencies in standards regarding time, survey methods, and sampling designs for cross-country comparisons; (2) the digital development surveys in Taiwan were conducted before or just after the COVID-19 pandemic, reflecting long-term effects rather than the immediate impact of the pandemic; (3) when interpreting cross-country survey data, cultural differences should be taken into account, as low adoption rates do not necessarily indicate poor digital opportunities; (4) the previous OECD report has not been updated for 4 years, so this report focuses on presenting the relative positional changes in Taiwan's annual survey data. It is important to avoid overinterpreting the leading aspects and instead focus on addressing the lagging aspects in Taiwan.

3 For specific questions of the indicators, please refer to the appendix. In addition, the research has revised the naming of the "Jobs and Earnings" dimension in the OECD framework to "Jobs," with slight differences in naming.

Table 4. Digital Development Index Framework

Main Dimension	Sub Dimension	Indicator	Definition / Calculation	Date Type	Data Source / Latest Data Year
ICT Access, Usage and Literacy	Environmental access opportunities	Household internet access*	The number of households with Internet access at home / the total number of households in Taiwan *100%	Survey	moda/2023
		Household device ownership	Types and quantities of devices capable of internet connectivity in households	Survey	moda/2023
		Household internetquality	The number of high-speed broadband households (100 Mbps and above) / the total number of households in Taiwan *100%	Secondary	NCC/2021
		5G network coverage rate	5G network station population coverage rate	Secondary	moda/2022
		Internet connection device ownership	Types and quantities of personal Internet connection devices	Survey	moda/2023
		Mobile data tariff	The percentage of 4G/5G mobile data tariff of the monthly income per capita (using the average price of major service providers)	Secondary	moda/2021
	Use of the Internet	People using the internet*	The number of individual using the Internet in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		Internet use frequency	The average days in a week that individuals use the Internet (Active Internet users: The number of daily internet users/ the population aged 12 above *100%)	Survey	moda/2023
	Variety of uses of the Internet	(01) E-mailing for private purpose*	The number of individuals using the Internet for e-mailing for private purpose in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(02) Searching for information about goods or services*	The number of individuals using the Internet for searching information about goods or services in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(03) Downloading software*	The number of individuals using the Internet for downloading software (other than games) in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(04) Consulting wikis*	The number of individuals who using the Internet for consulting wikis (e.g., Wikipedia) or any online source in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(05) Internet banking*	The number of individuals who using Internet banking in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(06) Instant messaging*	The number of individuals using instant messaging or Internet calls for communication in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(07) Online entrainment*	The number of individuals using the Internet for watching videos, listening to music, or playing games in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(08) Online reading*	The number of individuals using the Internet for reading online newspapers/news magazines in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(09) Cloud storage	The number of individuals using cloud storage in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(10) Mobile payments	The number of individuals using mobile payment in past 3 months / the population aged 12 above *100%	Survey	moda/2023

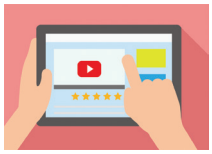


Table 4. Digital Development Index Framework (Continued 1)

Main Dimension	Sub Dimension	Indicator	Definition / Calculation	Date Type	Data Source / Latest Data Year
ICT Access, Usage and Literacy	Variety of uses of the Internet	(11) Digital audio and video editing	The number of individuals editing audio or video in past 3 months / the population aged 12 above *100%	Survey	moda/2023
		(12) Digital contents creation	The number of individuals creating digital contents in past 3 months / the population aged 12 above *100%	Survey	moda/2023
	Inequality of Internet uses	Number of activities that are used by fast adopters and those activities that are used by a broader public*	The difference between number of activities with the usage rate below 25%and those activities with the usage rate above 50%	Survey	moda/2023
		Regional difference in accessibility	1. The difference between top 20% cities/counties and bottom 20% cities/counties in Internet usage rates 2. Year-over-year improvement in Internet usage rates	Survey	moda/2023
		Identity difference in accessibility	1. The gender difference in Internet usage rates (the population aged 12 above) 2. The age difference in Internet usage rates (the population aged 12 above) 3. Year-over-year improvement in Internet usage rates	Survey	moda/2023
	Information usage skills	Information filtering skills	1. Self-rated on skills of using the Internet to screen useful dining information/ the population aged 12 above *100% 2. Self-rated on skills of using the Internet to screen useful travel information/ the population aged 12 above *100% 3. Self-rated on skills using the Internet to screen useful information for works or learning / the population aged 12 above *100%	Survey	moda/2023
Housing	Smart home	(01) Usage of smart home security services or apps (network monitoring, biometric identification, security system, disaster prevention system)	The number of households with smart home services or applications at home / the total number of households in Taiwan *100%	Survey	moda/2023
		(02) Usage of smart home appliances (smart home appliances, smart sensors, energy-efficient controls)			
		(03) Usage of smart healthcare services or apps (networked medical devices, healthcare system, smart wristband)			
		(04) Usage digital home entertainment services or apps (smart TV, smart speaker, online console gaming)			

Table 4. Digital Development Index Framework (Continued 2)

Main Dimension	Sub Dimension	Indicator	Definition / Calculation	Date Type	Data Source / Latest Data Year
Education and Skills	Digital skills	Problem-solving skills in technology-rich environments*	Problem solving in technology-rich environments	TBD	Separate research
		Student ICT skills	The number of grade 10 students who took programming courses/ the number of junior high school graduates in the previous year *100%	Secondary	MOE/2022
			The number of graduates from information-related departments in college	Secondary	MOE/2022
	Digital skills gap	Coefficient of variation of score in problem-solving in Technology-rich environments	Coefficient of variation of digital skills	TBD	Separate research
	Digital resources at school	Internet environment at school	The number of school with Internet connection speed over 1Gbps/ the total number of schools*100%	Secondary	MOE/2022
		Internet speed differences between schools	The Internet connection speed gap between the top 20% schools and the bottom 20% schools	Secondary	Calculated based on MOE data/2023
	Teacher ICT skills	Teacher ICT skills	The number of teachers who have completed the basic training courses/ the total number of teachers in K-12 Schools*100%	Secondary	MOE/2022
	Online courses	Online course participation*	The number of individuals who took online courses in past 3 months / the population aged 12 above *100%	Survey	moda/2023
Income and Wealth	Labor market returns to ICT tasks	Wage premium associated with digital skills*	Under similar working conditions, the salary increment difference between ICT-skilled workers and non-ICT-skilled workers.	Secondary	MOL/2023
	Online consumption	Purchasing goods or services online*	The number of individuals using the Internet for purchasing products, meals, car-hailing, or room reservation services in past year / the population aged 12 above *100%	Survey	moda/2023
	Selling online	Selling goods or services online*	The number of individuals using the Internet for selling products or services in past 3 months / the population aged 12 above *100%	Survey	moda/2023
Jobs	Employment in information industries	Share of information industries as a percent of total employment*	The number of individuals working in information industries / the total number of employments	Secondary	DGBAS
	Work digitalization level	Computer or internet application level in workers' job	The number of individuals using computers or Internet for work / the total number of employed persons*100%	Survey	moda/2023
	Jobs at risk of automation	Automation rate in jobs	The number of employees reporting on current job which may be replaced by automation or AI / the total number of employed persons*100%	Survey	moda/2023
	Online job search	Job search or resume submission through the Internet*	The number of individuals having used the Internet to look for a job or send a job application / the population aged 12 above *100%	Survey	moda/2023

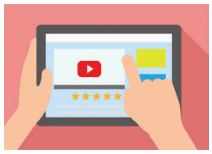


Table 4. Digital Development Index Framework (Continued 3)

Main Dimension	Sub Dimension	Indicator	Definition / Calculation	Date Type	Data Source / Latest Data Year
Jobs	Reduction in extended job strain associated with computer-based jobs	Job flexibility and workplace safety*	Employees' reporting on work flexibility and workplace safety from computerization of work	TBD	Separate research
	Job stress associated with computer-based jobs	Job stress and resources*	Employee's reporting on job stress and work resources balance from computerization of work	TBD	Separate research
Work-Life Balance	Teleworking	Teleworking experiences*	The number of employed persons who experienced teleworking in past 3 months/ the population aged 12 above *100%	Survey	moda/2023
	Worries about work when not working	Work/life division	The number of employed persons who worry about work when not working / the population aged 12 above *100%	Survey	moda/2023
Health	Medical appointments online	Making medical appointment online*	The number of individuals using the Internet for making medical appointment in past 3 months / the population aged 12 above *100%	Survey	moda/2023
	Online health information	Accessing health information online*	The number of individuals using the Internet for accessing health information in past 3 months / the population aged 12 above *100%	Survey	moda/2023
	Physical health risks	Negative physical health effectsdue to internet use	The number of individuals experiencing worse physical condition due to using Internet in past 3 months / the population aged 12 above *100%	Survey	moda/2023
	Mental health risks	Negative mental health effectsdue to internet use	The number of individuals who are classified as at high risk of Internet addiction (according to the 10-item form of Chen Internet Addiction Scale)/ the population aged 12 above *100%	Survey	moda/2023
Social Connections	Using online social networks	Use of online social networking sites*	The number of individuals accessing social networking site in past 3 months / the population aged 12 above *100%	Secondary	moda/2023
	Digital content participation	Digital content participation	The number of individuals who have posted or uploaded photos or video on the Internet in past 3 months / the population aged 12 above *100%	Survey	moda/2023
	Cyberbullying	Experiences with cyberbullying*	The number of individuals who report to have been bullied through online messages in past 1 year / the population aged 12 above *100%	Survey	moda/2023

Table 4. Digital Development Index Framework (Continued 4)

Main Dimension	Sub Dimension	Indicator	Definition / Calculation	Date Type	Data Source / Latest Data Year
Governance and Civic Engagement	Civic engagement	Expressing political opinions online*	The number of individuals posting opinions on civic or political issues via official or non-official online communities in past 1 year / the population aged 12 above *100%	Survey	moda/2023
		Public policy participation platform	1. The number of consultations on policy and draft laws & regulations and policy issues open for discussion on public policy participation platform 2. The number of proposal and cases filed on public policy participation platform	Secondary	NDC/2022
	Open government	Open Data	The quality and application of Open Data	Secondary	moda/2023
	E-government services	Usage of e-government*	The number of individuals receiving notification from e-government services, searching information in government websites, or downloading or submitting e-form in the past year / the population aged 12 above *100%	Survey	moda/2023
		Lack of skills to access e-government services*	The number of individuals who did not use e-government services due to lack of ICT skills / the population aged 12 above *100%	Survey	moda/2023
	Exposure to disinformation online	Exposure to disinformation online*	The number of individuals who self-reported exposure to disinformation in past a week / the population aged 12 above *100%	Survey	moda/2023
Environmental Quality	E-waste per person	E-waste generated per capita*	The weight of electronic and information technology waste generated and recycled in a given year/ the population aged 12 above	Secondary	MOENV/2022
Personal Digital Security	Digital security measures	Digital security protection actions	The number of individuals who had taken digital security protection actions (such as installing anti-virus software, changing password) / the population aged 12 above *100%	Survey	moda/2023
	Digitalsecurity threats	Individuals experiencing digital security incidents*	The number of individuals who report having experienced digital security incidents (such as computer virus, online scams, hacked account, privacy breach) / the population aged 12 above *100%	Survey	moda/2023
Subjective Well-Being	Life Satisfaction Gainsassociated withInternet access	Life Satisfaction Gains*	The coefficient of Internet access on life satisfaction	Survey	moda/2023

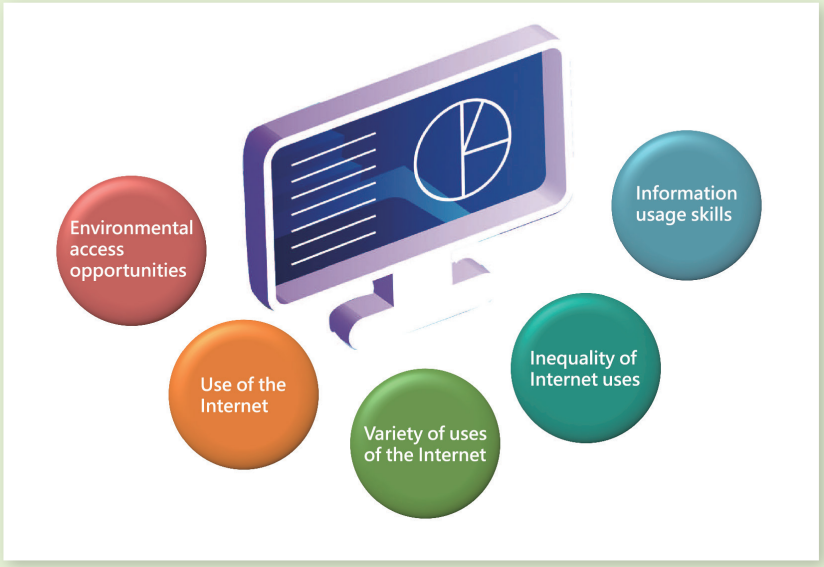
* Data Type: "Survey" indicates data collected through surveys conducted by moda; "Secondary" indicates data obtained from relevant government agencies' existing surveys or statistics.
* Source Abbreviation Explanation: "NCC" stands for "National Communications Commission"; "MOE" stands for "Ministry of Education";"MOL" stands for "Ministry of Labor";"DGBAS" stands for "Directorate General of Budget, Accounting and Statistics"; "MOENV " stands for "Ministry of Environment".
* Indicators marked with an asterisk (*) are defined the same as OECD or recalculated for cross-country comparisons, and do not include indicators with no data available in Taiwan.

1 The Digital Development in Taiwan

1. ICT Access, Usage and Literacy

In the "Digital Development Index Framework" in Taiwan, there are five sub-dimensions under the dimension of "ICT Access, Usage and Literacy," which evaluates people's "Environmental access opportunities," "Use of the Internet," " Variety of uses of the Internet," "Inequality of Internet uses" and "Information usage skills".

Figure 1. Sub-Dimension of ICT Access, Usage and Literacy



Environmental access opportunities

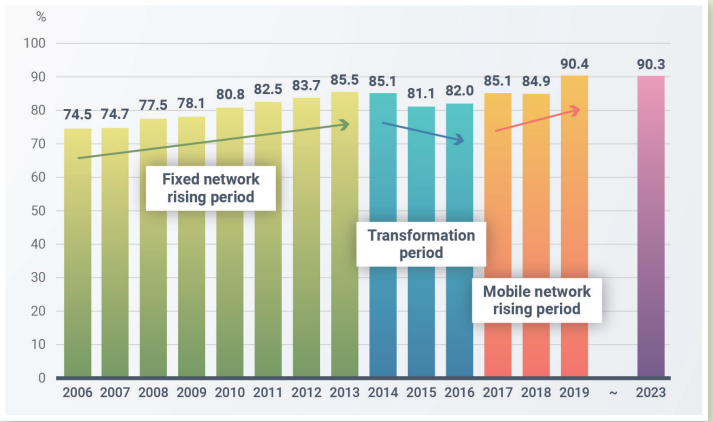
The sub-dimension of the "Environmental access opportunities" includes the indicator of "Household internet access," which is based on the definition of the OECD. For further analysis, Taiwan has added five additional indicators: Household device ownership," "Household internet quality," "Internet connection device ownership," "Mobile data tariff," and "5G Network Coverage Rate".

Household internet access

The historical data shows that there were three major periods of Internet access rates at home since 2006. In the period from 2006 through 2013, fixed network accounted for the major connection type in Taiwan. Internet access rate at home increased from 74.5% in 2006 to 85.5% in 2013. In the period from 2014 through 2016, with the popularity of mobile phones, more and more people only used their mobile phones to access the Internet because of its convenience and resulting in a downward trend in fixed network connection. In response to the change in the way people used the Internet, the Digital Opportunity Survey of the NDC has included using mobile phones as one of the ways for Internet access at home since 2017. Internet access rate at home exceeded 90% (90.4%) in 2019 (Figure 2) [4].

In 2020, due to the extensive coverage of the "2020 Taiwan Internet Report" conducted by the Taiwan Network Information Center (TWNIC), the indicator of household internet connectivity was not included in the self-conducted survey by the National Development Council (NDC). However, later, concerns about the stability of the data published by TWNIC arose [5], prompting the moda to reintroduce the household internet connectivity rate into the digital development survey in 2023. The results showed that the household internet connectivity rate in Taiwan in 2023 was 90.3%, which is comparable to 2019 (90.4%), indicating that there have been no significant changes in household internet connectivity in Taiwan over the past five years.

Figure 2. Trend of Taiwan's Household Internet Access Rate



4 In 2019, the option "Internet access at home with unclear connection method" was added to distinguish between those who are unsure of their home internet connection method and those who are unsure if they have internet access at home.

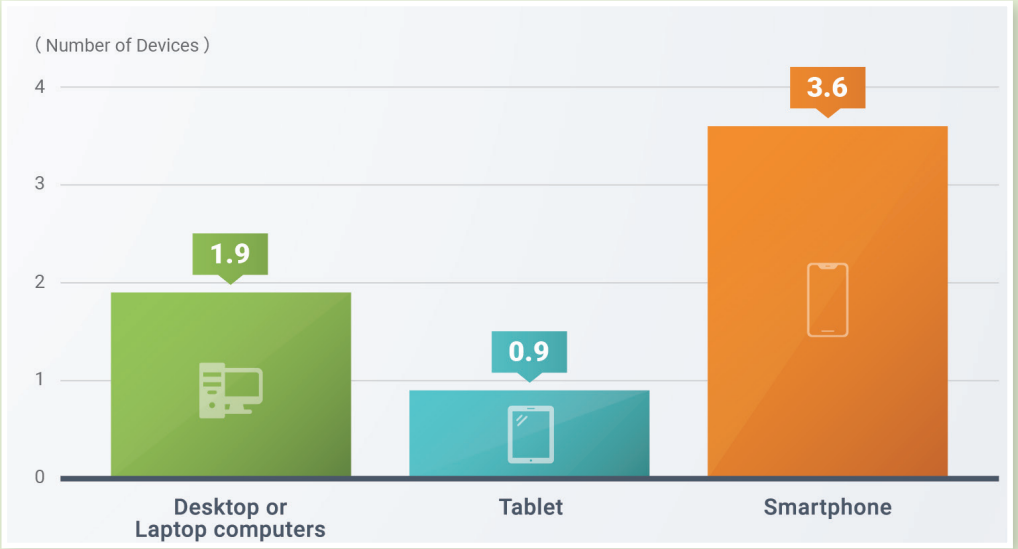
5 Taiwan Internet Surveys conducted by TWNIC in 2019 and 2020 were both dual-frame telephone surveys, and the household internet penetration rate decreased from 90.1% in 2018 to 82.8% in 2020.

Household device ownership

According to the survey, in Taiwan, out of every 100 households, 88 households have two or more types of internet-connected devices (such as desktop computers and mobile phones), while 11 households rely solely on mobile phones for internet access, and 1 household does not have any internet-connected devices.

On average, each household has 3.6 internet-connected mobile phones, 1.9 desktop or laptop computers, and 0.9 tablets. On average, each household has 6.4 internet-connected devices that can be used simultaneously. (Figure 3)

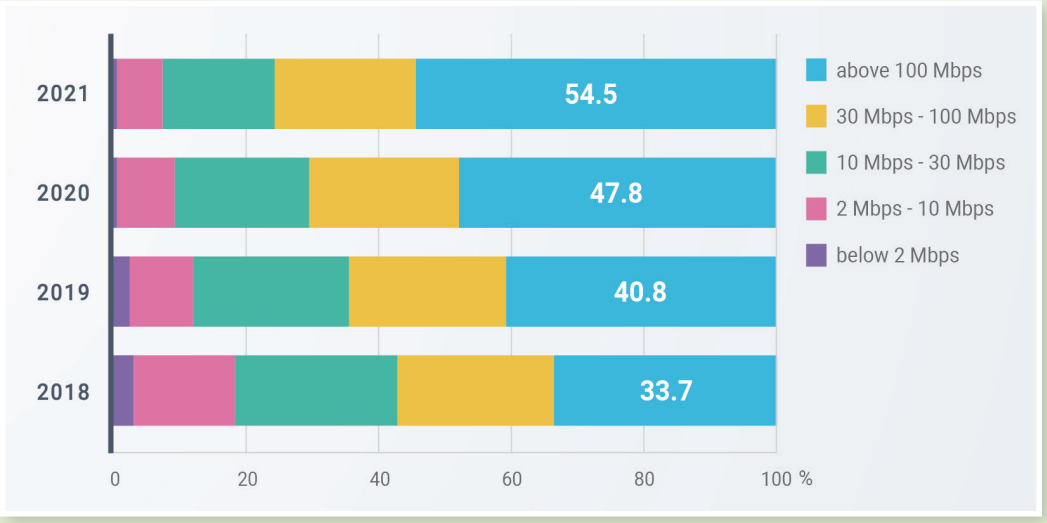
Figure 3. Types and Quantities of Internet-Connected Devices in Households



Household internet quality

With active deployment of network infrastructure by telecom operators and cable broadband service providers, the number of broadband users in Taiwan has been increasing year by year. In 2021, the total number of fixed broadband users reached 6.34 million households. Looking at the percentage of users at different broadband speeds, the number of fixed broadband users with speeds above 100 Mbps grew from 1.93 million households in 2018 to 3.45 million households in 2021. The percentage of these users also increased from 33.7% to 54.5% of the overall user base. (Figure 4)

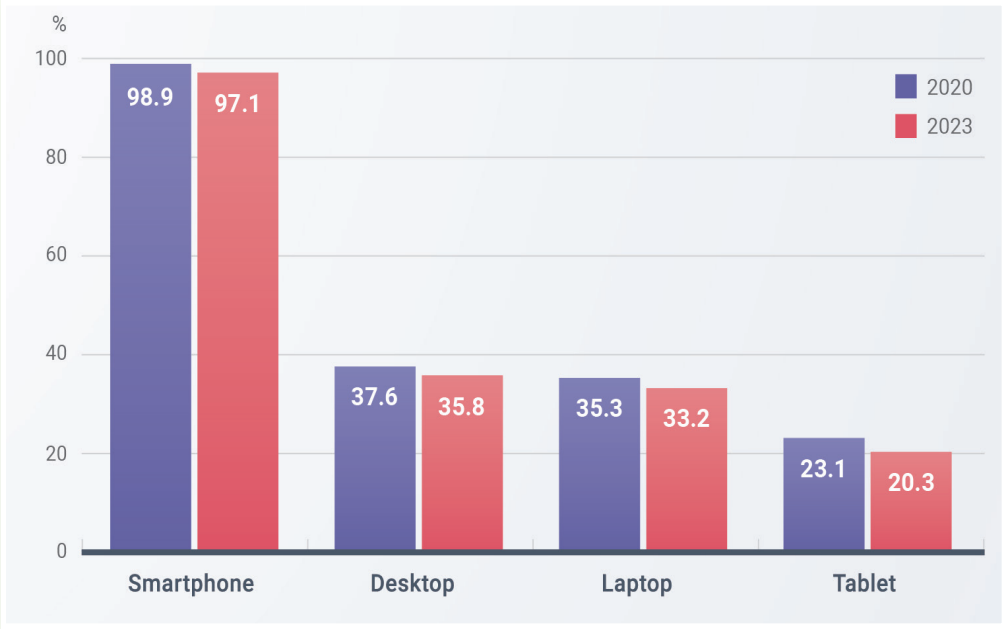
Figure 4. Percentage of Taiwan's Landline Broadband Users by Speed



Internet connection device ownership

If households have different Internet-connected devices, what devices do individuals usually use to access the Internet? The latest survey results for 2023 show no significant changes in the devices used by Internet users in Taiwan over the past three years. Even with the option to select multiple devices, 97.1% of Internet users still use smartphones to access the Internet. The usage of desktop computers (35.8%), laptops (33.2%), and tablets (20.3%) has slightly decreased by 1.8 to 2.8 percentage points compared to 2019, but these changes are within the margin of error. (Figure 5)

Figure 5. Comparison of Internet Devices Used by Internet Users in Taiwan [6]

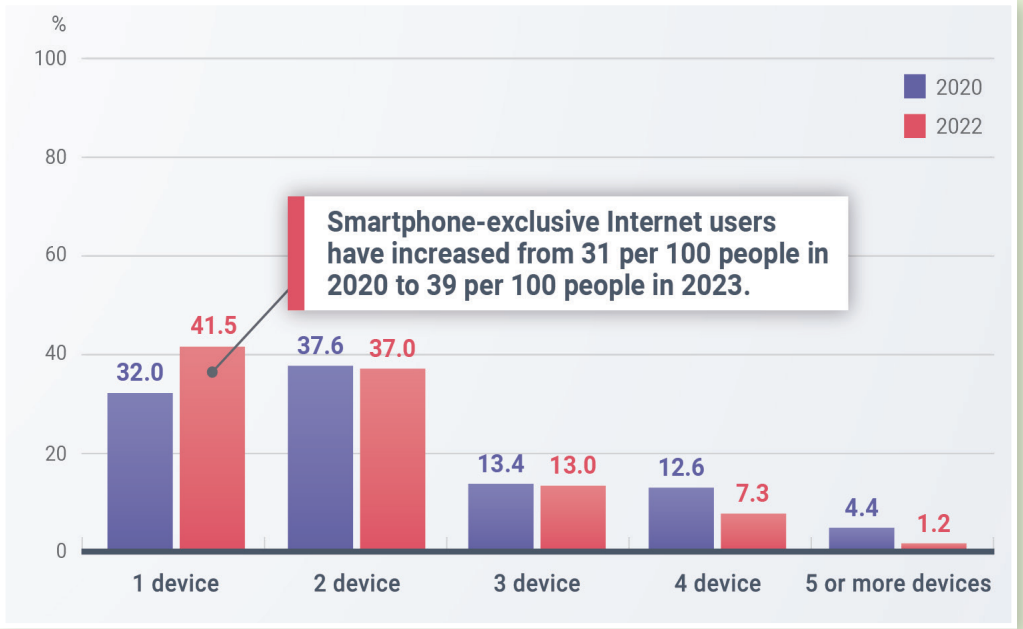


6 Only options with a percentage higher than 5% are listed.

According to the calculation of the number of internet devices owned by each internet user, it is found that the internet users in Taiwan have become increasingly reliant on a single internet device. The percentage of internet users who only own one internet device has increased from 32.0% in 2020 to 41.5% in 2023. Among those who only own one internet device, 93.8% use mobile phones, 4.4% use desktop or laptop computers, and 1.8% use tablets. Among all internet users aged 12 and above in Taiwan, the number of people who rely solely on mobile phones for internet access has increased from 31 per 100 people in 2020 to 39 per 100 people in 2023.

