

Communications Market Report

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Preface

With the advent of 5G, much faster network transmission speeds and greater data capacities have become a reality, resulting in a gradual shift in consumer behaviors and demands in the way we communicate and share information. In response to these changes and demands, more and more enterprises have embraced digital convergence. With the convergence of telecommunications and broadcasting and the rise of emerging businesses, the communications market has faced unprecedented challenges. In that light, and with view to facilitating healthy competition in communications, as well as respond to the most recent developments and demands of society, the government has to amend existing laws appropriately.

The 2021 Report on Communications Market is the National Communications Commission's (NCC) fifth annual comprehensive report on the communications industry both at home and abroad. Normally, such reports not only present statistics on industry supply, but also outline the results of a market survey with the aim of providing a general overview of specific developments and trends in Taiwan. However, due to the difficulty of conducting market surveys during the COVID-19 pandemic, this year's communications market report shifts its focus to industry trends and includes an analysis of the structure of both domestic and international communications industries, demand trends in global markets, as well as the industry's responses and countermeasures.

Unsurprisingly, the COVID-19 pandemic has significantly affected global communications markets, causing dips in revenues and severely impacting traditional communications. Nonetheless, with certain protocols, such as lockdowns and social distancing, demand for network data and connected devices have surged, and the lives of countless people have shifted to online, which, in turn, has enabled emerging digital services and accelerated digital transformation among many of these traditional communications enterprises.

This year's report provides a detailed summary of changes seen over the past few years and an analysis of both domestic and international markets being affected by the pandemic; the report also outlines key developments and trends, as well as the current challenges and opportunities for the communications industry in Taiwan and suggests appropriate regulatory measures to encourage development.

01

Overview of the Communications Industry



International Communications

According to research¹ by Analysys Mason, an international telecommunications research and consulting company, the scale of the global telecommunications service market declined slightly in 2020 due to the COVID-19 pandemic, with a total revenue of US\$1.4 trillion (approximately NT\$41.41 trillion²); nonetheless, market revenue is expected to rebound as the pandemic eases. In addition, due to the growing number of mobile network users and the growing market share of fiber to the premise (FTTP) services, the telecommunications services market is expected to grow at a compound annual growth rate of 1.2% to US\$1.5 trillion (approximately NT\$44.37 trillion) between 2012-2025.

Likewise, it is expected that the total mobile communications service revenue will grow at a compound

annual growth rate of 1.5%. Owing to stiff competition and limited services currently being offered, 5G revenue is expected to increase just slightly; in contrast, the number of FTTP subscribers is expected to grow at least 30% to 935 million as the FTTP infrastructure is deployed worldwide, with fixed broadband revenue expected to grow by 20% (Figure 1.1).

A global mobile communications report published by Ericsson in 2021 estimated that as of the end of 2020, there were six billion smartphone users worldwide, accounting for 76% of all mobile phone users. This number is expected to reach 7.7 billion by 2026, accounting for 88% of all mobile phone users. As of the end of 2020, 4G users accounted for the majority, but the number of 5G mobile users is growing steadily. Currently, global 5G penetration has already reached 15%, with the highest rate³ being in Northeast Asia (Figure 1.2).

1 Analysys Mason. (2021). Global telecoms market: trends and forecasts 2020–2025. Obtained from www.analysismason.com/contentassets/c397ba2767e343fc8a02eb549c7d3617/analysys_mason_global_telecoms_forecast_sample_feb2021_rddg0.pdf

2 The calculation is based on Central Bank's exchange rate in 2020 (NTD: USD = 29.578: 1)

3 Ericsson. (2021). Ericsson Mobility Report. Obtained from www.ericsson.com/4a03c2/assets/local/mobility-report/documents/2021/june-2021-ericsson-mobility-report.pdf