On the other hand, 37.0% of internet users own two connected devices, and 13.0% own three connected devices, making a total of 50.0%. Although the overall percentage is similar to that of 2020, there has been a significant decrease of 8.5 percentage points in the number of people who own four or more connected devices. (Figure 6)

Figure 6. Number of Internet Devices Owned by Internet Users in Taiwan



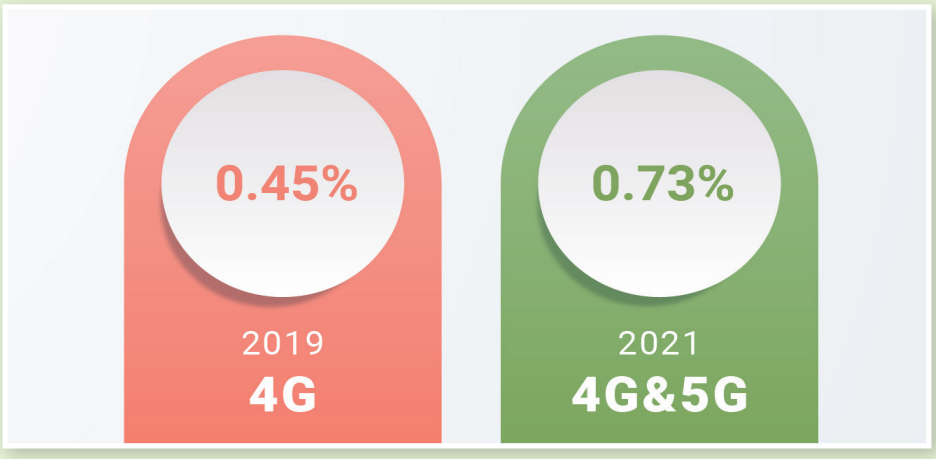
Mobile data tariff

Regarding the percentage of mobile data tariffs to per capita income in Taiwan, it is found that the average national income per person in 2019 was 691,579 NTD [7], equivalent to 57,632 NTD per month. According to the latest data from the National Communications Commission (NCC) [8], the price of a 1.5GB monthly mobile broadband plan accounted for 0.45% of the monthly per capita income. (Figure 7)

In 2021, the International Telecommunication Union (ITU) updated the definition of mobile broadband affordability as the cheapest tariff plan for 2G mobile broadband services (regardless of 4G or 5G technology) as a percentage of the country's per capita income. As the tariff plan increased from 1.5GB in 2019 to 2GB in 2021, the percentage of mobile broadband prices to monthly per capita income in Taiwan also increased from 0.45% to 0.73%.

Nevertheless, mobile internet rates in Taiwan are relatively affordable, and the lower entry barrier has greatly facilitated the adoption of mobile broadband services by the population.

Figure 7. Percentage of Mobile Data Tariffs to Monthly Per Capita Income in Taiwan



Source: NCC

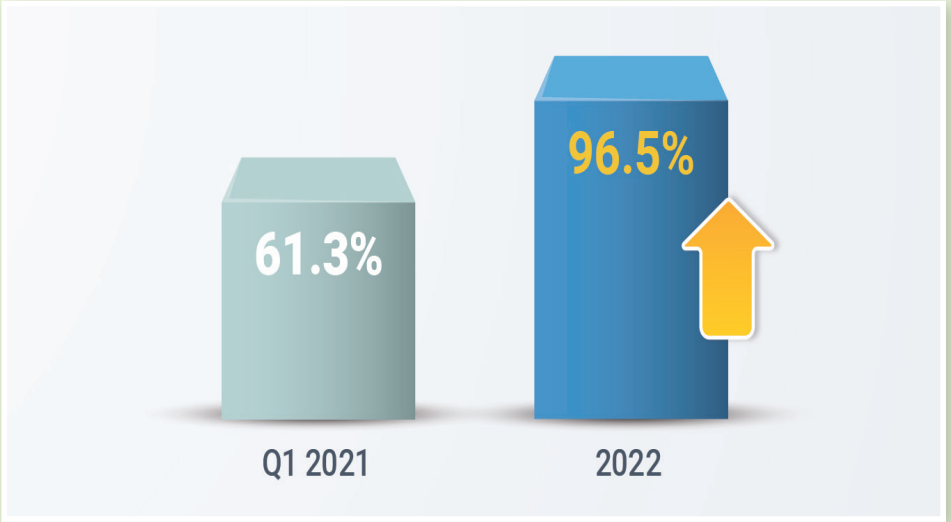
7 Source: Directorate-General of Budget, Accounting and Statistics, Executive Yuan. Summary of National Income Statistics. https://www.stat.gov.tw/public/data/dgbas03/bs4/nis93/ni.pdf

8 Telecom International Ratings for Taiwan from 2016 to 2022 https://www.ncc.gov.tw/chinese/news_detail.aspx?site_content_sn=5203&cate=0&keyword=&is_history=0&pages=0&sn_f=49388

5G network coverage rate

According to the latest information provided by the moda, as of the end of 2022, the population coverage rate of 5G base stations in Taiwan has reached 96.5%. The population coverage rate of 5G base station radio waves in the 87 remote townships (cities, towns, districts) of the 16 designated counties and cities has also reached 71.2%.(Figure 8)

Figure 8. 5G Network Coverage Rate in Taiwan



Source:moda

Use of the Internet

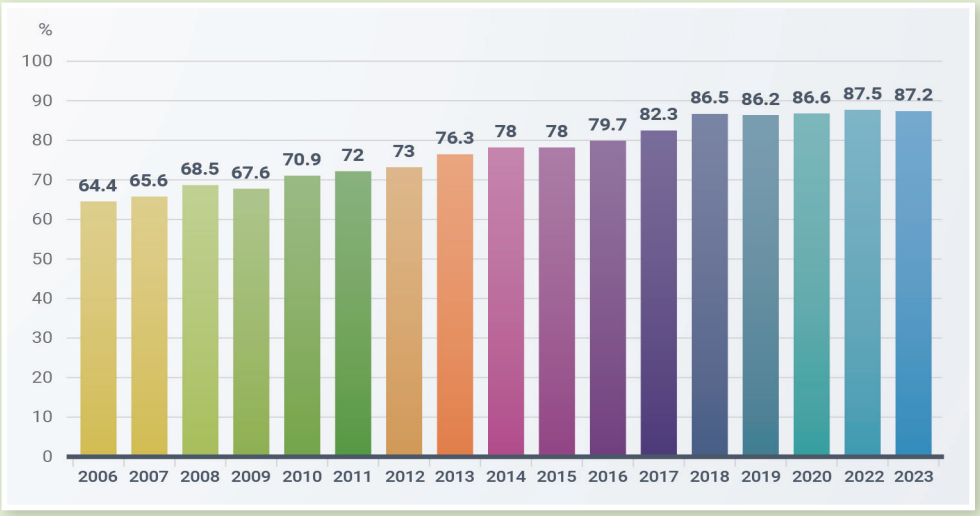
The "Use of the Internet" sub-dimension measures the ratio of people who effectively use their internet environment to access the internet. In addition to the "People using the internet," which is a necessary indicator for international comparisons, it also focuses on the frequency of internet usage among internet users.

● People using the internet

According to the Digital Development Survey Reports for the years 2020, 2021, and 2022, the percentage of individuals aged 12 and above who have used the internet in Taiwan has increased from 64.4% in 2006 to over 87% in recent years. The personal internet usage rate ranges from 87.2% to 87.5%, showing an overall growth of nearly 23 percentage points over the past 16 years. (Figure 9)

Comparing the personal internet usage rate with the household internet penetration rate, it can be observed that prior to 2014, the personal internet usage rate was consistently lower than the household internet penetration rate by 9 to 11 percentage points, indicating that while households had internet access, not everyone had the ability to go online. However, this phenomenon has significantly improved with the widespread adoption of mobile internet, reducing the gap between personal internet usage rate and household internet penetration rate to 3 to 4 percentage points.

Figure 9. Trend of Individuals Aged 12 and Above Using the Internets in Taiwan

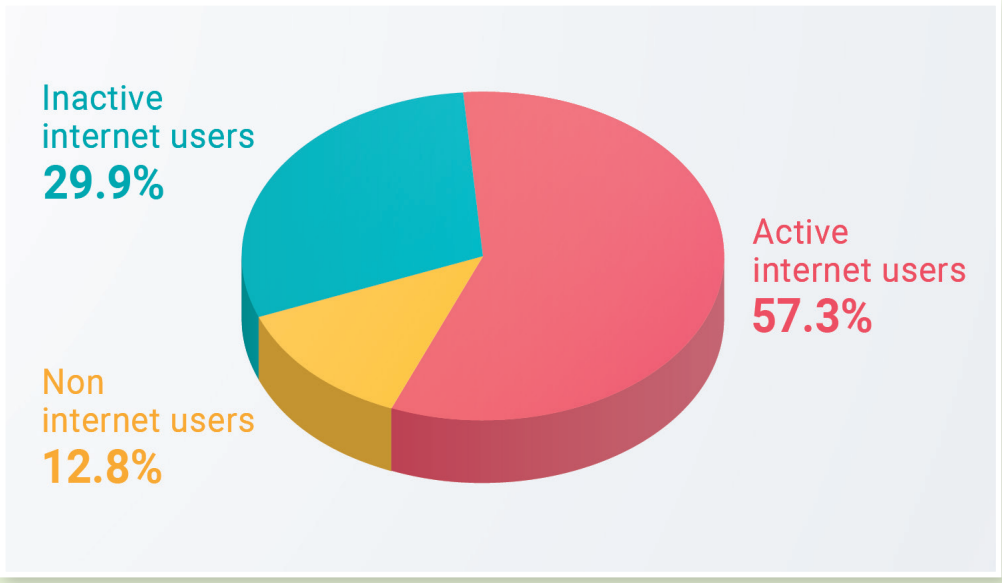


Internet use frequency

From the perspective of internet use frequency, according to the Digital Development Survey Report over the years, there has been no significant change in the internet usage frequency among those who have been online in the past three months. In 2023, 66.9% of respondents claimed to go online almost every day and spend a long time or have a high frequency of internet usage. 25.6% reported going online every day but with a lower duration or frequency. 2.3% reported going online four to six days a week, 3.8% reported going online one to three days a week, and 0.5% reported going online only once a week or less. These ratios are similar to the survey results from 2020 and 2022. On average, internet users in Taiwan still go online almost every day, with an average of 6.7 days per week, similar to 2020.(Figure 10)

Using the definition of "active internet users in the past three months with long duration or high frequency of internet usage," the percentage of active internet users among the population aged 12 and above in Taiwan increased slightly from 56.1% in 2020 to 57.3% in 2023.

Figure 10. Percentage of Active Internet Users in Taiwan among the Population Aged 12 and above



Variety of uses of the Internet

It is generally believed that internet participation can bring opportunities to individuals. However, even with internet access, the scope and depth of personal applications vary, resulting in different levels of digital opportunities. In order to observe the uneven distribution of opportunities and resources brought by diverse internet participation, Taiwan not only follows OECD's selection of 10 internet activities for international comparison, including e-mailing for private purpose, searching for information about goods or services, downloading software, consulting wikis, internet banking, instant messaging, online entrainment, online shopping, browsing or using official website services,and online reading, but also adds 5 additional indicators: cloud storage, mobile payments, internet content participation, digital audio and video editing, digital contents creation. Except for browsing or using official website services and digital creation, which are defined within the past year, the other indicators are defined based on usage within the past three months.

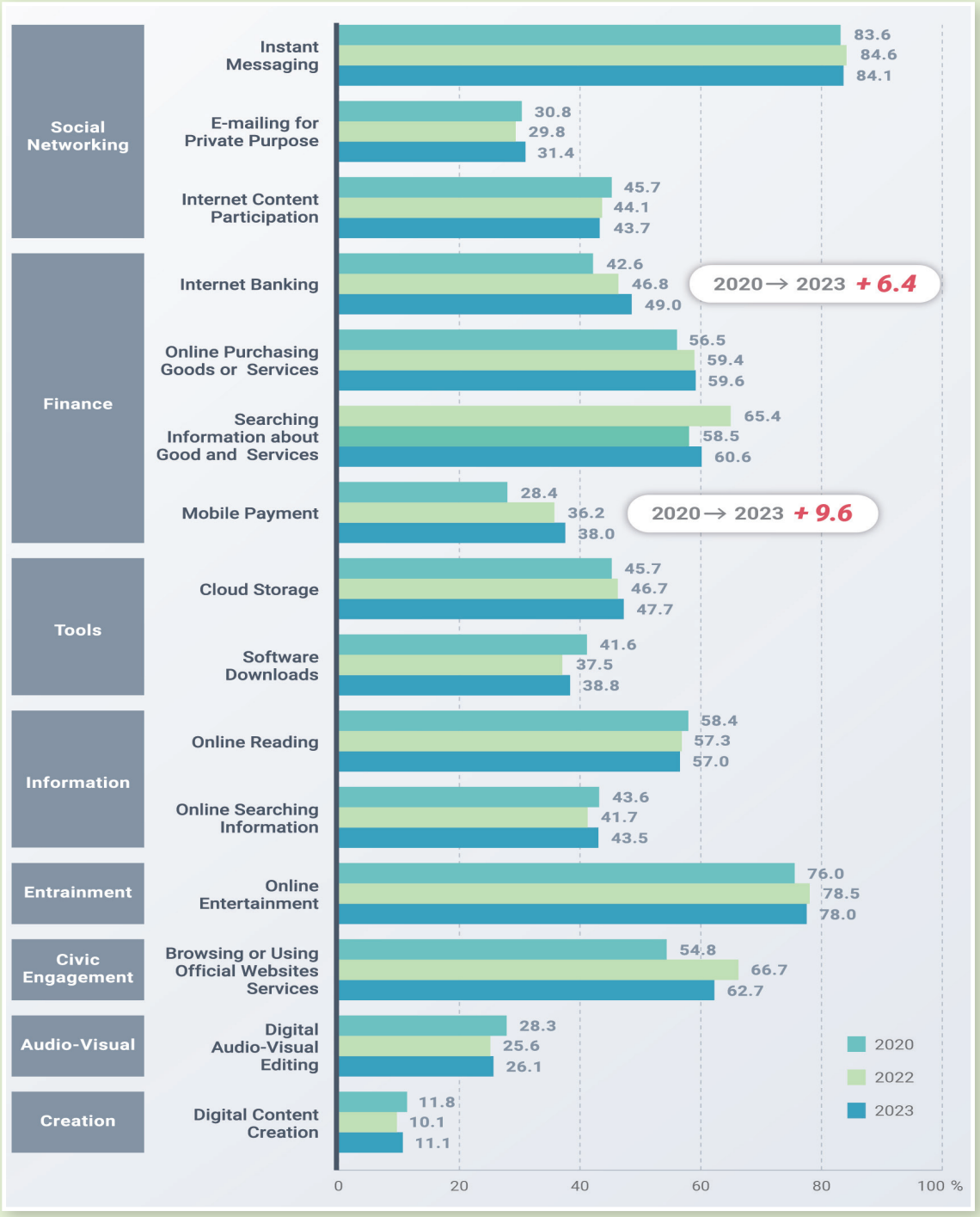
According to the Digital Development Survey Reports from 2020 to 2023, among the 15 internet usage indicators, Taiwan has consistently had 6 indicators with usage rates exceeding 50% in the past three years, although the rankings may differ slightly. The latest usage rate rankings in 2023 are as follows: instant messaging (84.1%), online entertainment (78.0%), browsing or using official website services (62.7%), searching for information about goods or services (60.6%), online shopping (59.6%), and online reading (57.0%). (Figure 11)

There are 7 internet activity indicators with usage rates between 30% and 50%: internet banking (49.0%), cloud storage (47.7%), internet content participation (43.7%), consulting wikis (43.5%), downloading software (38.8%), mobile payments (38.0%), and e-mailing for private purpose (31.4%).

Currently, only digital audio and video editing (26.1%) and digital contents creation (11.1%) have usage rates below 30%, indicating slower adoption of these applications.

Compared to the 2022 survey, the internet activity category that experienced the largest decrease in usage among internet users was browsing or using official website services (-4.0%). This can be attributed to services returning to physical locations after the pandemic. On the other hand, the demand for contactless payments and remote transfers, driven by the pandemic, continued to rise. The usage rates of mobile payments and online banking have grown for two consecutive years. Compared to the 2018 survey, the usage rate of mobile payments has increased by 9.6 percentage points over the past three years, while internet banking has increased by 6.4 percentage points.

Figure 11. Comparison of Internet Activities Usage in Taiwan



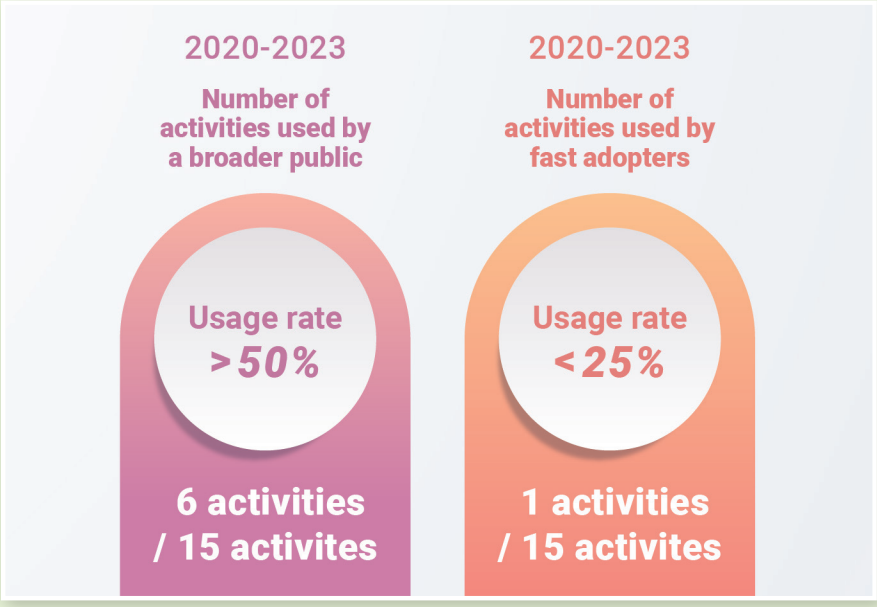
Inequality of Internet uses

The "Inequality of Internet uses" sub-dimension aims to capture the unequal application of technology under relatively equal access opportunities. In addition to the discrepancy in the quantity of internet usage types between the fast adopters and the majority, specific indicators have been added based on the national context to compare regional and identity differences in internet accessibility.