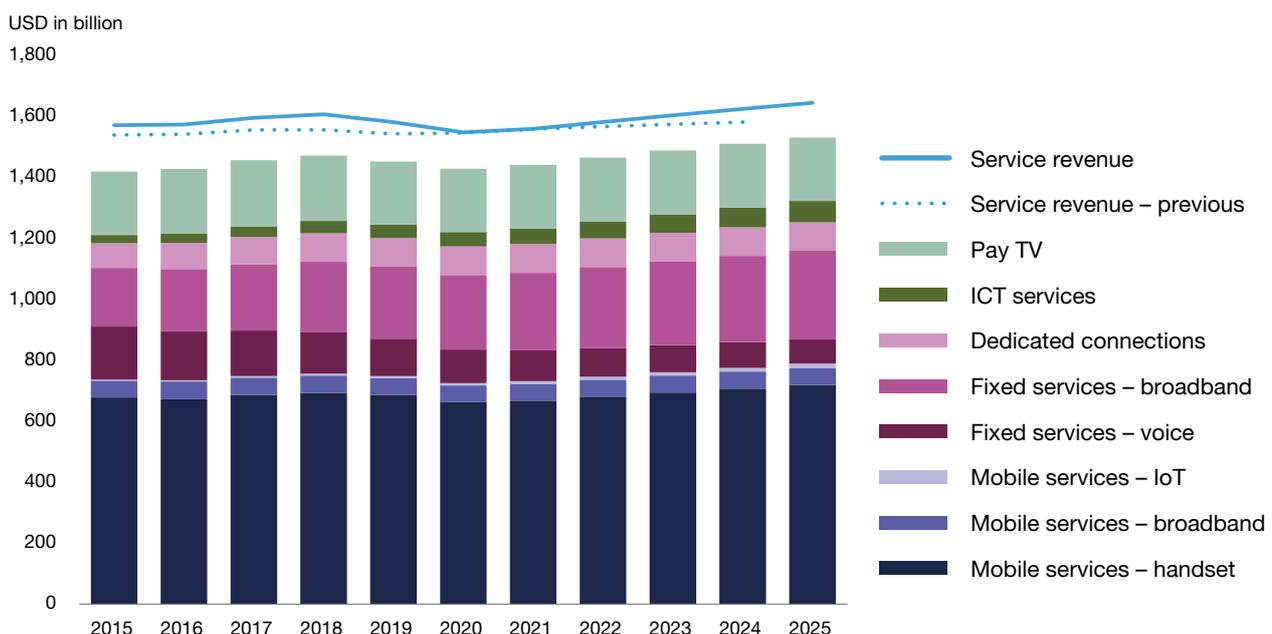


Figure 1.1 Global Revenue Growth of Telecom Services

Source: Analysys Mason. (2021). Global telecoms market: trends and forecasts 2020–2025. Obtained from www.analysismason.com/contentassets/c397ba2767e343fc8a02eb549c7d3617/analysys_mason_global_telecoms_forecast_sample_feb2021_rddg0.pdf

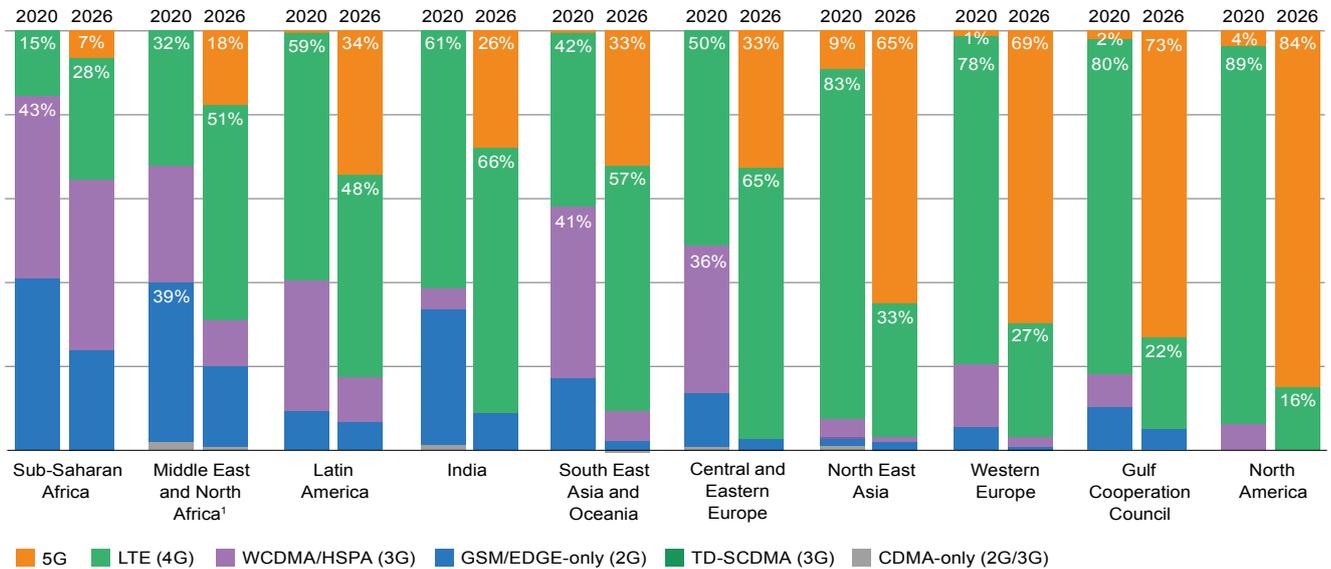


Figure 1.2 Ratios of Mobile Users Worldwide

Source: Ericsson. (2021). Ericsson Mobility Report. Obtained from www.ericsson.com/4a03c2/assets/local/mobility-report/documents/2021/june-2021-ericsson-mobility-report.pdf

Communications Market in Taiwan

Turning to the domestic mobile communications market, Chunghwa Telecom, Taiwan Mobile Telecom, and Far EasTone Telecom are the top three providers, followed by Taiwan Star Telecom and Asia Pacific Telecom. As of the end of 2020, the market share of Chunghwa Telecom for mobile communications was 35.94%, followed by Taiwan Mobile Telecom and Far EasTone Telecom, with respective market shares of 24.33% and 24.14%. These three enterprises accounted for more than 80% of the total market ⁴.