● Number of activities that are used by fast adopters and those activities that are used by a broader public

In the past three years, the survey results have shown that out of the 15 internet activities, 6 of them in Taiwan have a usage rate of over 50%, indicating that more than half of the population is familiar with and using these applications. On the other hand, only the "digital contents creation" activity has a usage rate below 25% among the 15 internet activities. This indicates that the majority of internet opportunities in Taiwan are not limited to fast adopters of information and communication applications. According to the OECD definition, Taiwan does not have a significant problem of unequal opportunities. (Figure 12)

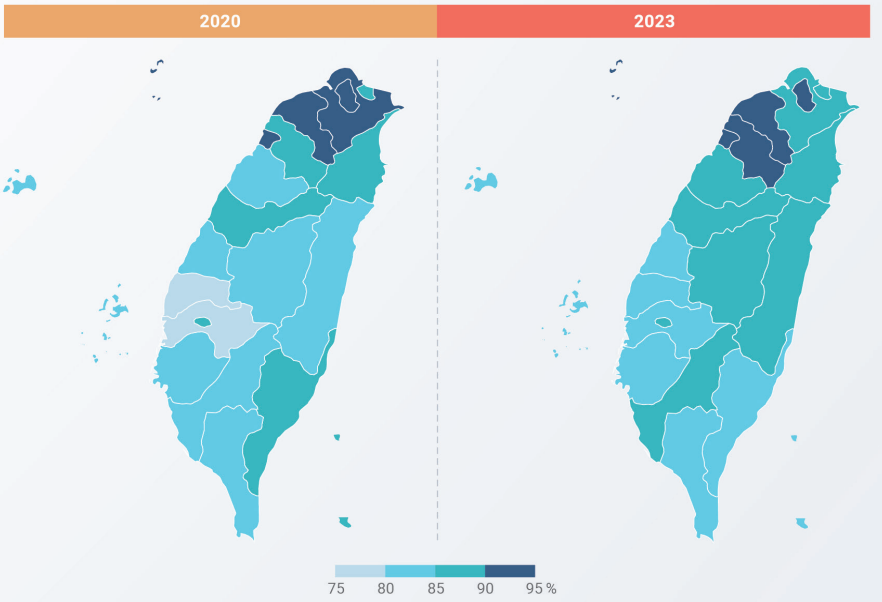
Figure 12. Differences in the Number of Internet Usage Types between Fast Adopters and a Broader Public Population in Taiwan



Regional difference in accessibility

Among the 22 cities and counties in Taiwan, Taipei City, Hsinchu City, and Hsinchu County consistently ranked among the top three with the highest internet penetration rates in 2022 and 2023. In 2023, Taoyuan City and Lienchiang County also had internet penetration rates exceeding 90%. (Figure 13)

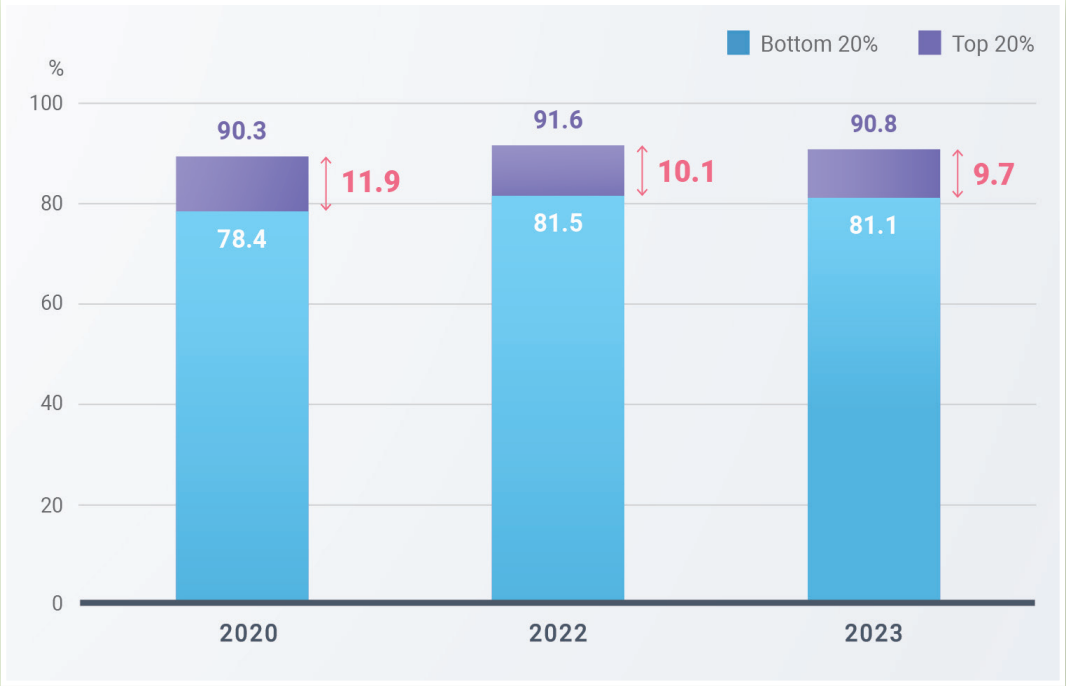
Figure 13. Yearly Changes in Internet Access Rate in Taiwan's 22 Cities and Counties



Cities and Counties	2020	2023	Cities and Counties	2020	2023
New Taipei City	90.0	88.8	Yunlin County	78.4	80.2
Taipei City	90.0	91.7	Chiayi County	75.8	80.4
Taoyuan City	91.3	90.4	Pingtung County	82.1	81.0
Taichung City	88.1	89.5	Penghu County	80.7	82.1
Tainan City	82.8	83.0	Hualien County	81.1	85.7
Kaohsiung City	84.1	85.0	Taitung County	85.1	82.1
Yilan County	85.7	88.5	Keelung City	88.7	89.1
Hsinchu County	89.7	91.1	Hsinchu City	90.1	92.3
Miaoli County	84.9	86.9	Chiayi City	88.5	88.4
Changhua County	83.3	82.0	Kinmen County	81.1	84.6
Nantou County	80.5	85.0	Lienchiang County	90.4	90.0

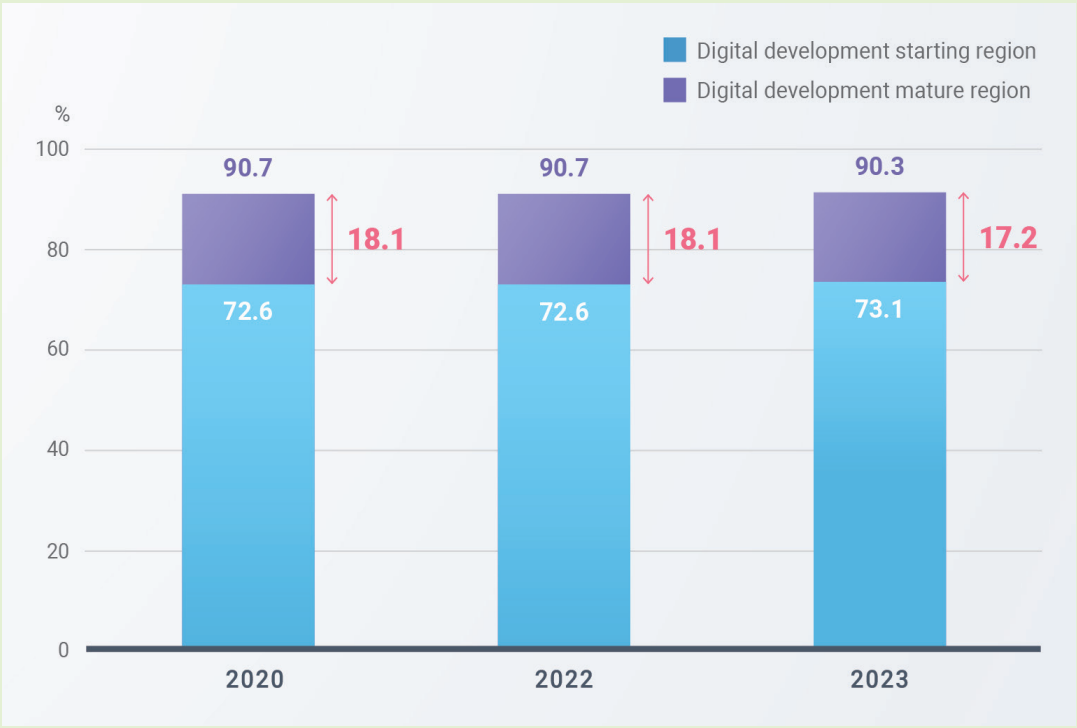
According to the weighted population, the average overall internet penetration rate for the top 20% of cities and counties in terms of population was 91.6% in 2022 and 90.8% in 2023, within the margin of error. On the other hand, the internet penetration rate for the bottom 20% of cities and counties exceeded 80% in both 2022 and 2023. According to the weighted population, the average overall internet penetration rate for these cities and counties was 81.5% in 2022 and 81.1% in 2023. This indicates that the gap in internet penetration rate between the top 20% and bottom 20% cities and counties in Taiwan has decreased from 11.9 percentage points in 2020 to 9.7 percentage points in 2023, showing an overall improvement of 18.5% over the three-year period. (Figure 14)

Figure 14. Gap in Internet Usage Rates between the Top 20% and Bottom 20% Counties and Cities in Taiwan



If classified by the digital development region in Taiwan, both in 2020 and 2022, the mature digital development region had the highest overall internet usage rate (90.7%), while the emerging digital development region had the lowest overall internet usage rate (72.6%), with a difference of 18.1 percentage points between the two surveys. In 2023, although the mature digital development region still had the highest overall internet usage rate (90.3%) and the emerging digital development region had the lowest overall internet usage rate (73.1%), the difference between the two regions decreased slightly from 18.1% to 17.2%, showing a 5% improvement. (Figure 15)

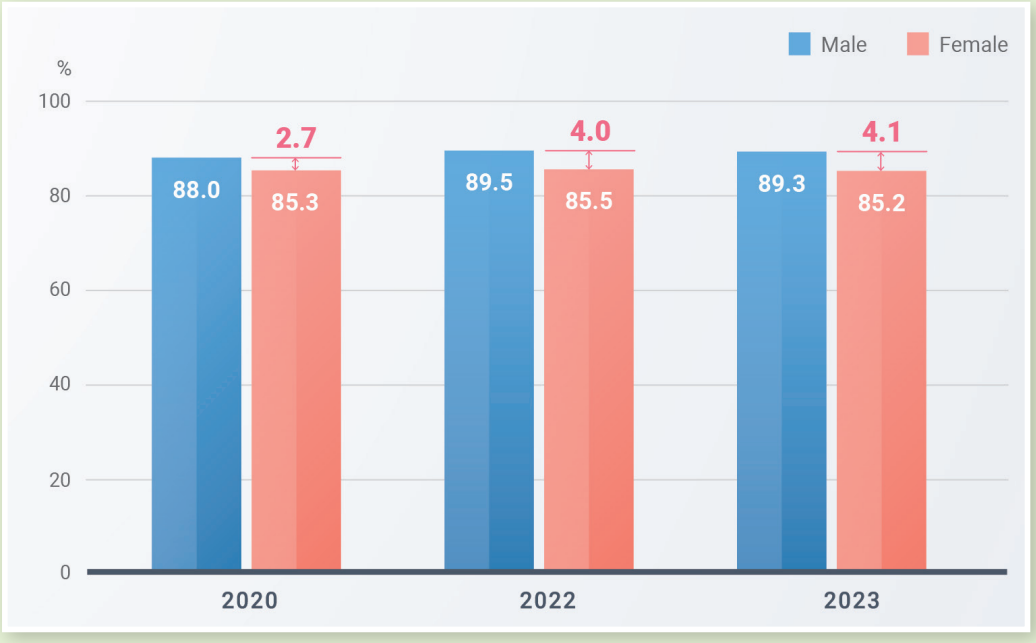
Figure 15. Gap in Internet Usage Rates Between Highest and Lowest Internet Usage Regions



Identity difference in accessibility

In 2020, the internet usage rate in Taiwan for individuals aged 12 and above was 88.0% for males and 85.3% for females, with a gender gap of 2.7 percentage points. In 2022 and 2023, the gender gap widened to 4.0 and 4.1 percentage points, respectively, indicating no improvement in gender equality. (Figure 16)

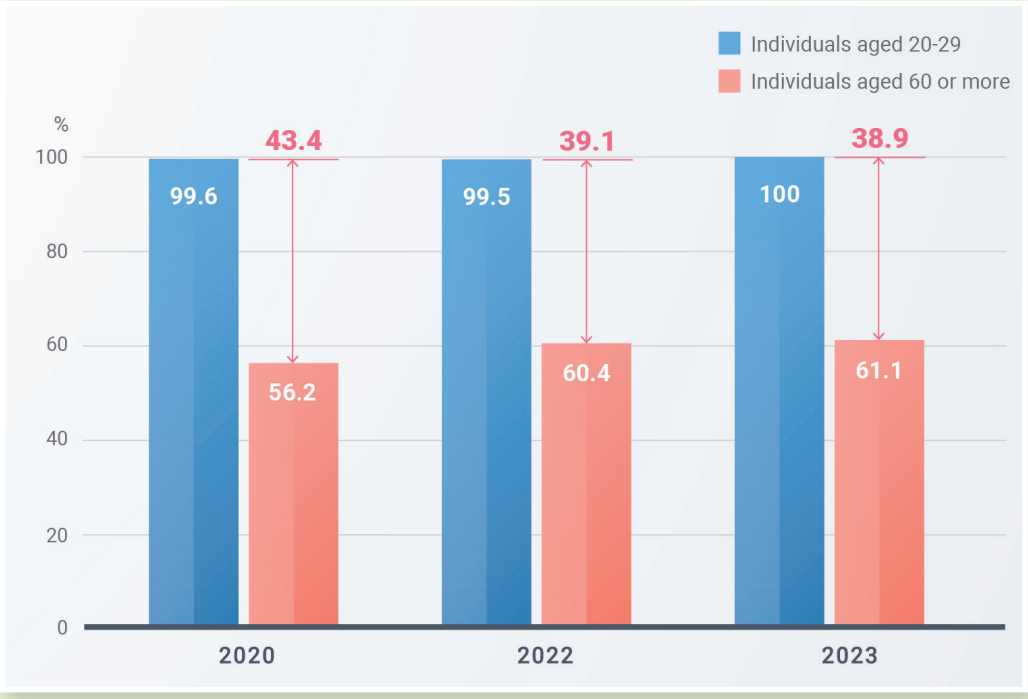
Figure 16. Gap in Internet Usage Rates Between Genders in Taiwan



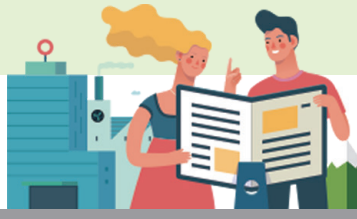
There is a significant generational gap in internet usage. In 2020, the difference in internet usage rate between the highest and lowest generations was 43.4 percentage points. However, this gap narrowed to 39.1 percentage points in 2022 and further decreased to 38.9 percentage points in 2023, showing an improvement of 10.4% over the past three years. (Figure 17)

When considering both gender and age as vulnerable factors, according to the Digital Development Survey Report 2023, among individuals aged 12-64, the internet usage rate is nearly equal between males and females. However, among women aged 60 and above, the internet usage rate is only 58.0%, significantly lower than the rate of 65.2% among their male counterparts. [9]

Figure 17. Gap in Internet Usage Rates Between the Highest and Lowest Generations

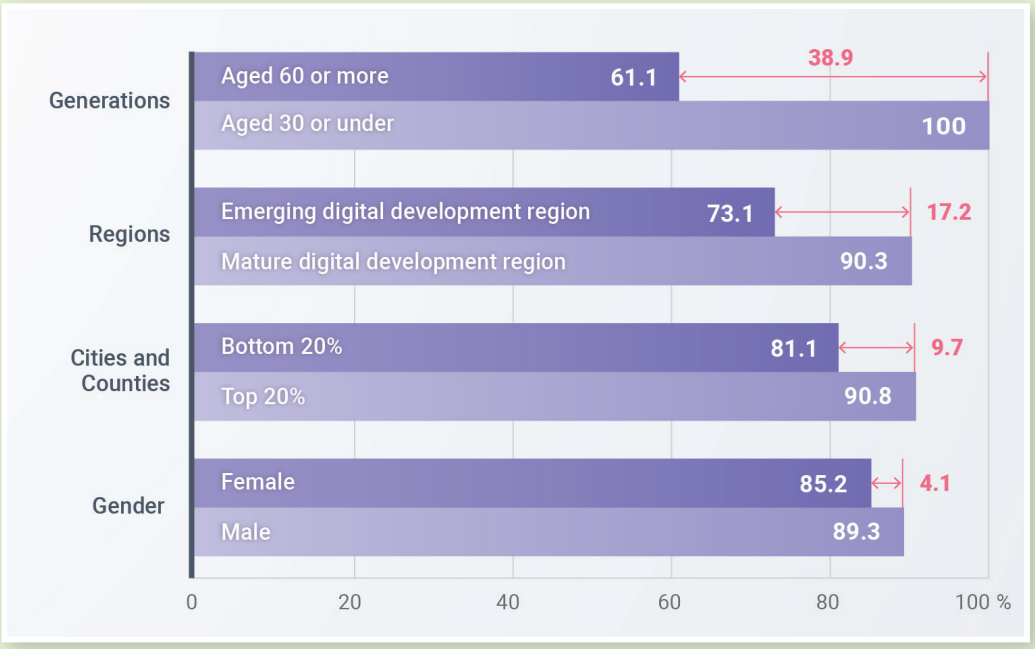


9 In 2021, the average life expectancy for men in Taiwan was 77.67 years, while for women it was 84.25 years. The age structure of women aged 60 and above shows higher aging and lower educational opportunities compared to men, which may be a contributing factor to the lag.



Based on various regional and identity factors, Taiwan currently faces the greatest information accessibility gap in terms of age, followed by challenges posed by remote towns or cities. The good news is that all three gaps have narrowed compared to the data from 2020. On the other hand, the gender digital opportunity gap is relatively minor, but it has slightly widened compared to the data from 2020. (Figure 18)

Figure 18. Gap in Internet Usage Rates Between Region and Identities (2023)

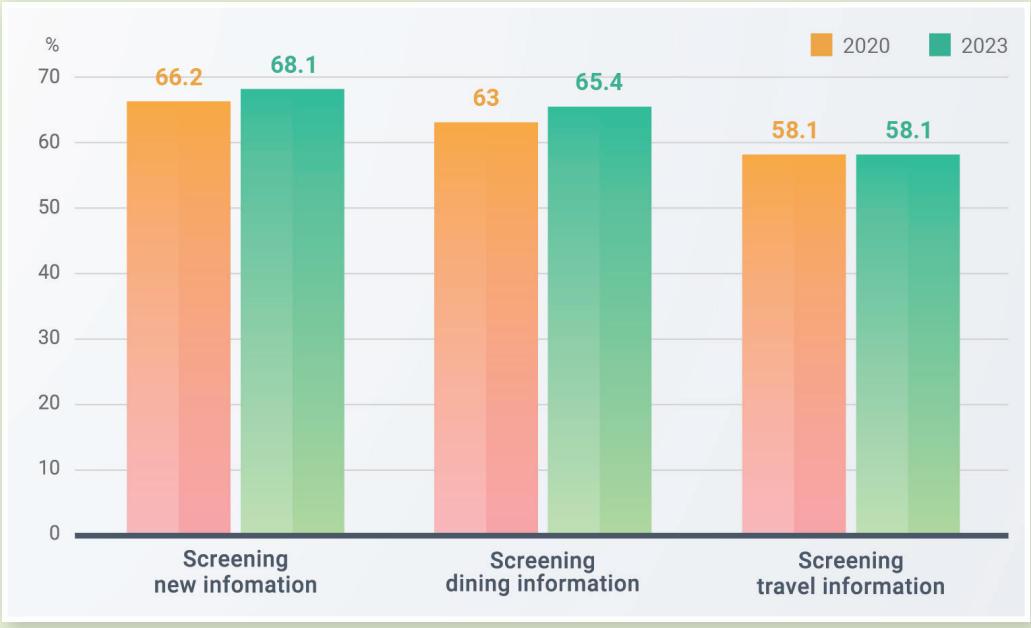


Information usage skills

Information overload is one of the important characteristics of the online world. For internet users to be able to utilize and create information, the ability to filter and discern the value of massive amounts of information is crucial. According to the Digital Development Survey Report 2020, before the occurrence of the COVID-19 pandemic, the self-rated ability of individuals aged 12 and above in Taiwan to filter and integrate information was as follows: 66.2% for new information, 63.0% for food information, and 58.1% for travel information, all rated at 6 or above on a scale of 1 to 10. (Figure 19)

After the pandemic, the self-assessed capabilities of individuals in terms of information usage have seen slight increases compared to 2020, except for travel-related abilities which remained at 58.1%. The rates of individuals who perceive themselves as having improved abilities in filtering and using new information for work or learning, as well as in filtering food information, have increased by 1.9 to 2.4 percentage points compared to 2020.

Figure 19. Self-Rated on Skills of Filtering Various Types of Information



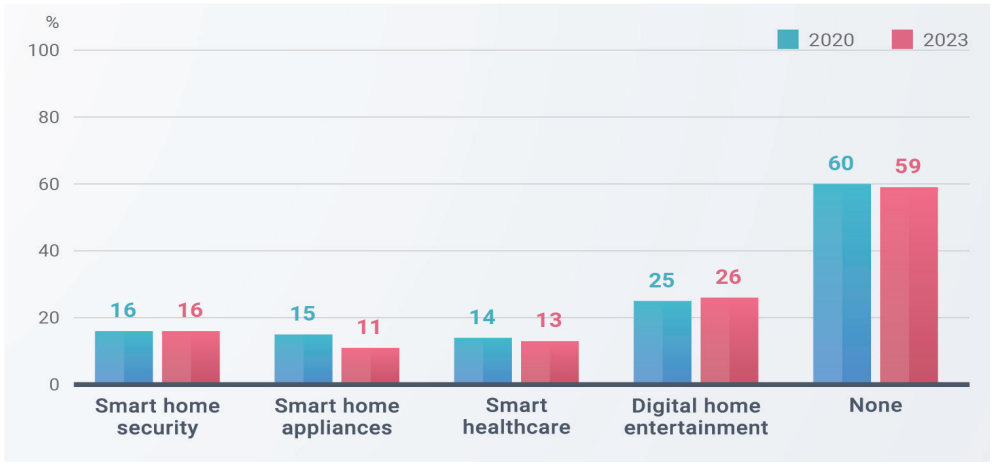
2. Housing

The "Housing" dimension of the "Digital Development Index Framework 2.0" is defined from the consumer perspective, based on the percentage of households in Taiwan that use applications or services such as smart monitoring, smart appliances, smart care, or digital home entertainment.

Looking at the current situation of households in Taiwan using internet or artificial intelligence service applications, the Digital Development Subsurvey Report 2023 shows that out of every 100 households, 16 households use smart monitoring services or applications such as internet monitoring, biometric recognition, theft prevention, and disaster prevention. Additionally, 11 households use smart appliances-related services or applications such as internet-connected appliances, smart sensors, and energy management. Moreover, 13 households use smart care-related services or applications such as internet-connected medical devices, care systems, and smart bracelets. Furthermore, 26 households use digital home entertainment-related services or applications such as smart TVs, smart speakers, and internet-connected gaming consoles. Overall, there are 41 households out of every 100 currently using internet or artificial intelligence service applications. (Figure 20)

Compared to the results of the survey in 2020, although there is still about 40% of households in Taiwan currently using internet or artificial intelligence service applications, the usage rate of smart appliances has slightly decreased compared to 2020. [10]

Figure 20. The Usage of Smart Home Related Services or Applications in Households in Taiwan



10 The number of households in Taiwan continues to grow. In 2019, there were 8.93 million households, and in 2021, there were 9.09 million households. The increase in quantity is mainly due to the rise in single-person households.

3. Education and Skills

In the "Digital Development Index Framework" in Taiwan, there are five sub-dimensions under the "Education and Skills" dimension, which evaluate "Digital skills," "Digital skills gap," "Online courses," "Digital resources at school" and "Teacher ICT Skills."

Digital skills and digital skills gap

Under the digital skills dimension, there should have been an assessment of digital skills for adults and students. However, since Taiwan has not yet introduced or developed an adult skills assessment system [11], there is currently no relevant data for adults.

As for the digital skills development of students, Taiwan originally used the number of high school students taking programming courses as a substitute indicator for students' ICT skills. However, since "programming" is a mandatory course for grade 10 students, the percentage of grade 10students taking programming courses compared to the number of graduates from junior high school in the previous year serves as a new indicator for general ability. The number of graduates from information-related majors in universities and colleges serves as an indicator of students' professional ICT skills.

In terms of general ability indicators, according to statistics from the Ministry of Education, there were a total of 191,732 grade 10 students in the 2022 academic year, and a total of 196,233 junior high school graduates in the 2021 academic year. [12] Therefore, the rate of 16-year-old teenagers with programming skills is 97.7%. (Figure 21)

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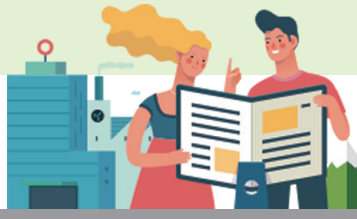
11 OECD member countries adopt the Program for the International Assessment of Adult Competencies (PIAAC), an online computer-based assessment that measures adult literacy, numeracy, and problem-solving skills in technology-rich environments. It aims to evaluate the human capital and skills supply and demand in different countries.

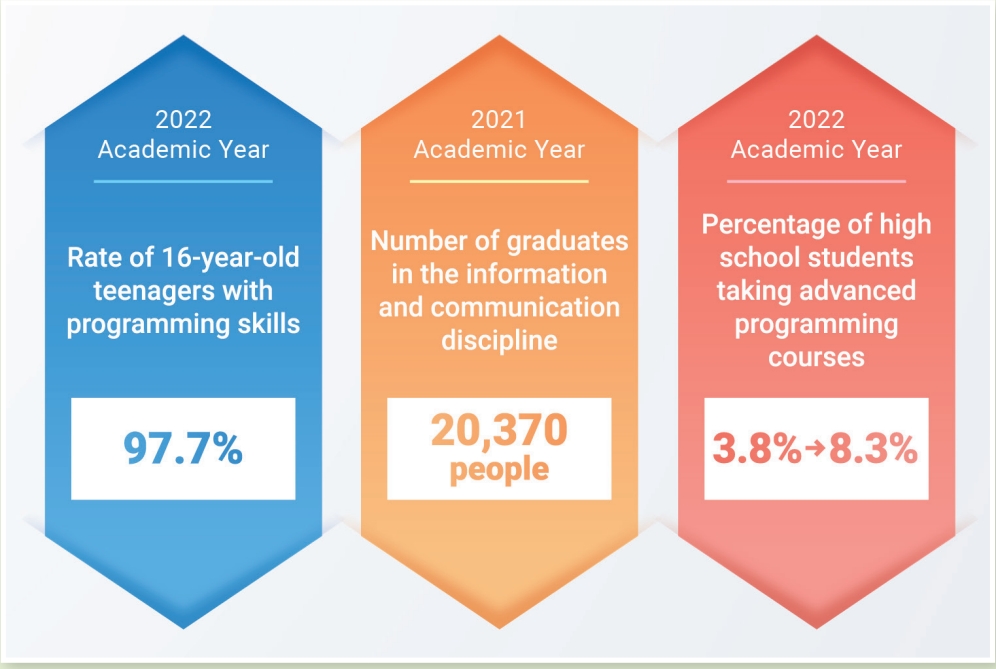
12 Source: Department of Statistics of MOE. https://depart.moe.edu.tw/ed4500/News_Content.aspx?n=5A930C32CC6C3818



As for professional ability indicators, the number of graduates in the information and communication discipline in the 2021 academic year was 20,370, slightly higher than the 19,081 in the 2019 academic year and the 19,386 in the 2020 academic year.

It is worth mentioning that the percentage of high school students taking advanced programming courses increased from 3.8% [13] in the 2020 academic year to 8.3% [14] in the 2022 academic year, indicating a continuous improvement in high school students' interest and ability in advanced programming.

Figure 21. Overview of ICT Skills among High School Students in Taiwan [15]



Source: MOE

13 2020 academic year, the total number of high school students was 608,090, with 22,922 students taking elective courses.

14 2022 academic year, the total number of high school students was 567,943, with 47,377 students taking elective courses.

15 High school age refers to 16 years old.

Online courses

During the outbreak of the COVID-19 pandemic, Taiwan's effective measures led to a record of zero local infections for 8 consecutive months from April to December 2020. At that time, a survey showed that 21.8% of people aged 12 and above in Taiwan adopted online learning.

In May of the following year (2021), Taiwan's COVID-19 situation escalated to Level 3 alert, resulting in the suspension of in-person classes in all levels of education and a shift to online courses. If a survey were conducted during that time, the usage rate would undoubtedly have surged, providing insights into the state of online learning. Unfortunately, no digital development survey was conducted in 2021, and the surveys in 2022 and 2023 were conducted when the pandemic was easing or about to be lifted. Looking back at the usage situation in the past three months, the usage rate in 2022 was 22.4% (including the summer vacation), and in 2023, including the winter vacation, the demand for online learning significantly declined, with a usage rate even lower than before the pandemic, reaching a new low of 17.7%. (Figure 22)

Figure 22. Comparison of Online Learning Participation among Individuals aged 12 and above in Taiwan

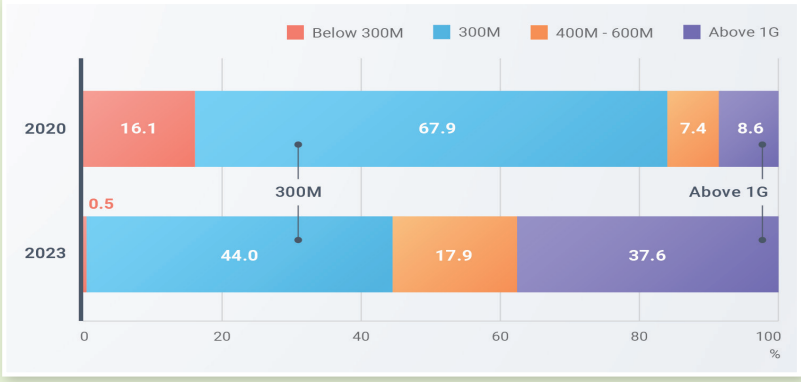
Digital resources at school

Since the third grade of elementary school, Taiwan has arranged computer courses, and the rate of students aged 15 who can access school computers via the internet is 100%. However, this lacks discrimination, so it has been replaced with indicators of unequal internet connectivity rates at different levels of schools. The former measures the percentage of schools with internet connectivity rates reaching 1Gbps, while the latter measures the difference in connectivity rates between the top 20% and bottom 20% of schools, reflecting the disparities in basic network environments among different levels of schools.

According to statistics from the MOE, in 2020, there were a total of 3,386 national primary and secondary schools in Taiwan, of which only 290 schools had internet connectivity rates of 1Gbps or higher, accounting for 8.6% of the total number of primary and secondary schools. 254 schools had internet connectivity rates between 400M and 600M, accounting for 7.4% of the total number of primary and secondary schools. The network bandwidth of 2,298 schools was 300M, accounting for 67.9% of the total number of primary and secondary schools. In addition, a total of 544 schools had campus bandwidth below 300M, accounting for 16.1% of the total number of primary and secondary schools. (Figure 23)

In the latest statistics for 2023, there are a total of 3,475 national primary and secondary schools in Taiwan. The internet connectivity rates of schools have greatly increased. The percentage of schools with connectivity rates of 1Gbps has increased from 8.6% to 37.6%, the percentage of schools with connectivity rates between 400M and 600M has increased from 7.4% to 17.9%, and the percentage of schools with a bandwidth of 300M has decreased from 67.9% to 44.0%. Schools with connectivity rates below 300M now only account for 0.5%.

Figure 23. Distribution of Internet Bandwidth in High School Campuses in Taiwan



Source: MOE

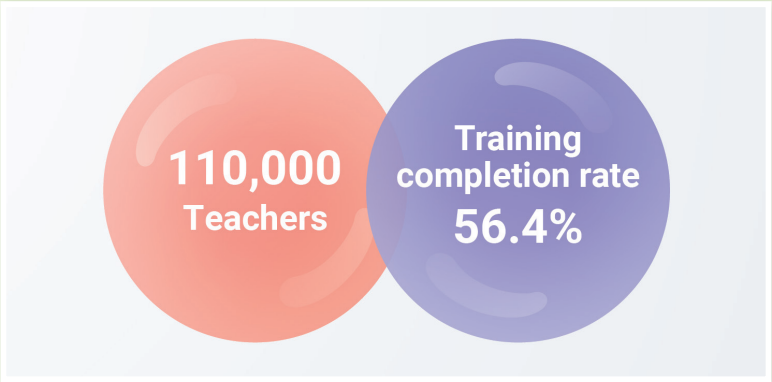
The Digital Development Index Framework uses the difference in internet connectivity rates between the top 20% and bottom 20% of schools as a substitute indicator to observe the inequality of school resources. In 2023, the top 20% of schools have a bandwidth of 1G, while the bottom 20% have a bandwidth of 300M, resulting in an average internet bandwidth of 294M and an inter-school connectivity rate difference of 705M, compared to 578M in 2020. This means that although the internet connectivity rates of primary and secondary schools in Taiwan have greatly increased, the difference between schools has actually intensified from the perspective of fairness.

Teacher ICT skills

Due to Taiwan's non-participation in the OECD's "Teaching and Learning International Survey," and considering the lack of available data for updates in the future, the MOE has implemented the "The Digital Learning Enhancement Plan for Grade 1-12 Students." This program provides subsidies to county and city governments and national K-12 schools to conduct nationwide training for teachers to enhance their digital teaching abilities. Therefore, the number of teachers who have completed the basic training courses is used as an indicator to evaluate the overall ratio of teachers with ICT teaching skills.

According to data provided by the MOE, there are approximately 195,000 K-12 school teachers in the 2022 academic year. As of March 2023, around 110,000 teachers have completed the basic digital teaching training, achieving a training completion rate of 56.4%. (Figure 24)

Figure 24. Number of K-12 School Teachers in Taiwan Who Have Completed Basic ICT Training Courses



Data Source: MOE

4. Income and Wealth

The dimension of "Income and Wealth" include three sub-dimensions – "Labor market returns to ICT tasks," "Online consumption" and "Selling online".

Labor market returns to ICT tasks

Regarding the salary difference between information workers and non-information workers, although there is no detailed salary statistics by industry in our country, according to the MOL's salary survey for the years 2018-2020 [16] , the starting salaries for professionals in the information and communication industries are NT$30,511 for those with a bachelor's degree and NT$35,191[17] for those with a graduate degree. These starting salaries are similar to those of professionals in other industries with the same educational background, indicating that the salary premium for information workers is limited. (Table 5)

However, starting from 2021, the MOL has removed the survey items on starting salaries from the occupation-based salary survey. Currently, salary statistics for newly employed graduates are calculated based on big data from graduates of senior secondary schools and above, monthly income for labor retirement pension contributions, and insurance for public servants. According to the latest statistics released in April 2023 [18] , the starting salaries for professionals in the publishing, audiovisual production, broadcasting, and information service industries with a bachelor's degree are NT$33,000, and for those with a graduate degree, it is NT$57,000. The former has increased by NT$2,500 compared to the survey results from 2021, while the latter has significantly increased from NT$35,191 to NT$57,000, second only to the manufacturing industry. This indicates that information industry professionals with a graduate degree have significantly better salary conditions than most industries, showing a clear salary premium for those with an information background.

16 Source: https://pswst.mol.gov.tw/psdn/

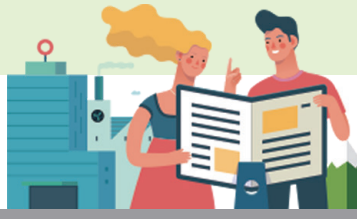
17 According to the 2019 survey, the starting salaries for entry-level professionals in the information and communication industries were NT$32,723 for those with a bachelor's degree and NT$37,659 for those with a master's degree. However, please note that these figures may have changed since the survey was conducted.

18 Source: https://www.mol.gov.tw/1607/1632/1633/58627/

Table 5. Comparison of Salaries of Entry-Level Professionals with University Degree or Above

Industry	College Degree New Graduate		Master's degree New Graduate	
	2020	2023	2020	2023
Publishing, Audio and Video Production, Broadcasting, Information and Communication	$30,511	$33,000	$35,191	$57,000
Mining and Quarrying	$28,909	$29,000	$31,723	-
Manufacturing	$29,699	$32,000	$34,698	$58,000
Electricity and Gas Supply	$31,424	$34,000	$33,689	$30,000
Water Supply and Remediation Activities	$30,815	$30,000	$34,392	$35,000
Construction	$30,165	$29,000	$33,650	$40,000
Wholesale and Retail Trade	$29,548	$29,000	$34,469	$42,000
Transportation and Storage	$30,308	$32,000	$32,549	$37,000
Accommodation and Food Service Activities	$28,018	$29,000	$30,588	$30,000
Financial and Insurance Activities	$32,940	$34,000	$37,181	$46,000
Real Estate Activities	$30,218	$29,000	$34,638	$35,000
Professional, Scientific and Technical Activities	$30,127	$31,000	$35,483	$44,000
Support Service Activities	$28,536	$29,000	$31,584	$38,000
Education	$28,570	$33,000	$33,528	$44,000
Human Health and Social Work Activities	$30,372	$36,000	$34,709	$39,000
Arts, Entertainment and Recreation	$28,110	$29,000	$30,696	$33,000
Other Personal Service Activities	$26,676	$29,000	$30,348	$35,000

Data Source: MOL

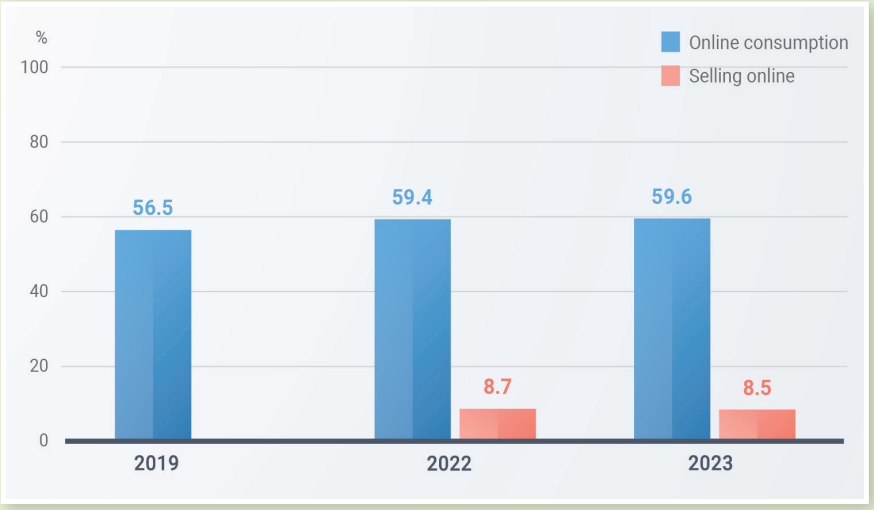


Online consumption and selling online

From the perspective of individuals aged 12 and above in Taiwan participating in online consumption or the sharing economy, the percentage of individuals who made online purchases, ordered food, booked transportation, or made hotel reservations through the internet in 2022 and 2023 ranged from 59.4% to 59.6%. Although the usage rate did not show significant changes between these two years, compared to the 2019 Digital Opportunity Survey [19] , it is evident that the population engaging in online shopping in Taiwan has been growing, with a 3% increase over a span of 4 years.

Regarding the percentage of individuals who sold goods or services online in the past three months, it remained stable at 8.5% to 8.7% in the past two years. Figure 25 illustrates the participation individuals aged 12 and above in Taiwan in online consumption and selling online.

Figure 25. Comparison of Online Consumption and Selling Online of Population Aged 12 above in Taiwan [20]



19 Please refer to https://moda.gov.tw/digital-affairs/digital-service/op-survey/2080 for the usage rates in the past year.

20 2019, 2022, and 2023 surveys asked about usage rates in the past year, while the 2020 survey asked about usage rates in the past three months, so it was not included in the comparison.

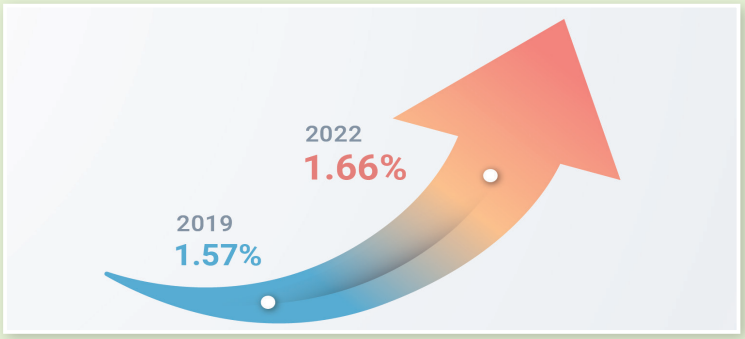
5. Jobs

In the "Digital Development Index Framework" of Taiwan, the "Job" dimension includes six sub-dimensions: "Employment in information industries," "Work digitalization level," "Online job search," "Jobs at risk of automation," "Reduction in extended job strain associated with computer-based jobs" and "Job stress associated with computer-based jobs". However, the last two sub-dimensions, "Reduction in extended job strain associated with computer-based jobs" and "Job stress associated with computer-based jobs," have been temporarily postponed due to updates in the survey indicators cited by OECD.

Employment in information industries

According to the 2022 Manpower Survey [21] conducted by the Directorate-General of Budget, Accounting and Statistics, Taiwan has a total of 11.418 million employed individuals, including 43,000 in the telecommunications industry, 123,000 in computer and programming occupations, and 24,000 in information services. Compared to 2019 the number of individuals in computer and programming occupations increased from 116,000 to 123,000, a growth rate of 6.0%. The number of individuals in information services increased from 17,000 to 24,000, a growth rate of 41.2%. The combined ratio of employment in the information industries to total employment in Taiwan increased from 1.57% in 2019 to 1.66%. (Figure 26)

Figure 26. Percentage of Information Industry Employment in Taiwan



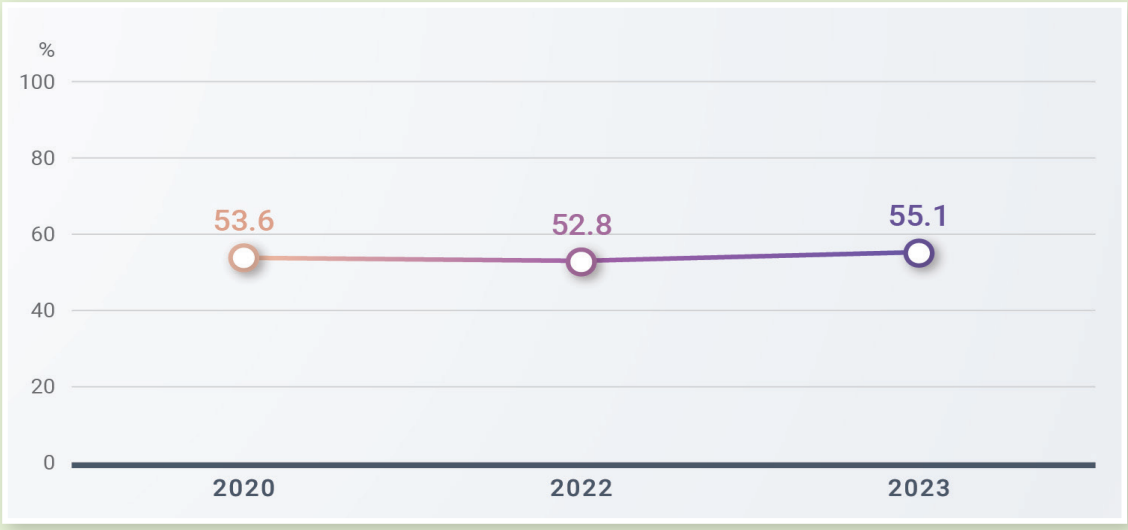
Data Source: Directorate-General of Budget, Accounting and Statistics, Executive Yuan

21 Source: https://www.stat.gov.tw/News_Content.aspx?n=4001&s=231112

Work digitalization level

According to the Digital Development Survey Report 2023, among employed individuals aged 12 and above in Taiwan, 22.6% do not require the use of computers or the internet for work, while 76.6% of employed individuals require computers or the internet for work. Among those who require computers or the internet, 24.2% have a usage rate between 1% and 50%, 24.7% have a usage rate between 51% and 99%, and 27.7% have job responsibilities that entirely rely on computers or the internet, with a 100% digitalization level. On average, the work digitalization level for employed individuals in Taiwan is 55.1%, showing a slight increase compared to 2020 (53.6%) and 2022 (52.8%). (Figure 27)

Figure 27. Comparison of the Work Digitalization Level of Employees aged 12 and above in Taiwan



Online job search

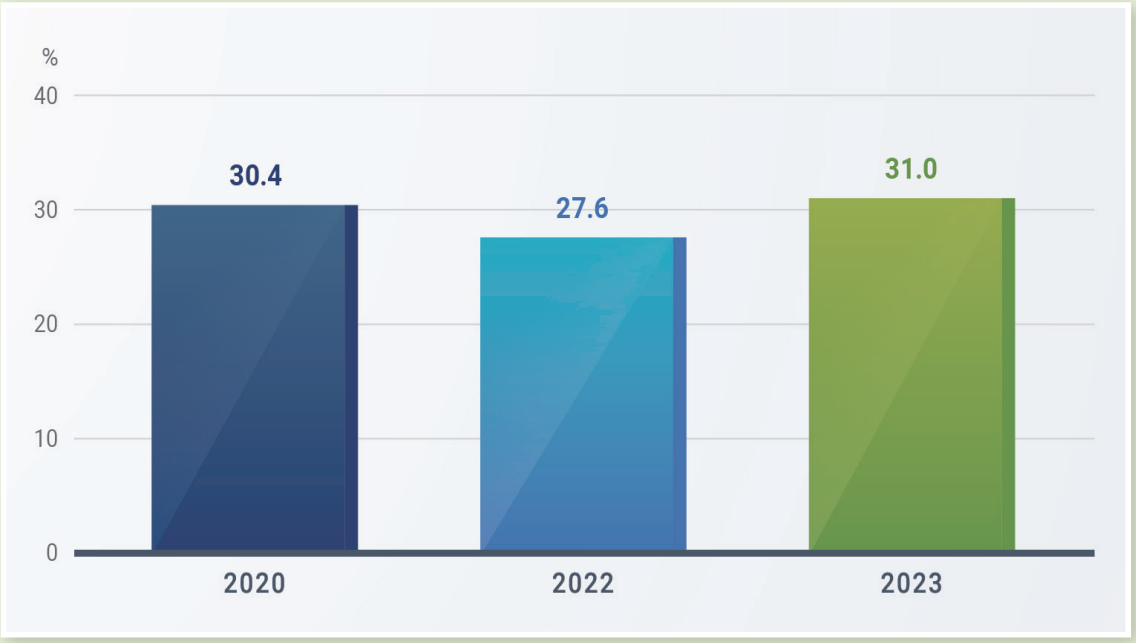
Online job searchrefers to the experience of individuals who have used the internet to access job information (subscribed to job newsletters) or applied for jobs online (such as submitting resumes) within the past three months. According to the annual Digital Development Surveys, the percentage of individuals aged 12 and above in Taiwan who have engaged in online job seeking activities has slightly increased from 13.1% in 2020 to 15.4% in 2022, and further rose to 16.8% in 2023. (Figure 28)

Figure 28. Online Job-seeking Information Viewing or Resume Submission by Individuals aged 12 and above in Taiwan in the Last Three Months

Jobs at risk of automation

The MOL has not developed risk assessments for various occupations. According to the annual Digital Development Survey reports, among employed individuals aged 12 and above in Taiwan, the percentage of those who believe that their job content is very likely or somewhat likely to be replaced by automation or artificial intelligence in the future ranged from 27.6% to 31.0% over the past three years. This means that approximately 3 out of 10 workers may face the possibility of job displacement due to technological advancements. On the other hand, around one-fifth of employed individuals perceive no risk of being replaced, with percentages ranging from 21.9% to 24% (Figure 29).

Figure 29. Self-Rated on the Possibility of Current Jobs Will Be Replaced by Automation or Artificial Intelligence



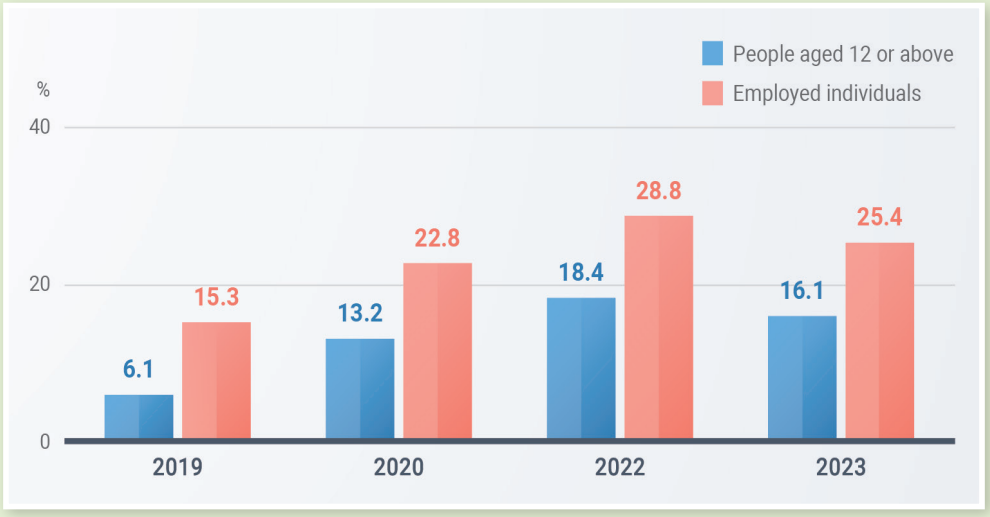
6. Work-Life Balance

In "Digital Development Index Framework," the "Work-Life Balance" dimension focuses on the opportunities for remote work brought by technological advancements, as well as the pressure of being constantly connected to work due to instant messaging expectations.

Teleworking

According to the 2019 Digital Opportunity Survey conducted prior to the global outbreak of the COVID-19 pandemic, only 6.1% of individuals aged 12 and above in Taiwan had experience with remote work. However, after the outbreak, the percentage of people who had engaged in remote work in the past three months increased to 13.2% in 2020, 18.4% in 2022, and then decreased to 16.1% in 2023. The demand for remote work slightly declined. If we consider the employed population as the denominator, the percentage of remote workers increased from 22.8% in 2020 to 28.8% in 2022, and then slightly decreased to 25.4% in 2023. In other words, after the pandemic, approximately 1 in 4 employed individuals had engaged in remote work in the past three months. (Figure 30)

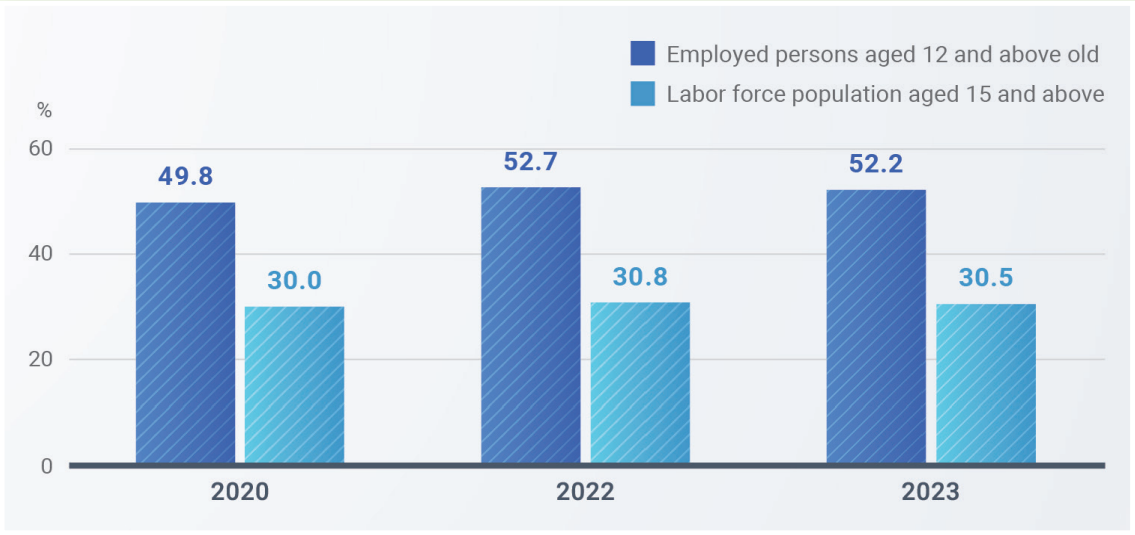
Figure 30. Percentage of Engaging in Teleworking in Taiwan



Worries about work when not working

According to the NDC's Digital Development Survey Report 2020, approximately half (49.8%) of employed individuals aged 12 and above in Taiwan still receive work-related messages or need to continue handling work matters online after work hours. This percentage increased to 52.2% to 52.7% in the years 2022 and 2023. If we consider the total labor force population aged 15 and above, around 30% of individuals in 2020, 2022, and 2023 still have work-related concerns after work hours, showing no significant change over time (Figure 31).

Figure 31. Percentage of Employed Individuals Handling Work Matters Online after Work Hours in Taiwan



7. Health

In the "Digital Development Index Framework" of Taiwan, the "Health" dimension encompasses four sub-dimensions, including "Medical appointments online," "Online health information," "Physical health risks," and "Mental health risks."

Medical appointments online

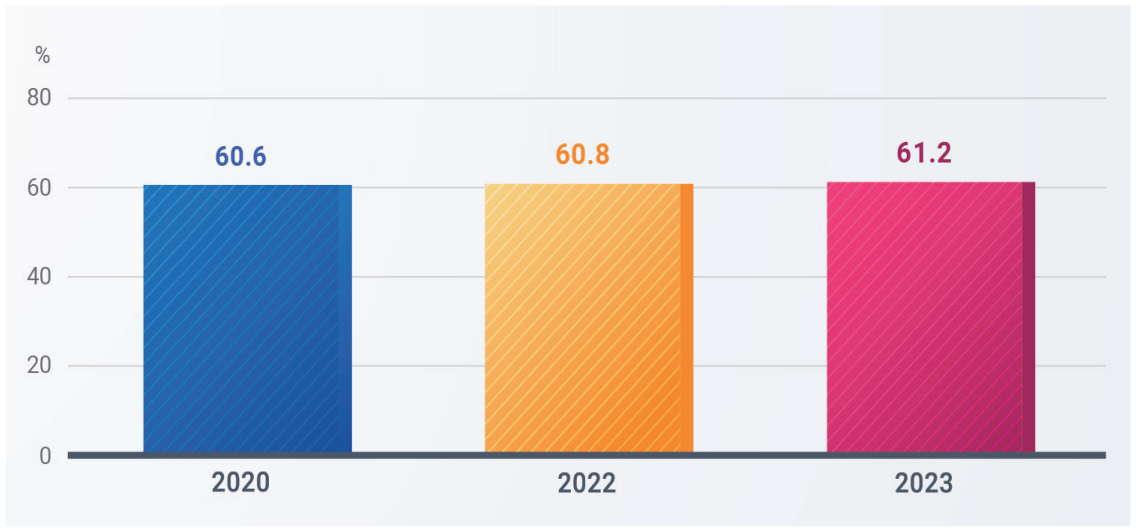
In the "Online Medical Appointment" sub-dimension, in 2020, the measurement indicator was based on the usage of online appointment registration in the past year, while starting from 2022, it followed the OECD standard and measured the usage within the past three months. The Digital Development Surveys conducted in previous years showed that in 2020, 40.6% of respondents had used online registration and appointment for medical visits in the past year. In 2022 and 2023, with the measurement period reduced to the past three months, the usage rate decreased to 36.7%. (Figure 32)

Figure 32. Population Aged 12 above Making Medical Appointment Online

Online health information

The "Online health information" sub-dimension in Taiwan measures the percentage of people aged 12 and above who search for health-related information online. The Digital Development Surveys conducted in recent years have consistently shown that the rate of people in Taiwan using the internet to search for health-related information has remained stable. In the past three months, the rate has ranged from 60.6% to 61.2%, with little variation. (Figure 33)

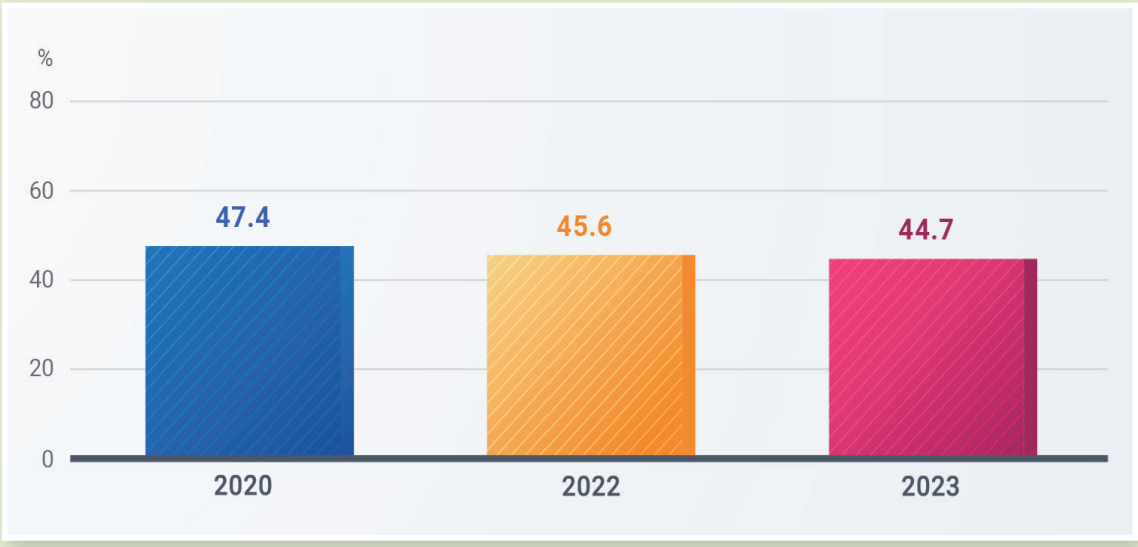
Figure 33. Population Aged 12 above in Taiwan Searching Health Information Online



Physical health risks

The "Physical health risks" mainly assesses the deterioration of physical health among the population in Taiwan due to internet use. The survey results show that the percentage of individuals aged 12 and above who reported a deterioration in their physical condition due to internet use in the past three months has decreased over the years. It decreased from 47.4% in 2019, to 45.6% in 2022, and further decreased to 44.7% in 2023. This phenomenon may indicate a change in people's perception of the negative impact of internet use on their physical well-being, or it may reflect the effectiveness of related prevention and education measures. (Figure 34)

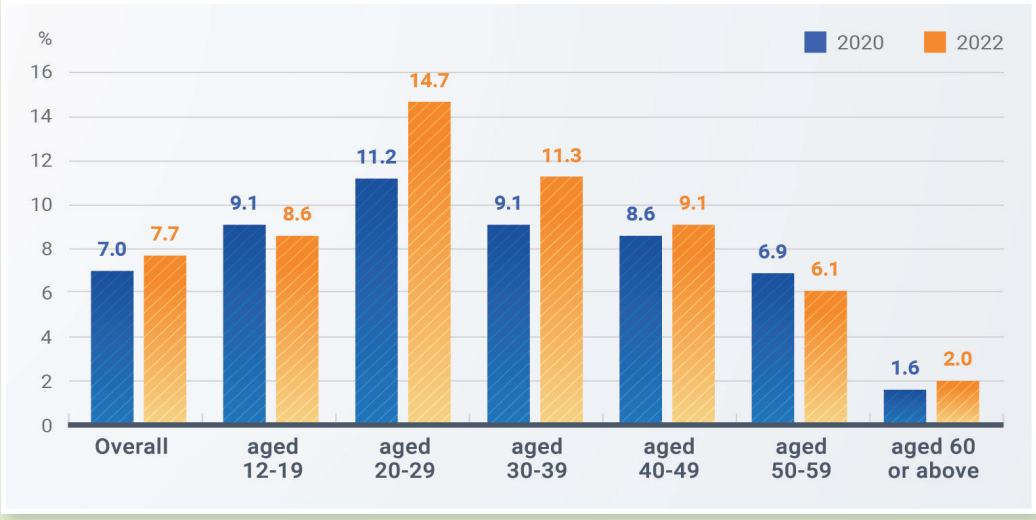
Figure 34. Population Aged 12 above in Taiwan Feeling That Their Physical Condition Deteriorated Due to Internet Use



Mental health risks

In Taiwan's Digital Development Index Framework, "Mental health risks" is measured by the percentage of internet users aged 12 and above who are identified as having addiction risk based on the Chen Internet Addiction Scale short version (CIAS-10) [22] . According to the latest Internet Addiction Research conducted by the moda in December 2022 [23] , the average total score on the CIAS-10 for internet users aged 12 and above in Taiwan was 18.9 in 2022. Using a cut-off point of 27/28, 7.7% of the population aged 12 and above in Taiwan were classified as being at risk of internet addiction. When examining different age groups, the highest rate of internet addiction risk was found among individuals aged 20-29 (14.7%), followed by 8.6% to 11.3% among those aged 12-19 and 30-49, respectively. This indicates that internet addiction is not limited to school-age children. (Figure 35)

Figure 35. Percentage of Internet Addiction Risk among Individuals aged 12 and above in Taiwan



22 In 2015, the Ministry of Health and Welfare commissioned a research team led by Professor Chen, Sue-Huei from the Department of Psychology at National Taiwan University to develop a 10-item version based on the 26-item Chen Internet Addiction Scale (CIAS). This version is used as a tool to screen for internet addiction tendencies.

23 The NDC conducted the first-ever internet addiction research in 2015, surveying individuals aged 12 and above. This research is unique internationally as it explores internet addiction among adults.

8. Social Connections

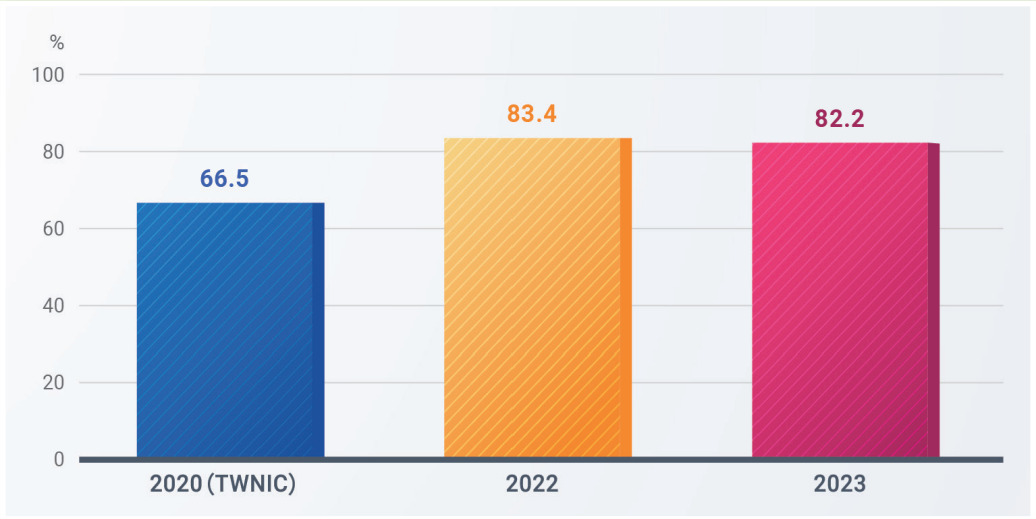
In the "Digital Development Index Framework" in Taiwan, the "Social Connections" dimension includes the indicators of "Using online social networks," "Digital content participation" and "Cyberbullying".

Using online social networks

According to the "2020 Taiwan Internet Report" by TWNIC, only 80.1% of internet users aged 12 and above in Taiwan accessed social networking sites, forums, or blogs. Considering the entire population aged 12 and above, the participation rate in social networking in Taiwan is approximately 66.5%.

In 2022, the indicators were changed to be based on the Digital Development Survey conducted by the moda. The results showed that in the past two years, the usage rate of social networking among internet users aged 12 and above in Taiwan ranged from 94.3% to 95.3%. Considering the entire population aged 12 and above, on average, there are 82 users of social media for every 100 individuals in Taiwan. (Figure 36)

Figure 36. The Participation Rate of Using Online Social Networks in Taiwan

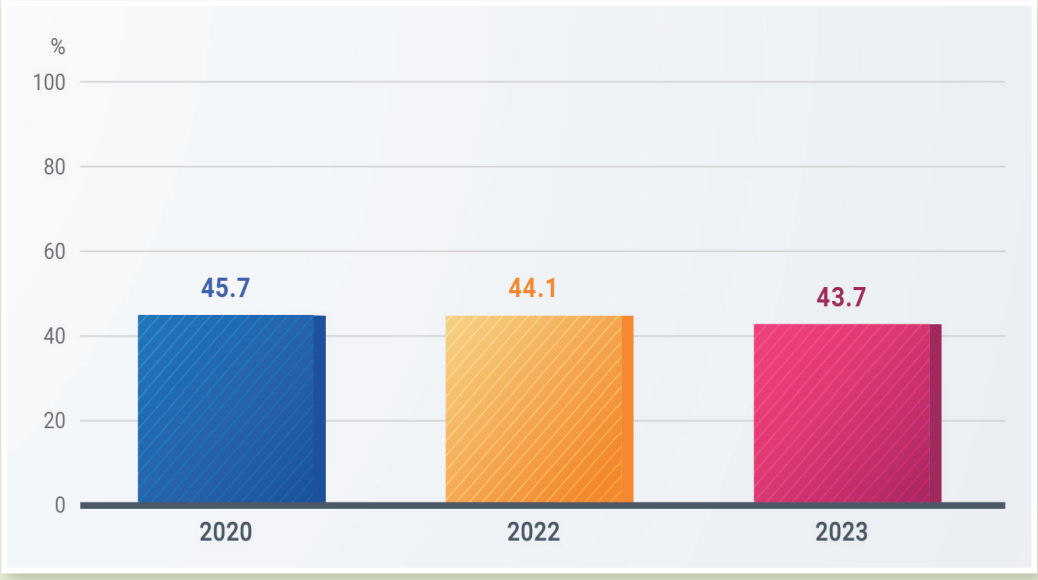


Digital content participation

According to the annual digital development surveys, the percentage of individuals aged 12 and above in Taiwan who have posted on social media or uploaded photos or videos to blogs in the past three months has slightly decreased from 45.7% in 2020 to 44.1% in 2022 and 43.7% in 2023. (Figure 37)

Looking at the 38.5 percentage point difference between the indicators of online social networks participation (82.2%) and digital content participation (43.7%) in 2023, it can be observed that approximately half of those who participate in social networks belong to closed communities or are passive participants.

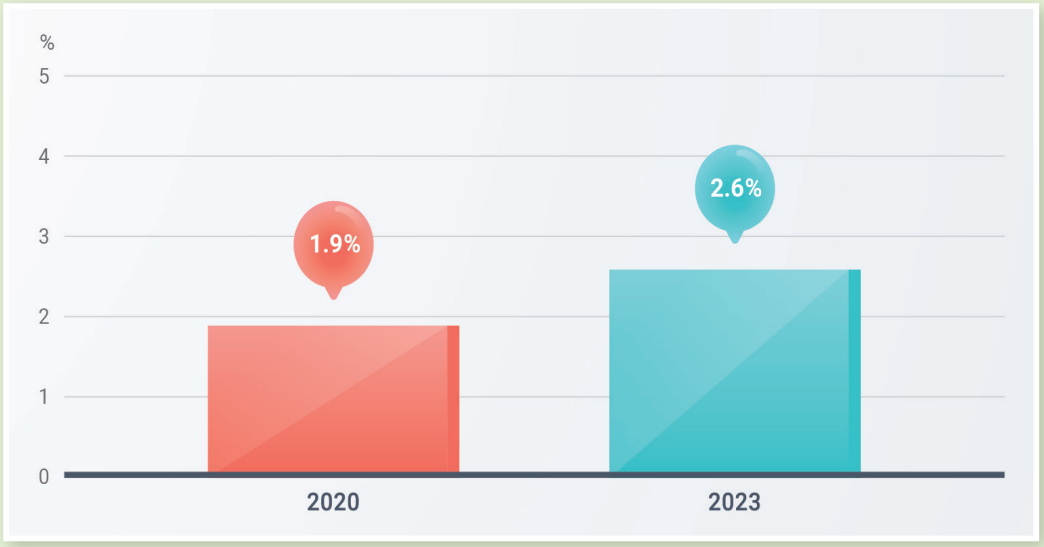
Figure 37. The Participation Rate of Digital Content Creation in Taiwan



Cyberbullying

According to the "2023 Digital Development Survey," among internet users aged 12 and above in Taiwan, 3.0% reported experiencing online verbal attacks in the past year. When considering the entire population aged 12 and above, approximately 2.6% of people in Taiwan have encountered cyberbullying issues [24] , slightly higher than the 1.9% reported in 2020. (Figure 38)

Figure 38. Percentage of Individuals Aged 12 and above in Taiwan Who Have Experienced Cyberbullying



24 This type of data, which relies on self-reported information from victims, may be prone to underestimation.

9. Governance and Civic Engagement

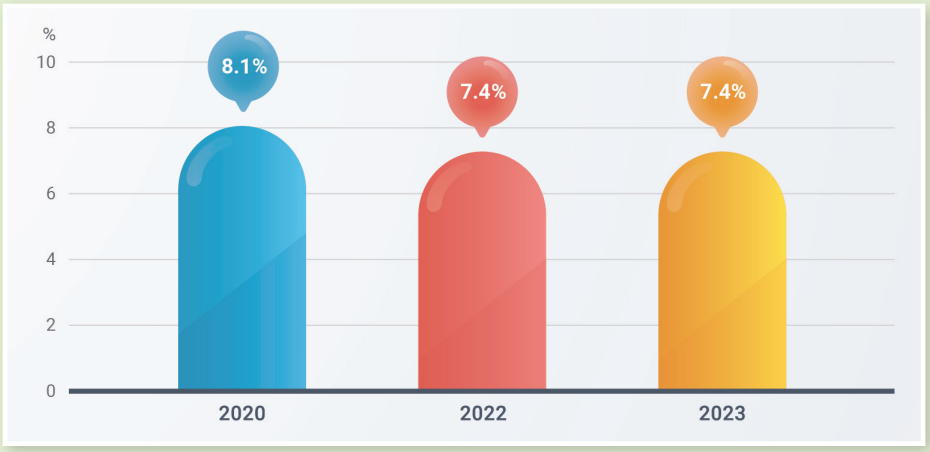
According to the Digital Development Index Framework, in the "Governance and Civic Engagement" dimension, in addition to the "Civic engagement," "E-government services" and "Exposure to disinformation online" discussed by the OECD, a new "Open government" sub-dimension has been added, with open data promotion as a measurement indicator.

Civic engagement

The "Digital Development Index Framework" in Taiwan measures civic engagement through "expressing political opinions online" and "participation in public policy participation platform" [25]. The latter is specifically defined as the number of open consultations on policy issues, regulations, and legal draft announcements on public policy participation platform, as well as the number of suggestions and proposals.

Regarding the expression of political opinions online, based on the results of the annual Digital Development Survey, the percentage of individuals aged 12 and above in Taiwan who have expressed their opinions on public or political issues through official or unofficial online channels in the past three months was 8.1% in 2020, and 7.4% in both 2022 and 2023. (Figure 39)

Figure 39. The Percentage of Individuals Expressed Political Opinions Online in Taiwan



25 The public policy participation platform was launched in 2015 as an important online channel for citizen participation in policy discussions established by the government of Taiwan.

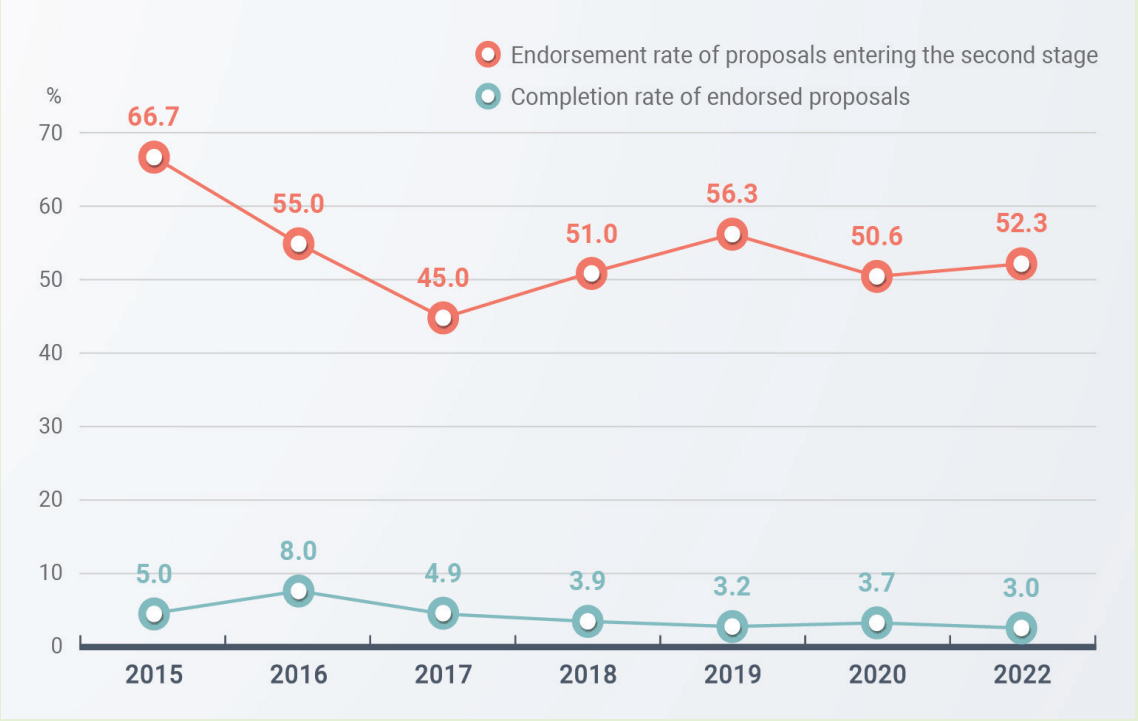
"Public policy participation platform" section, according to statistics from the NDC, as of the end of 2022, government agencies had opened 163 policy issues for public consultation on the "Talk" section, accumulating a total of 7,155 consultations on policy and draft laws & regulations. In 2022 alone, there were 10 policy issues and 1,172 consultations on policy and draft laws & regulations on the "Talk" section. (Figure 40)

Figure 40. The Number of Policy Issues Open for Discussion on Public Policy Participation Platform

Data Source: NDC

On the other hand, in the "Propose" section where the public can actively propose policy suggestions, a total of 14,875 public proposals have been accumulated, with 297 of them being adopted and entering the endorsement stage, increasing the endorsement rate to 52.3%. However, the completion rate of endorsed proposals has slightly decreased from 4.2% in 2020 to 3.8% in 2022. In terms of annual statistics for 2022, the number of proposals has decreased from 2,398 in 2020 to 1,563, with 30 of them being adopted, and the adoption rate has also decreased from 3.7% in 2020 to 3.0% in 2022. (Figure 41)

Figure 41. The Number of Proposals and Cases Filed on Public Policy Participation Platform

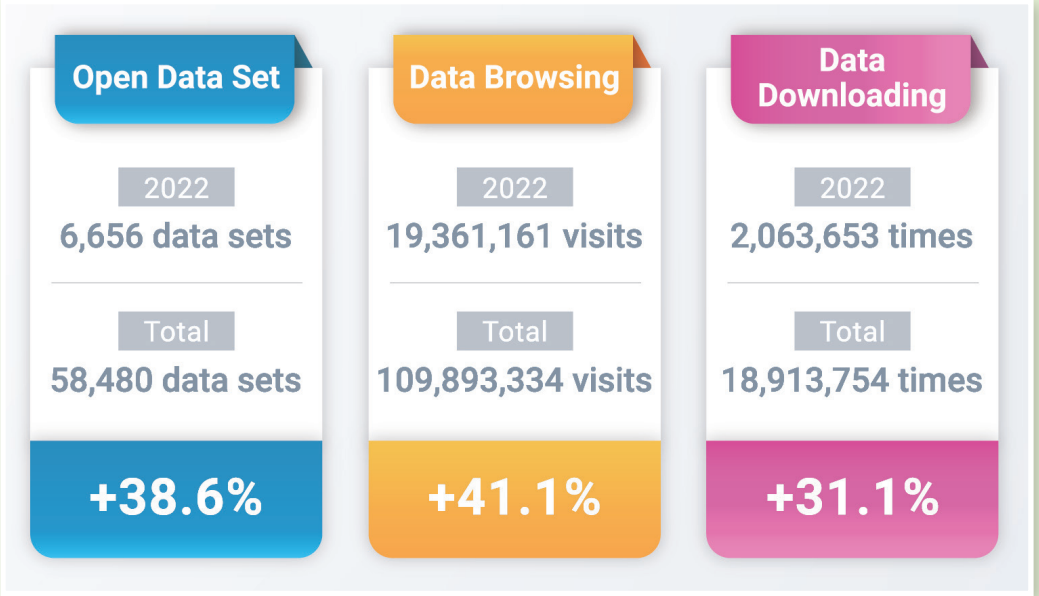


Data Source: NDC

Open government

According to the dataset provided by the Taiwan government's Open Data platform [26] , as of the end of 2022, a total of 58,480 datasets have been made available. Out of these, 538 datasets were provided upon request, and 89.39% of them have been awarded the Gold Mark for being machine-readable, structured, and in an open format. The datasets have accumulated a total of 109,893,334 views and 18,913,754 downloads. Looking at the progress in 2022 alone, there was an increase of 6,656 datasets in the open data collection, with a rise of 19,361,161 views and 2,063,653 downloads of the data [27] . This represents a growth of three to four times compared to 2020. (Figure 42)

Figure 42. Quality and Application of Open Data



Data Source: moda

26 Source: https://data.gov.tw

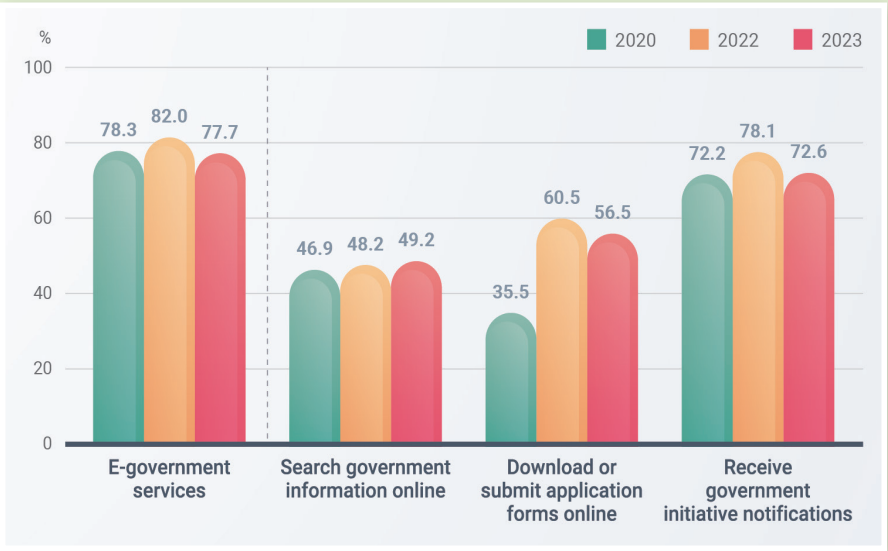
27 In 2020, there was an improvement in the Open Data category with an increase of 4,802 datasets, an increase in data views by 13,719,829 people, and 1,574,429 downloads.

E-government Services

According to the Digital Development Survey Report 2023 on government-provided digital services, as the pandemic nears its end, the rates of internet users receiving proactive government notifications and applying for government services online have decreased by 4 to 6 percentage points compared to the 2022 survey. However, out of every 100 internet users, 73 individuals still received proactive government notifications, and 57 individuals applied for government services online. Particularly, when compared to the results of the 2020 survey, the rate of applying for government services online remains significantly higher than pre-pandemic levels, indicating the potential for online application of government services to become the norm. As for internet users searching for government information online, the data from the past three surveys are quite consistent, ranging from 46.9% to 49.2%.

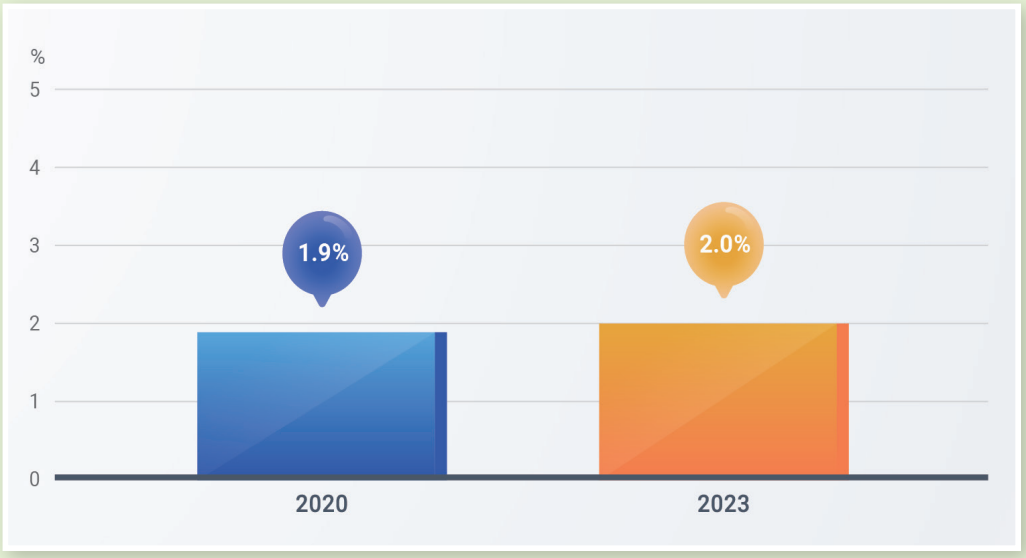
In summary, e-government service utilization rates, encompassing both proactive and passive engagement, reached their highest point at 82.0% during the pandemic in the 2022 survey. Comparatively, the utilization rates for the 2020 survey stood at 78.3%, and the 2023 survey recorded a figure of 77.7%, demonstrating a consistent trend around the 78% mark (see Figure 43).

Figure 43. The Percentage of Using E-Government Services in the Past Year



While the government provides various digital services, attention should also be paid to whether there are excluded due to insufficient digital skills. The Digital Development Survey Report 2020 and the Digital Development Subsurvey Report 2023 show that among those who have never been online, the percentage of people who are unable to use government online services due to their own lack of abilities has increased slightly from 13.8% to 15.6%. However, when calculated based on the total population of 12-year-olds, it is about 1.9% to 2.0% who have not used digital government services due to a lack of relevant skills (including technical or knowledge), and the rate of change is not significant. (Figure 44)

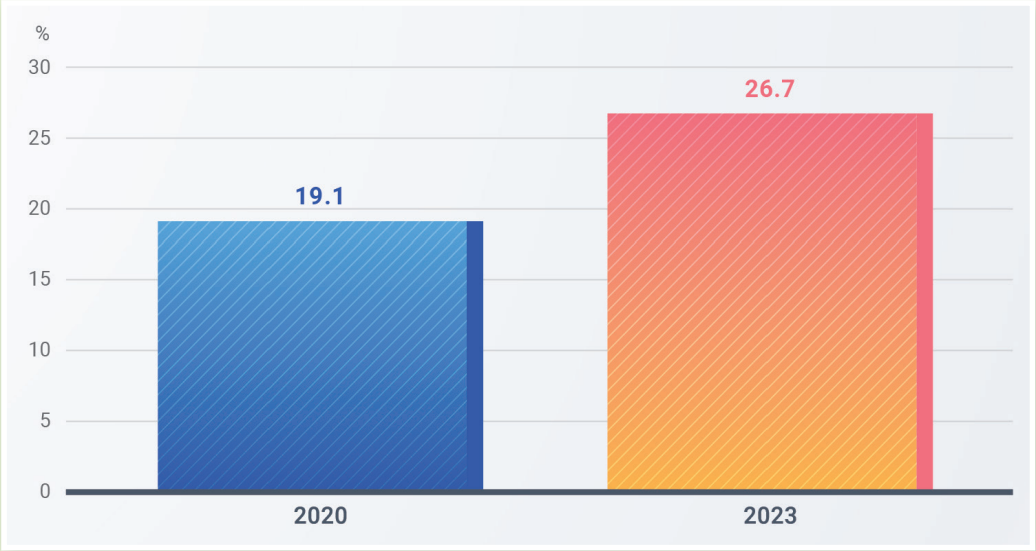
Figure 44. The Percentage of People Who Have Not Used E-government Services Due to Lack of Skills



Exposure to disinformation online

With the development of emerging internet technologies and social media, the phenomenon of spreading false or fake information online has become serious and impactful. According to the Digital Development Survey Report 2020 and the Digital Development Subsurvey Report 2023, the percentage of individuals aged 12 and above in Taiwan who reported encountering false information in the past week has significantly increased from 19.1% to 26.7%. (Figure 45)

Figure 45. The Percentage of Population Exposed to Disinformation Online in Taiwan in the Past Week



10. Environmental Quality

With the development of information technology, the dematerialization of consumer products has helped save energy and resources. However, it has also increased the demand for energy and digital technology products, leading to the generation of more electronic waste.

In Taiwan, the "Environmental Quality" dimension measures per capita e-waste using indicators adopted from OECD. It is defined as the average weight of electronic and information technology waste generated and recycled per person in a given year. It is important to note that this indicator may be influenced not only by the amount of e-waste produced but also by the effectiveness of recycling, potentially underestimating the actual values.

According to the statistics on the recycling volume of waste and container recycling announced by the Ministry of Environment (MOENV), the total amount of e-waste recycled increased from 158,883 metric tons [28] in 2020 to 177,327 metric tons [29] in 2022. The average per capita generation of e-waste per year increased from 7.5 kilograms to 7.6 kilograms. (Figure 46)

Figure 46. E-Waste Generated per Capita in Taiwan

Data Source: MOENV

28 Electronic and electrical waste recycling: 139,010,712 kilograms; Information waste recycling: 19,873,093 kilograms.

29 Electronic and electrical waste recycling: 159,484,360 kilograms; Information waste recycling: 17,842,725 kilograms.

11. Personal Digital Security

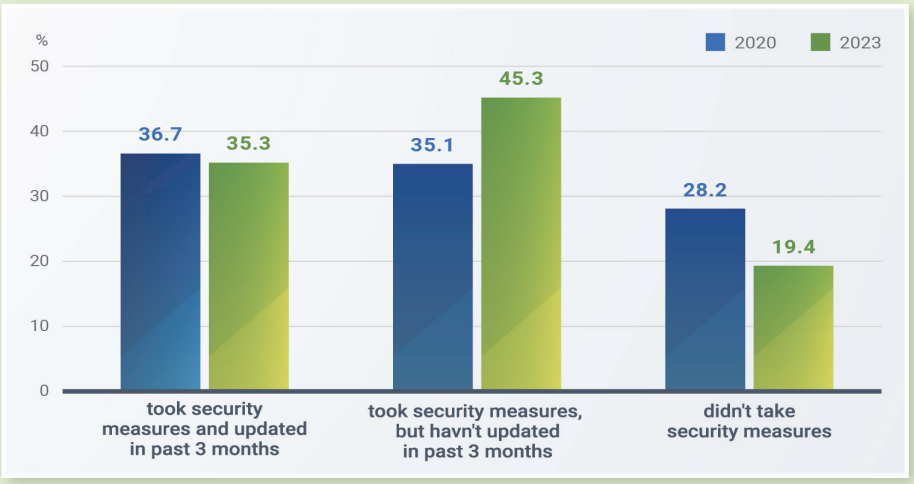
In the "Digital Development Index Framework," it examines the key impact of the digital transformation process on individual well-being. In the "Personal Digital Security" dimension, in addition to using the occurrence of information security incidents as an indicator, it corresponds to the risk with the indicator of "Digital security measures" for internet users.

Digital security measures

According to the annual Digital Development Survey Reports, in 2020, only 35.1% of individuals aged 12 and above in Taiwan adopted cybersecurity measures (such as installing antivirus software or setting up digital passwords, pattern passwords, facial recognition, or fingerprint recognition) and updated them within past three months. Additionally, 36.7% had cybersecurity measures but hadn't updated them in over three months, while 28.2% hadn't installed antivirus software or set up passwords for their information devices.

The latest survey in 2023 shows that the situation regarding information security in Taiwan has improved to some extent. The rate of adopting digital security measures and updating them within the past three months has significantly increased to 45.3%, indicating that some individuals have realized the importance of cybersecurity and have taken corresponding measures. However, there is still a considerable portion of the population that remains relatively weak in this aspect: 35.3% have digital security measures but haven't updated them in over three months, and 19.4% haven't installed antivirus software or set up passwords for their information devices. (Figure 47)

Figure 47. Digital Security Measures of Population Aged 12 above in Taiwan

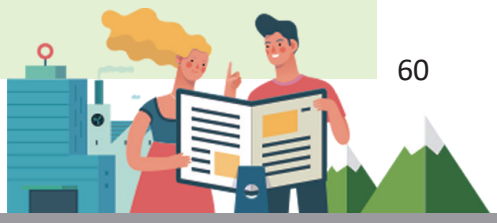


Digital Security Threats

With the improvement of cybersecurity, it seems that people are encountering fewer information security threats. According to the annual digital development surveys, among internet users aged 12 and above, the percentage who experienced personal data breaches (such as credit card numbers and phone numbers) in the past three months decreased from 6.6% in 2020 to 4.9% in 2023. The percentage of internet users who fell victim to online scams decreased from 4.3% to 0.9%, and the percentage of individuals whose computers, tablets, or mobile phones were infected due to internet usage decreased slightly from 3.9% to 2.8%. Only the incidence of account theft remained at 2.5%.

When considering the entire population aged 12 and above, the overall percentage of individuals who experienced any of the aforementioned digital security incidents in the past three months decreased from 11.3% to 10.3%. (Figure 48)

Figure 48. Digital Security Threats in the Past Three Month in Taiwan



12. Subjective Well-Being

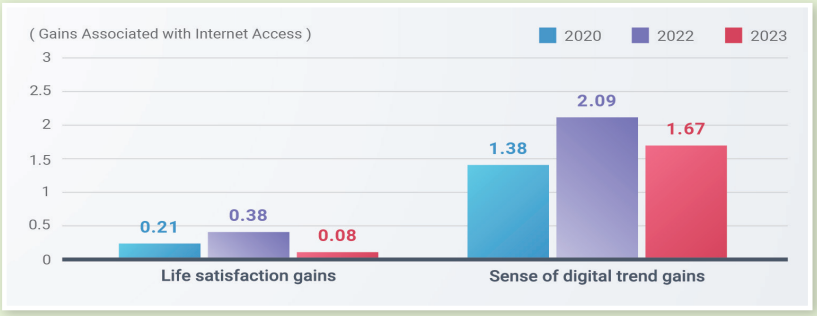
"Subjective well-being" dimension focuses on whether individuals experience an increase in personal well-being due to internet usage. Specifically, it measures satisfaction with current life on a scale of 0 to 10, where 0 represents extreme dissatisfaction and 10 represents extreme satisfaction. The results show that the satisfaction rating of individuals aged 12 and above in our country regarding their lives has mostly been 8 and 7 throughout the years, with an average satisfaction score ranging from 7.0 to 7.1, showing no significant changes.

On the other hand, using a scale of 0 to 10, where 0 represents individuals feeling completely unable to keep up with digital development and 10 represents individuals feeling completely able to keep up, the results of the Digital Development Survey indicate that the average self-rated score of individuals aged 12 and above in our country regarding keeping up with technological trends ranges from 6.3 to 6.5, with minimal changes over the years.

Comparing with the regression model established by the OECD [30] , after controlling for age, gender, employment status (unemployed, retired, and employed), and education level, it was found that in 2022, individuals who use the internet had a significantly higher well-being score of 0.383 compared to those who do not use the internet. However, in 2023, the impact of internet usage on well-being was not significant (0.08 points), indicating that people were more able to perceive the convenience brought by internet usage during the pandemic.

Comparing with the well-being and digital trend perception regression model, after controlling for age, gender, employment status (unemployed, retired, and employed), and education level, it was found that internet users had significantly higher digital trend perception scores compared to non-internet users. In 2020 , the difference was 1.38 points, which increased to 2.09 points in 2022, and had an effect of 1.67 points in 2023. This indicates that the impact of digital trend perception on well-being is 5 to 21 times stronger. (Figure 49)

Figure 49. Comparison of Life Satisfaction Gains and Sense of Digital Trend in the Access of the Internet



30 The regression model in Taiwan lacks three indicators: marital status, economic satisfaction, and income.

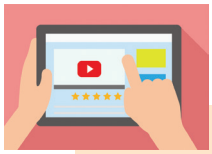
2

The Status of Internet Usage by Groups in Taiwan

The 15 internet usage type indicators in Taiwan's digital development index can be categorized into 8 types of digital application based on their usage attributes: tool application (cloud storage, downloading software), civic engagement application (browsing or using official website services), social application (instant messaging, internet content participation, e-mailing for private purpose), entertainment application (online entertainment), economic application (searching for information about goods or services, purchasing goods or services online, internet banking, mobile payments), audio-visual application (digital audio and video editing), information application (online reading, consulting wikis), and personal creation (digital contents creation). (Table 6)

Table 6. The Types of the Internet Usage

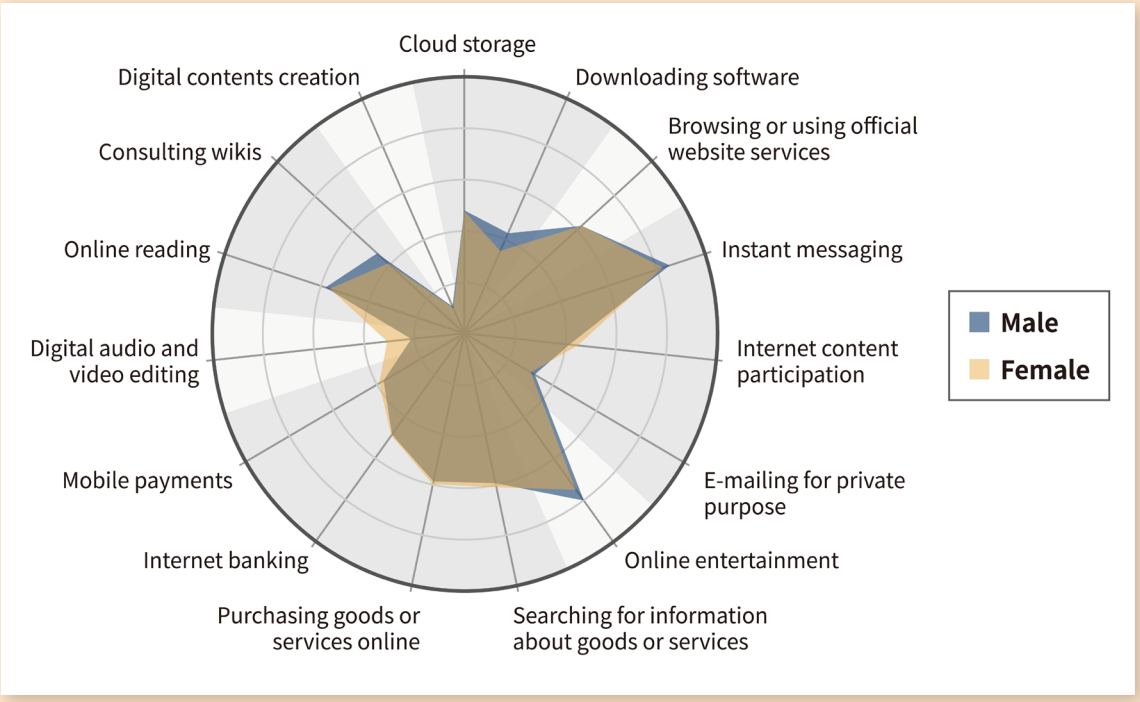
Type	Internet Usage
Tools Application	Cloud storage
	Downloading software
Civic Engagement Application	Browsing or using official website services
Social Networking Application	Instant messaging
	Internet content participation
	E-mailing for private purpose
Entrainment Application	Online entertainment
Economic Application	Searching for information about goods or services
	Purchasing goods or services online
	Internet banking
	Mobile payments
Audio-Visual Application	Digital audio and video editing
Information Application	Online reading
	Consulting wikis
Creation Application	Digital contents creation



1.Differences between Genders

Observing the differences in internet activities between genders, from Figure 50, the overall internet usage patterns for both genders are fairly similar. Both genders engage more in applications such as instant messaging, online entertainment, and browsing or using official website services, while showing less involvement in digital contents creation. However, in relative terms, women are more enthusiastic than men in participating in internet economy applications and digital audio and video editing, while men are more active than women in tools and information applications such as downloading software, online entertainment, and consulting wikis. (Figure 50)

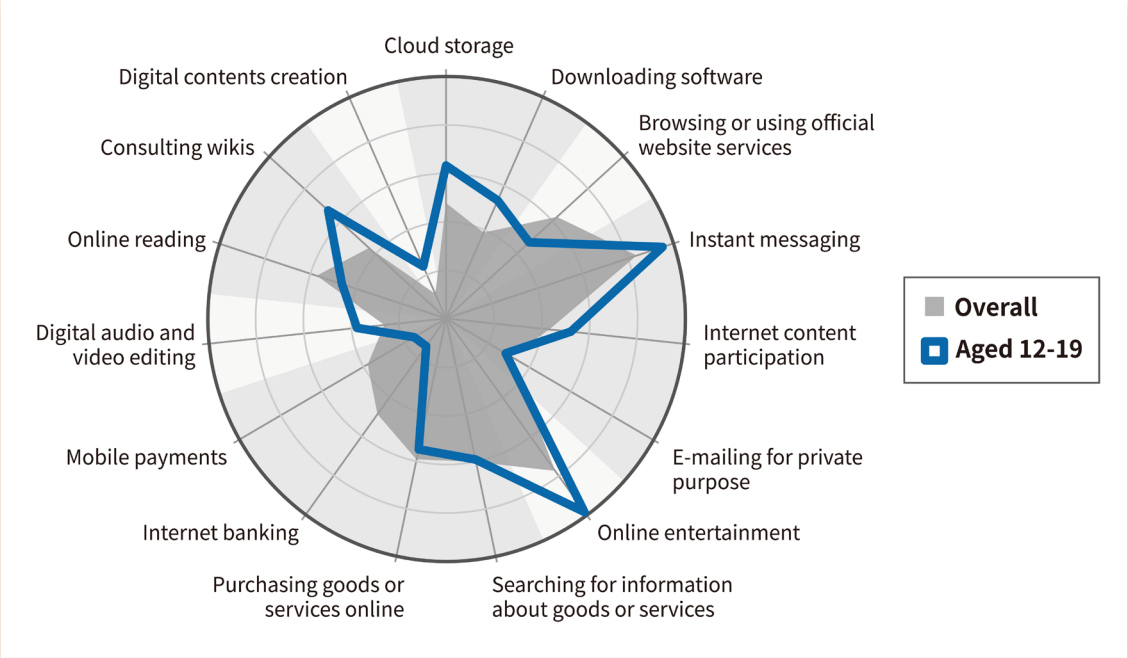
Figure 50. Differences in Internet Activities Between Gender

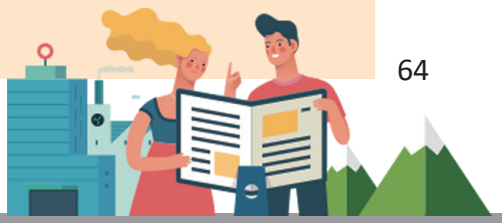


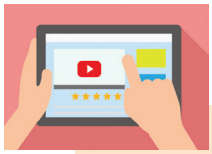
2. Differences among Generation

Regarding generation gap in internet activities is since individuals aged 12-19 are mostly students and their internet usage patterns are more focused on social and entertainment applications such as instant messaging and online entertainment. Consulting wikis and cloud storage are also important information tools for this age group. However, due to limited financial capacity, they are less involved in economic activities such as internetbanking or mobile payments. (Figure 51)

Figure 51. Differences in Internet Activities among 12-19-year-olds







As for the 20-29 age group, both the range and depth of internet applications are similar to those of the 30-39 age group (Figure 52). The differences in internet application patterns among different generations are more apparent for those above 30 years old. From Figure 53, it can be observed that the general patterns of internet application among different generations above 30 years old are relatively consistent. The most active internet applications are instant messaging and onlineentertainment, followed by browsing or using official website services, searching for information about goods or services, purchasing goods or services online, and online reading. However, when considering the depth of internet application, the usage rates of various internet activities decrease with increasing age, with the largest generation gap observed among those aged 65 and above. In terms of internet application attributes, the generation gap is relatively more pronounced for economic-related internet applications.

Figure 52. Differences in Internet Activities among 20-29-year-olds and 30-39-year-olds

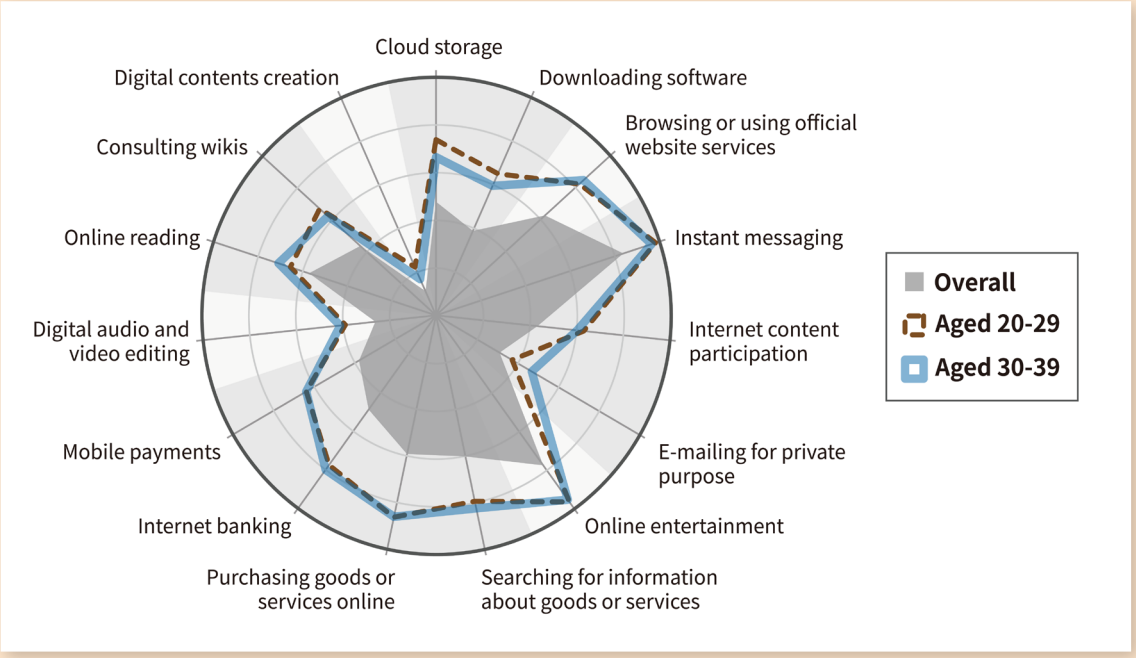
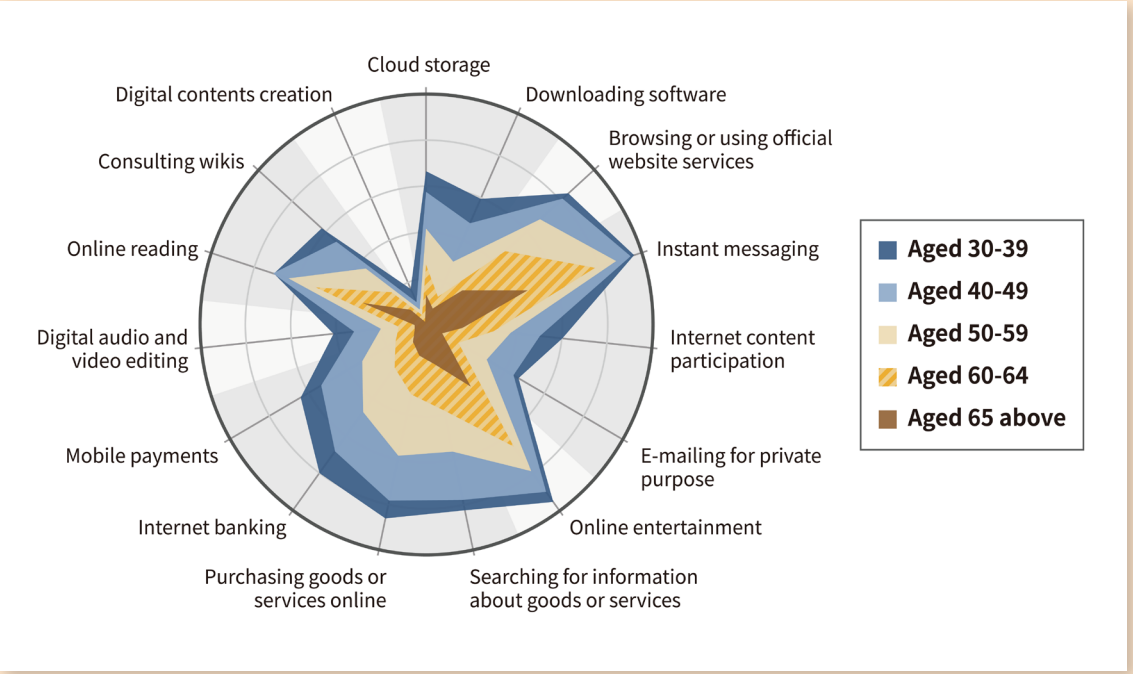
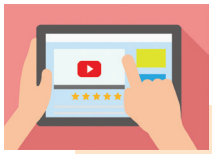


Figure 53. Differences in Internet Activities among 30-years-old above

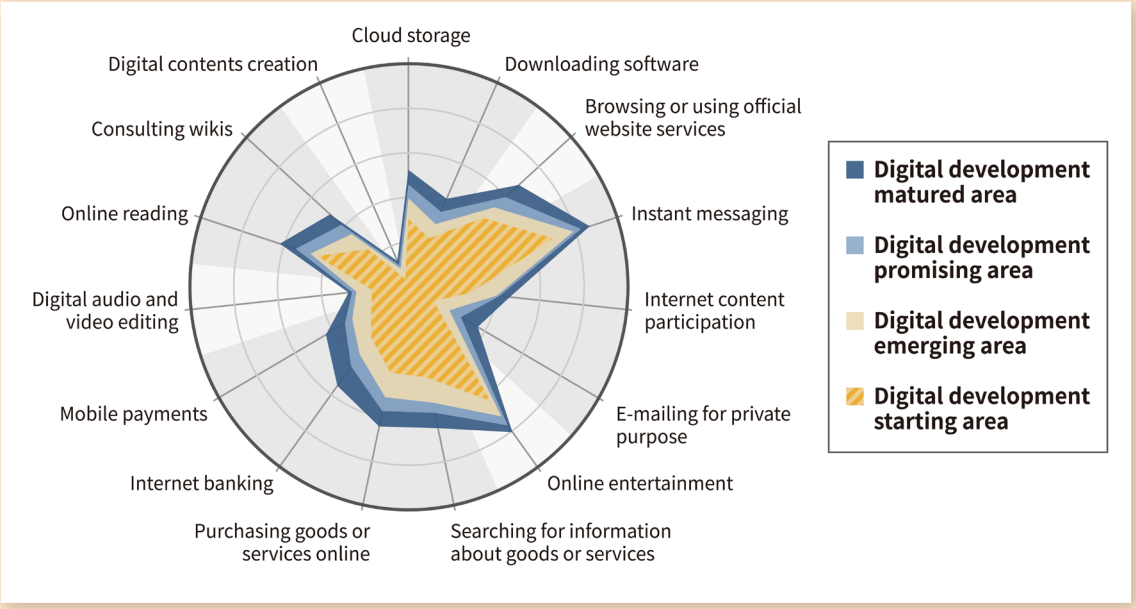




3. Differences among Regions

Observing the differences in online activities among regions with different levels of digital development, it is generally found that each region exhibits similar patterns of internet usage. Instant messaging and online entertainment are the two most commonly used internet activities across all regions. However, in terms of usage depth, various internet activities show regional differences that increase with the level of digital development, with the greatest difference found in economic-related internet applications. (Figure 54)

Figure 54. Differences in Internet Activities among Regions



3

The Impact of COVID-19 on the Use of Digital Applications

The outbreak of the COVID-19 pandemichad an unexpected impact on the world. Although the first Digital Development Survey was conducted in late 2020, it did not reflect the influence of the pandemic on the digital behavior due to the effective control of the situation in Taiwan, where social and economic activities remained relatively normal.

The second Digital Development Survey was conducted in September and October 2022, when the global pandemic was starting to stabilize and Taiwan was preparing to lift travel restrictions. Considering that the online activities during the pandemic might have returned to a more normal state (such as students returning to physical classes and reduced demand for online courses), a special section related to the pandemic was included in the main survey, along with a separate subsurvey. The subsurvey evaluated the impact of the COVID-19 pandemic on internet usage in Taiwan through the recollection of internet habits during that period. The following provides a summary of the survey results:

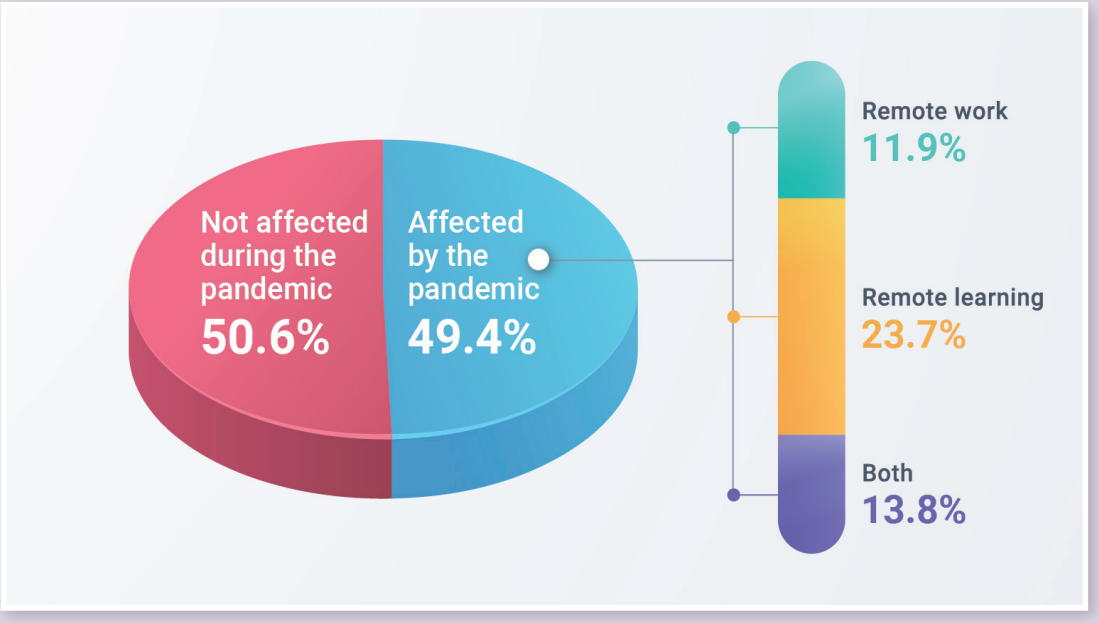
1. Impact on Households

The pandemic has accelerated the global trend of teleworking. To ensure employee safety and pandemic control, many companies have implemented remote work policies, and Taiwan is no exception. Since the implementation of Level 3 alert in May 2021, a survey shows that 28 out of every 100 households have been affected, meaning that during the pandemic, family members or individuals have worked remotely from home.

The impact of suspending in-person classes in schools in Taiwan is even more extensive. In addition to students having to transition from traditional face-to-face teaching to remote learning, schools also face challenges in teaching methods and resource allocation. Parents not only need to supervise their children's learning but also assist in resolving technical and learning difficulties. The survey shows that during the Level 3 alert period, 40 out of every 100 households have been affected, experiencing the shift from traditional education to remote learning.

When comparing the overlap between households working remotely and households engaged in remote learning, the results show that during the pandemic, on average, out of every 100 households, 12 households only engage in remote work, 24 households engage in remote learning, and 14 households have both remote work and remote learning. In total, 49 out of every 100 households have been affected by the pandemic, working remotely or engaging in remote learning. This accounts for nearly half of the affected households. Based on Taiwan's approximate 8.4 million households in 2021, around 4.1 million households have been affected by the pandemic in terms of work or education. Among the affected households, on average, each household has 2.0 individuals working or learning from home due to the pandemic. (Figure 55)

Figure 55. Households Affected During the COVID-19 Pandemic in Taiwan



2. Challenges Encountered and Response Measures during the Pandemic

Challenges Encountered

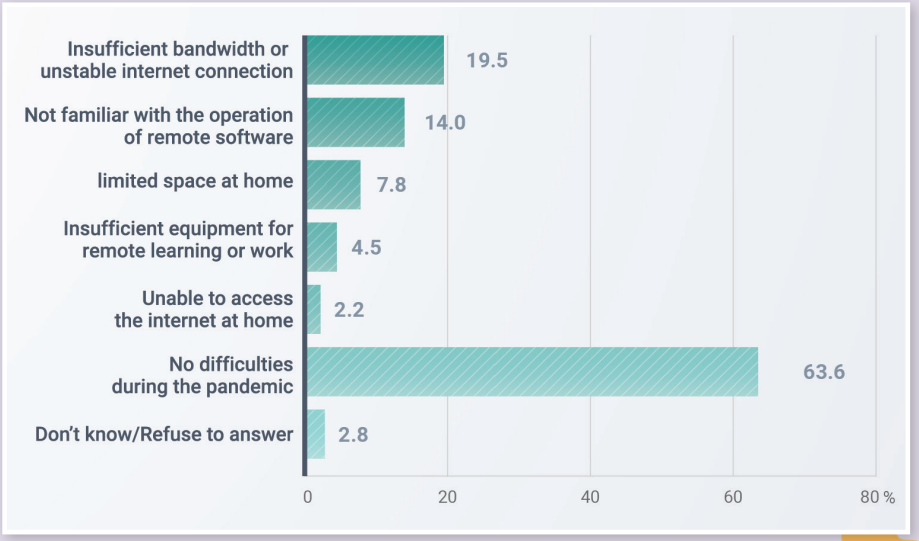
During the pandemic, remote work or remote learning from home became a norm for some people. However, this new arrangement also came with its challenges. The survey found that on average, 1 out of every 3 people faced difficulties during the initial period of remote work or remote learning from home.

Firstly, with multiple family members relying on the internet at the same time, there was a significant increase in bandwidth demand. The most common problem encountered was insufficient bandwidth or unstable internet connection, affecting 20 out of every 100 people.

Secondly, many people had not previously been exposed to remote work or remote learning before the pandemic, so they needed some time to familiarize themselves with the operation and functions of remote software. This difficulty was experienced by 14 out of every 100 people.

In addition, 8 out of every 100 people reported experiencing the challenge of limited space at home, leading to mutual interference during remote work or remote learning. 5 households did not have sufficient equipment for remote learning or remote work, and 2 households were unable to access the internet at home. (Figure 56)

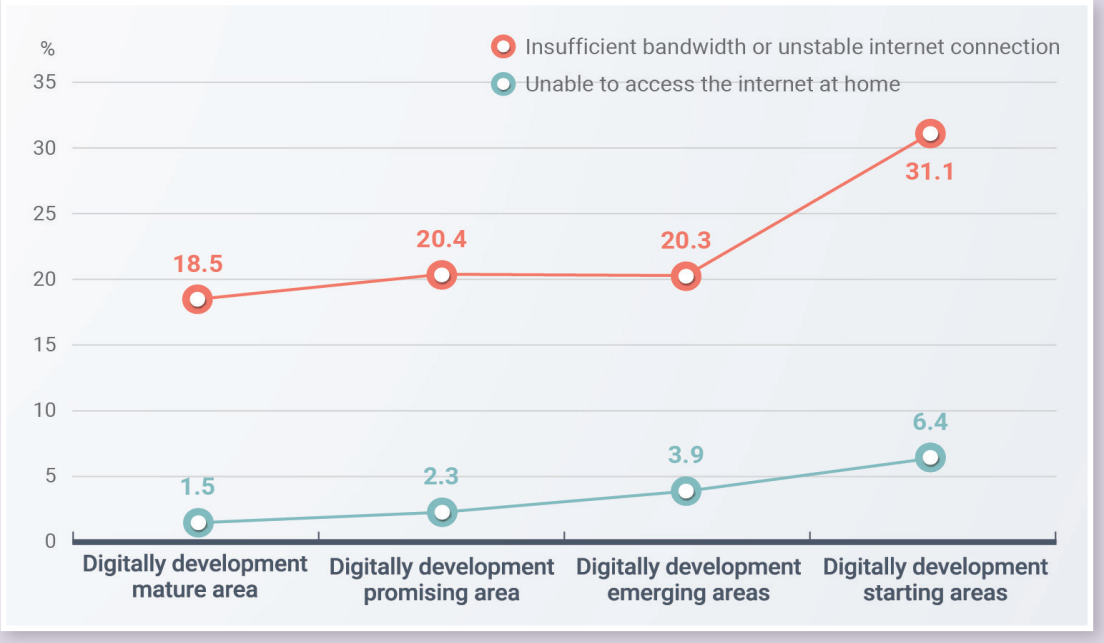
Figure 56. Challenges Encountered while Working or Studying from Home



Cross-analysis revealed that even in the digitally mature area of Taiwan, nearly 20% of households experienced insufficient bandwidth during the pandemic. This issue was even more prevalent in the digitally emerging areas, where the rate of encountering insufficient bandwidth or unstable internet reached 31%. Additionally, 6% of households were unable to access the internet, the highest rate among the four digital development regions. (Figure 57)

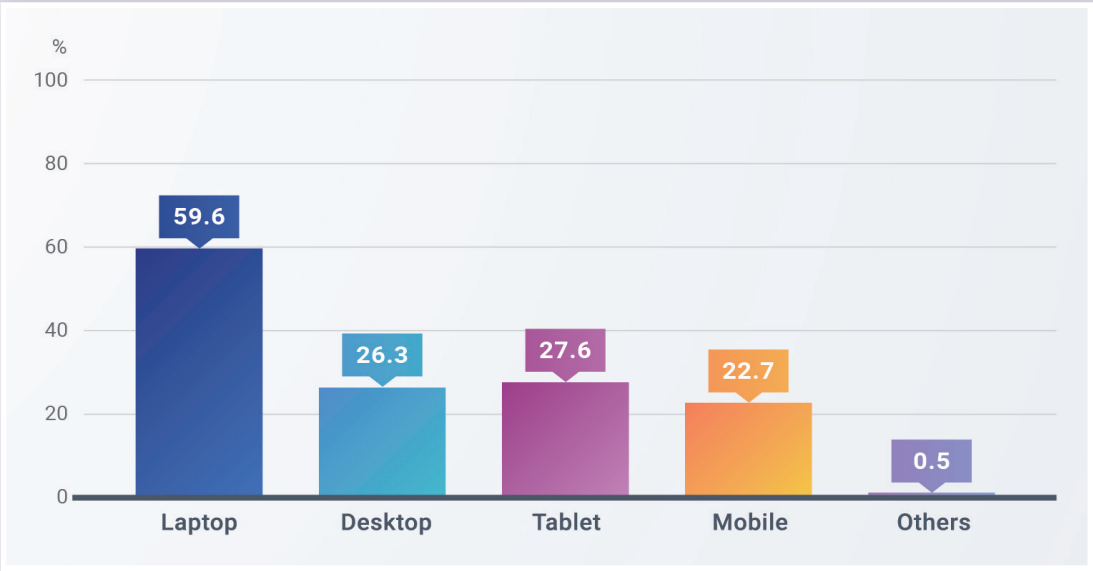
Furthermore, the survey found that low- and middle-income households faced significant challenges during the pandemic. 16.7% of these households lacked internet access devices, 9.1% were unable to connect to the internet, and 28.6% experienced bandwidth insufficiency or unstable internet. These rates were 7 to 12 percentage points higher than those of non-low-income households.

Figure 57. Poor Internet Service in Households in Different Levels of Digital Development Areas during the Initial Stage of the Pandemic



The survey also found that when asking students about the information devices they used during remote learning, laptops were the most used device (60 per hundred people), followed by desktop computers (26 per hundred people), tablets (28 per hundred people), and mobile phones (23 per hundred people). It is worth noting that although mobile phones are widely used personal devices with portability and ease of use, compared to laptops or desktop computers, they have smaller screens, less convenient keyboard input, and are not as suitable for multitasking. These factors may have a negative impact on students' learning experience and outcomes. (Figure 58)

Figure 58. Types of Devices Used by Students for Remote Learning



Challenges Responses

For issues related to insufficient bandwidth, unstable internet connection, unfamiliarity with remote software, and limitations in home space and equipment, these problems can typically be addressed by improving technical capabilities and enhancing internet infrastructure.

Regarding the improvement of technical capabilities, the survey found that when facing new challenges while working or studying remotely from home, 39 out of every 100 individuals demonstrated resilience and chose to explore solutions on their own or seek assistance from family members to overcome difficulties. (Figure 59)

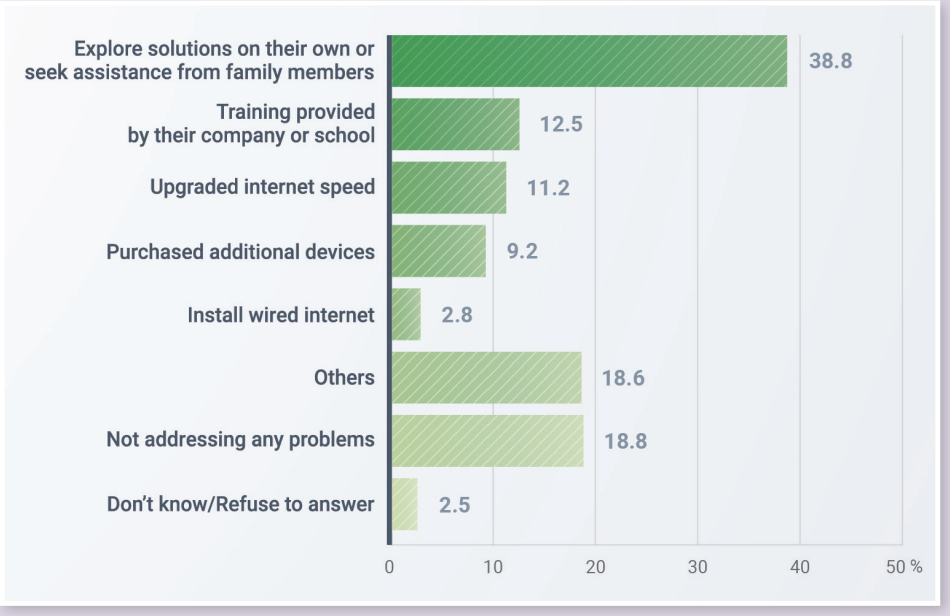
Furthermore, many institutions and organizations have actively assisted employees or students in adapting to the new work or learning environment. Among every 100 individuals, 13 indicated that they resolved remote work or remote learning issues through training provided by their company or school.

Improving internet infrastructure or subscribing to internet services was a common solution during the pandemic. According to the survey, 11 out of every 100 households upgraded their internet speed to address issues with insufficient bandwidth or unstable internet, making remote work or online learning smoother. Additionally, 3 out of every 100 individuals chose to install wired internet to solve problems with unstable wireless connections or weak signals. Data from the NCC supports these trends. Before the COVID-19 alert level was raised to level 3 at the end of April 2021, the total number of wired broadband accounts reached 6,021,185. By the end of July 2021, it had increased to 6,113,286, an increase of 92,101 accounts in just three months. The number of mobile broadband accounts also significantly increased during the pandemic. In May 2021, the actual number of mobile broadband accounts was 27,754,938, an increase of 144,395 accounts in one month.

The survey also found that 9 out of every 100 individuals purchased additional devices during the pandemic, such as laptops, audio equipment, or other necessary work or study equipment, to cope with issues encountered during remote work or learning from home.

However, it is concerning that 19 out of every 100 individuals admitted to not addressing any problems encountered during remote work or learning from home, possibly due to a lack of awareness, resources, or other reasons.

Figure 59. Ways to Cope with Issues of Remote Work and Remote Learning at Home (N = 177)



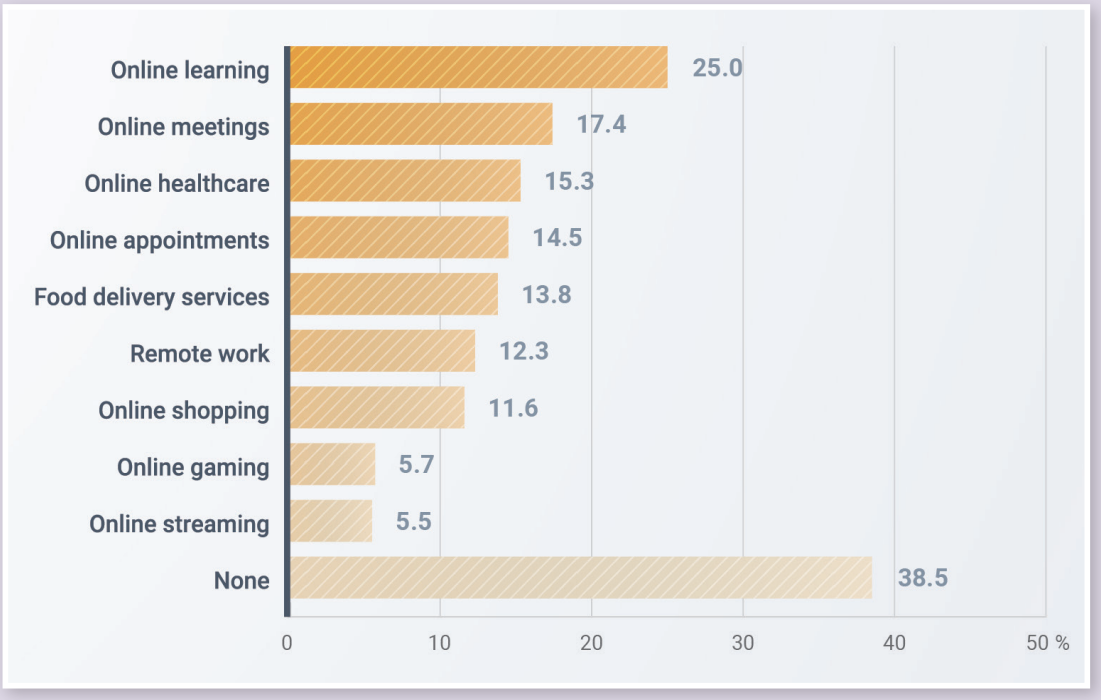
3. Personal Digital Transformation under the Pandemic

Under the influence of the pandemic, personal digital transformation in Taiwan has shown three main aspects. Firstly, there has been an increase in internet usage rates. Secondly, internet applications have diversified. Lastly, the frequency of internet application usage has become more frequent compared to pre-pandemic times. These trends reflect the increased trust and acceptance of digital technology and the demand for more convenient and digitized lifestyles.

Firstly, the increase in internet usage rates is one of the significant changes brought about by the pandemic. According to the Digital Development Survey conducted in previous years, the internet usage rate in Taiwan before the pandemic in 2020 was 86.6%. By the time the country was about to lift border restrictions in 2022, the internet usage rate reached a new high of 87.5%, an increase of 0.9 percentage points compared to two years ago. This means that approximately 190,000 individuals who were previously not using the internet started exploring online activities during the pandemic to meet their information, social, and entertainment needs.

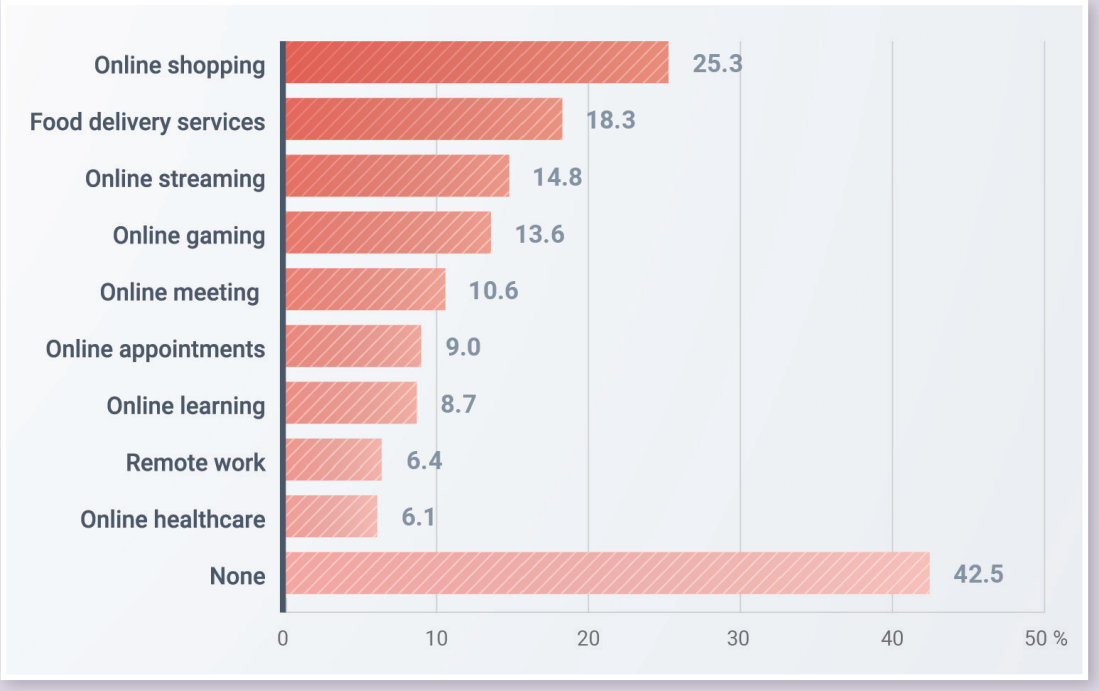
Secondly, the pandemic has led to the diversification of internet applications. For example, due to the pandemic, in-person meetings have transitioned to online platforms, creating opportunities for people to experience online meetings. This forced transition has broadened the types of online activities that people engage in compared to before the pandemic. According to the 2022 Digital Development Survey, out of every 100 internet users, 61 individuals experienced the transition of "from nothing to something" by adopting new internet applications. These new applications mainly include online learning (25 individuals), online meetings (17 individuals), online healthcare and appointments (15 individuals), food delivery services (14 individuals), remote work and online shopping (12 individuals), online gaming and streaming (6 individuals), and others. The widespread adoption of these applications allows people to complete various work, learning, and entertainment activities from home. It also reflects the increased trust and acceptance of digital technology, as well as the search for more convenient and real-time solutions. (Figure 60)

Figure 60. Newly Added Internet Applications During the Pandemic (Multiple Selections Allowed)



The impact of the pandemic is also evident in the increased frequency of use, referring to internet users who already used specific internet applications but increased their usage frequency due to the pandemic. For example, those who had experience with remote learning increased their usage frequency during the period of level 3 alert, when all classes were conducted online. According to the survey results, out of every 100 internet users, 57 individuals increased their usage frequency of specific internet applications due to the pandemic. Among these applications, online shopping had the highest rate (25 individuals), followed by food delivery services (18 individuals), online streaming (15 individuals), online gaming (14 individuals), online meetings (11 individuals), online reservations and home-based learning (9 individuals), online healthcare and remote work (6 individuals), etc. People are using these applications more frequently than before, such as ordering food through delivery platforms. This increased frequency demonstrates a higher reliance on digital life and a demand for convenience and immediacy. (Figure 61)

Figure 61. Internet Activities with Increased Frequency during the Pandemic (Multiple Selections Allowed)



In summary, we are in an era of digital life. The pandemic has led to an increase in internet usage, making online applications more diverse and increasing the frequency of their use. This trend reflects an increased reliance on digital technology and an increased demand for digital life. However, is this change only temporary, or will it continue even after the pandemic?

According to the 2022 Digital Development Survey, the most significant changes from the previous year were the increase in internet usage in Taiwan (87.5%) and the growth in users of online banking (+4.3%), remote work (+5.8%), mobile payments (+8.6%), receiving proactive government notifications (+5.5%), and online application for government services (+28.0%). Other indicators remained relatively stable.

In 2023, apart from mobile payments and online banking, which continued to grow from the previous year due to the pandemic, other indicators either showed little change or declined. For example, although the percentage of internet users receiving proactive government notifications (83 out of 100) and applying for government services online (65 out of 100) remained relatively high, they decreased by 4 to 6 percentage points compared to 2022. However, the usage rates are still significantly higher than before the pandemic, indicating that online application for government services is more widely accepted by the public than before.

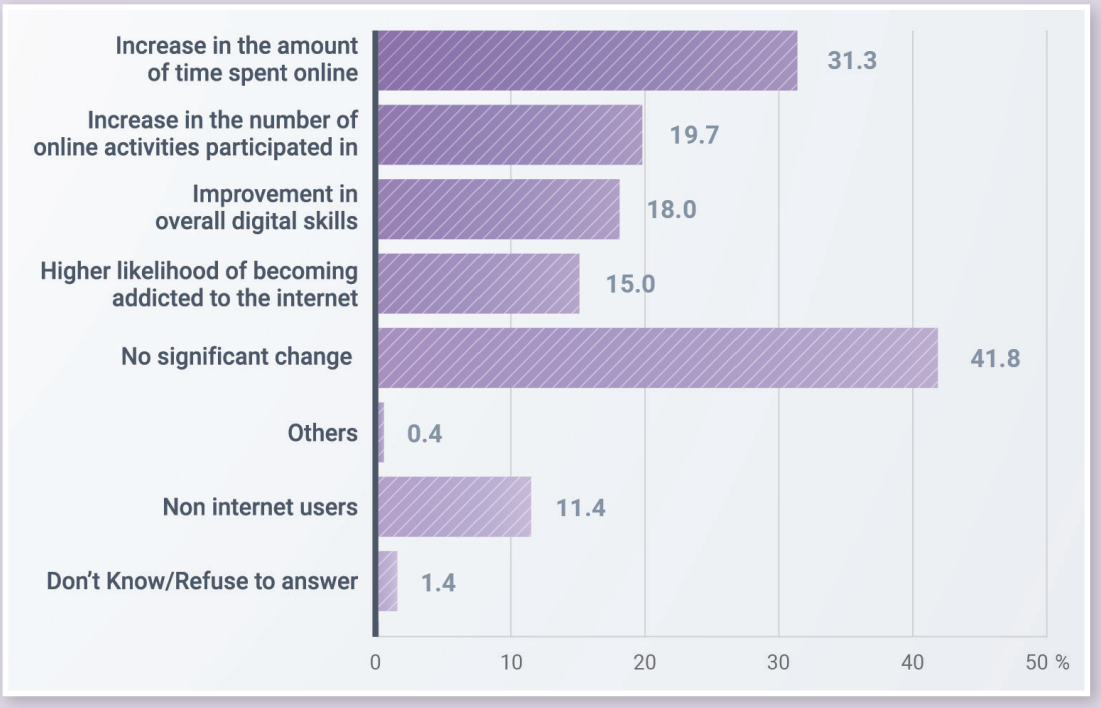
Regarding the once popular remote work and online learning during the pandemic, their rates have significantly decreased due to the resumption of in-person activities. The percentage of people who have participated in online courses in the past three months has decreased from 25.6% in 2022 to 20.3%, a decrease of 5.3 percentage points. The rate of remote work, which increased from 15.2% in 2020 to 21.0% in 2022, has decreased to 18.5% in 2023.

Overall, the digital transformation during the pandemic has had a profound impact on our lifestyles and habits. Some popular applications have gradually returned to normalcy after the pandemic, while emerging applications have shown growth trends. This indicates that people's acceptance and reliance on digital technology continue to increase, and digitalization has become an indispensable part of our daily lives. However, we still need to pay attention to the issue of digital divide.

4. Other Impacts

The pandemic has not only changed people's perceptions but also their online behavior and digital capabilities. Compared to before the pandemic, 45 out of every 100 individuals aged 12 and above in Taiwan reported changes in their online behavior. Among them, the majority indicated an increase in the amount of time spent online (31 out of every 100 individuals), followed by an increase in the number of online activities participated in (20 out of every 100 individuals), an improvement in overall digital skills (18 out of every 100 individuals), and a higher likelihood of becoming addicted to the internet (15 out of every 100 individuals). However, 42 out of every 100 individuals felt that their online behavior had not changed significantly before and after the pandemic. These changes reflect that a significant number of people have become more reliant on the internet during the pandemic and have gained a certain level of confidence. (Figure 62)

Figure 62. Changes in Personal Internet Usage before and after the Pandemic



4 Conclusion

Based on the main findings related to the **"ICT Access, Usage and Literacy"** dimension, it can be observed that the personal internet usage rate of individuals aged 12 and above increased from 86.6% in 2020 to 87.5% in 2021. Although the internet usage rate in 2023 did not continue to rise, the percentage of active internet users who accessed the internet frequently for long periods or with high frequency in the past three months increased slightly from 56.1% in 2020 to 57.3% in 2023, indicating an increasing number of frequent internet users.

Furthermore, due to the improvement of mobile network infrastructure in Taiwan, with 96.5% population coverage of 5G base stations, and relatively low mobile data fees, the ratio of 4G and 5G data tariffs to average per capita income is far below the OECD-recommended 2%. This has significantly facilitated the access of the population to mobile broadband services. According to the latest survey in 2023, 97.1% of internet users in Taiwan access the internet through mobile phones, which is the most commonly used device for internet access.

In terms of internet activities, instant messaging (84.1% to 84.6%) and online entertainment (78.0% to 78.5%) remained the most popular online activities in Taiwan over the past two years. However, in terms of growth, mobile payments (+9.8%), browsing or using official website services (+7.9%), and internet banking (+6.4%) showed the fastest development, with an increase of 6.4% to 9.8% compared to 2020.

From an equality perspective, although there is still information access disparities due to age, the majority of internet opportunities are not monopolized by a few fast adopters of information and communication applications. According to the OECD definition, the problem of unequal opportunities in Taiwan is not severe.

Regarding information filtering ability, after the COVID-19 pandemic, although self-rated travel ability remained unchanged, the self-rated ability to filter and use new information for work or learning (68.1%) and for food information (65.4%) increased by 1.9 to 2.4 percentage points compared to 2020, indicating a slight improvement in information reuse ability.

The **"Housing"** dimension shows that approximately 41 out of 100 households in Taiwan currently use internet or artificial intelligence services, which is similar to the rate in 2020.

In the **"Education and Skills"** dimension, there are a total of 3,475 primary and secondary schools in Taiwan, all with 100% internet connectivity. In terms of external connectivity, statistics from 2023 show that although the majority of junior high and primary schools still have a bandwidth of 300Mbps (43.97%), the percentage of schools with a speed of 1Gbps or higher has significantly increased to 37.6%. However, due to the large difference in speed between 1Gbps and 300Mbps, the bandwidth gap between schools has intensified from a fairness perspective.

After the pandemic, Taiwan has made efforts to invest in basic school network infrastructure and actively plan teacher training. As of March 2023, approximately 110,000 teachers have completed basic digital teaching training, with a training completion rate of 56.4%.

However, the survey also found that the percentage of people engaging in online courses decreased from 21.8% in 2020 to a new low of 17.7% in 2023, indicating a decline in related demand after the pandemic.

In terms of the **"Income and Wealth"** dimension, for newly entered job seekers, working in the information industry only offers a premium for those with postgraduate degrees, with significantly higher salaries than those in other industries with the same educational background. On the other hand, online consumption is considered to provide more diverse and reasonable consumption choices. However, although online consumption

has shown long-term growth, the growth rate is not fast (an increase of approximately 3 percentage points over four years), and the current online consumption rate has not yet exceeded 60%, with the rate of offering goods for sale in the past three months being less than 10%.

In the **"Jobs"** dimension, the level of digitalization among employed individuals in Taiwan is not high. Although 27.7% of employed individuals rely entirely on computers or the internet for their work, 22.6% of employed individuals do not need to use computers or the internet at all, and the percentage of those who use computers or the internet is below 50%. In total, more than 45% of employed individuals in Taiwan engage in non-digital or low-digital work. However, due to the low level of digitization in job duties, only 3 out of 10 workers believe that their jobs may be replaced by automation.

In terms of the **"Work-Life Balance"** dimension, although our country did not investigate the situation of working from home during the pandemic, it can be seen that the pandemic has indeed changed the arrangement of workplaces. Before the pandemic (in 2019), only 6.1% of individuals in Taiwan had experience with remote work, but from 2022 to 2023, even before the pandemic was fully under control, 16.1% to 18.4% of the population had recently engaged in remote work. On the other hand, the impact of information technology development on the boundaries between work and personal life continues. About half of the employed individuals still receive work-related messages or need to deal with work matters online even after work hours.

"Health" dimension shows that information technology development has indeed increased people's access to healthcare resources. Among individuals aged 12 and above, approximately 6 out of 10 have searched for health-related information online in the past three months, and 1 out of 3 have used online services for medical appointments and reservations. This demonstrates the important role of the internet in providing healthcare information and facilitating medical appointments for the public.

However, internet use also brings risks to the population. About 44.7% of individuals

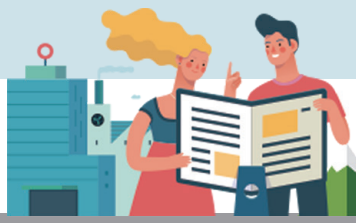
believe that their physical condition has worsened in the past three months due to internet use. Preliminary screening using the CIAS-10 indicates that 7.7% of the population in Taiwan is classified as being at high risk of internet addiction. This suggests that internet use may have negative effects on the mental and physical health of some individuals, highlighting the need for attention and concern.

In conclusion, information technology provides a more convenient way to access healthcare resources. However, it is important to balance the benefits and risks of internet use. Providing appropriate support and education is necessary to protect people's health.

"Social Connections" dimension shows that among Taiwan's population aged 12 and above, approximately 82 out of every 100 individuals participate in social networking activities, and around 44% have recently posted on social media or blogs, uploaded photos or videos. From the significant difference of about 40 percentage points between these two indicators, it can be inferred that about half of the individuals participating in social networking in Taiwan belong to closed communities or are passive participants. This indicates that although social networking is widespread in Taiwan, there are differences in the level of participation.

Indeed, social participation carries the risk of encountering cyberbullying. In terms of the entire population aged 12 and above, approximately 2.6% of individuals in Taiwan have experienced cyberbullying, which has remained unchanged from the previous year. This highlights the need for corresponding legislation or preventive measures.

"Governance and Civic Engagement" section reveals that 7.4% of individuals aged 12 and above in our country have expressed their opinions on public or political issues through online official or unofficial channels in the past three months, slightly lower than the 8.1% rate in 2020. "Public policy participation platform" is the most important official channel for citizen participation in our country. According to statistics from the NDC, as of the end of 2022, government agencies have opened 163 policy issues for public opinion solicitation in the "Talk" section, accumulating 7,155 consultations on policy and draft laws & regulations.



In 2022, a total of 10 policy issues and 1,172 consultations on policy and draft laws & regulations were open for public consultation in the "Talk" section.

In terms of government governance, transparent and open data is one of the goals of government governance. According to statistics provided by our country's government Open Data platform, the number of open datasets increased by 6,656 in 2022, with 19,361,161 views and 2,063,653 downloads. On the other hand, the usage rate of e-government services in the past year reached a new high of 82.0% in 2022. Although the usage rate declined slightly in 2023 due to the lifting of pandemic restrictions, the online application usage rate is still about 20 percentage points higher than before the pandemic, indicating a significant shift in people's habits of applying for government-related services online. Among those who have not used e-government services, the majority stated that they have no need, while about 2.0% of individuals mentioned a lack of relevant skills (including technical or knowledge) as the reason for not using e-government services.

"Environmental Quality" dimension found that the average electronic waste generated per person per year increased from 7.5 kilograms to 7.6 kilograms.

"Personal Digital Security" dimension found that people in Taiwan have made significant progress in cybersecurity awareness and protective measures. The rate of adopting digital security measures and updating them within the past three months has increased from 35.1% in 2020 to 45.3% in 2023. The rate of experiencing personal data leaks (such as credit card numbers and telephone numbers) in the past three months has decreased from 6.6% in 2020 to 4.9% in 2023. The rate of falling victim to online fraud has decreased from 4.3% to 0.9%. These trends indicate positive developments.

"Subjective Well-Being" dimension found that internet users in 2022 had significantly higher levels of subjective well-being compared to non-internet users, with a difference of 0.383 points. However, the impact of internet usage on subjective well-being in 2023 was not significant (0.08 points), suggesting that people were able to experience the convenience of the internet more during the pandemic.

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Summary Report

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