When the structure and scale of the mobile communications market are stable, it is more challenging for new entrants to enter the market; after all, communications operators need frequency bands and costly mobile network infrastructure to provide mobile communications services. Consequently, smaller operators with no

frequency bands or funds have no choice but to rent networks from larger telecom operators and resell them to consumers to provide mobile communications services as Mobile Virtual Network Operators (MVNO), such as Uni-President, which partners with Far EasTone Telecom to offer ibon mobile, and Carrefour, which partners with Asia Pacific Telecom, as Carrefour Telecom.

As for the fixed line voice market, clearly this is dominated by Chunghwa Telecom with Asia Pacific Telecom, Taiwan Fixed Network, and New Century Infocomm Tech being others. As of the end of 2020, the landline market share of Chunghwa Telecom was 92.05%. Turning to fixed broadband, this market depends on two technologies – FTTX and cable modem. The FTTX market is dominated by telecommunications operators (such as Chunghwa Telecom) while the cable modem market is dominated by cable TV providers, such as Kbro, Home+, TFN Media, Taiwan Broadband, and New Century Infocomm Tech. However, some cable TV providers today

⁴ NCC. (2021). Statistical Report of Mobile Communications Market Q4 2020. Obtained from www.ncc.gov.tw/chinese/news_detail.aspx?site_content_sn=3773&cate=0&keyword=&is_history=0&pages=0&sn_f=45925

also provide FTTX services. According to statistics as of the first quarter of 2021, Chunghwa Telecom had acquired a market share of nearly 70% with the remaining cable TV providers representing just over 30%.

In terms of the implementation of communications policy, in February 2020, NCC released the first batch of 5G mobile broadband licenses with total bids amounting to NT\$142.191 billion, some of which shall be used to enhance public 5G infrastructure, reduce the digital divide between urban and rural areas, and promote digital public welfare with the objective of accelerating the deployment of 5G infrastructure. Furthermore, with the advent of 5G and the easing of the conventional regulatory framework behind the Telecommunications Act, NCC passed the Telecommunications Management Act, which took effect on July 1, 2020 with a transitional period in which both new and old laws coexist for three years.

The following pages provide a more in-depth analysis of the overall communications market in Taiwan, focusing on both the mobile communications and fixed communications markets, as well as broadband internet and an overview of communications resources.

Overall Communications Market

Revenue of the telecommunications market in Taiwan showed a downward trend between 2012 and 2020. Total telecommunications revenue reached NT\$388.1 billion in 2012 but in 2020 had fallen to NT\$282.7 billion. Due to the ubiquity of mobile broadband, people have generally become most used to accessing the internet with smartphones. Meanwhile, since the launch of 4G services in Taiwan in June 2014, the number of 4G users has soared. Network communications software has become more stable and easier to use. Meanwhile, landlines, mobile communications, and fixed broadband have decreased in importance. As a result, total telecommunications revenues in Taiwan have fallen in recent years with landline, mobile voice, and fixed broadband revenues shrinking significantly (Figure 1.3).

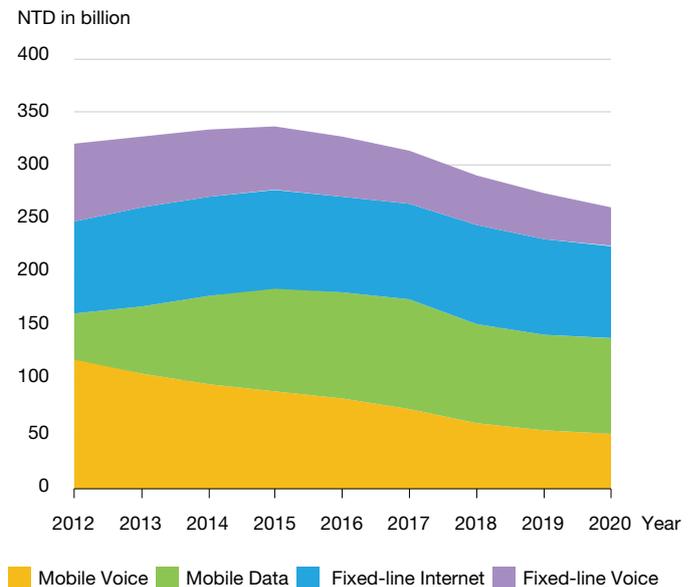


Figure 1.3 Revenues of Telecommunication Services

Source: NCC

Note: 4G services were added in 2014 and 5G services added in 2020. The data revenue does not include SMS revenue in accordance with the amended NCC definition.

The number of mobile broadband accounts have surged over recent years, particularly in 2016 when a large number of people opted to change over to 4G services due to the increasing stability and convenience of 4G services, as well as the NCC subsidy program, which encouraged upgrading from 2G with the support from telecom operators. Furthermore, the successive launch of 5G services since July 2020 have pushed the number of mobile broadband accounts up to 27.8 million, an increase of 10 million from 2012. (Figure 1.4).

Mobile Communications

Revenue of the mobile telecommunications market in Taiwan also declined between 2012 and 2020. Mobile voice revenue has declined year-on-year to NT\$51.2 billion due to the impact of instant messaging applications, while mobile data revenue was increasing, reaching a peak in 2017, before declining slightly and remaining stable. The revenue in 2020 was NT\$89.1 billion, 2.2 times that of 2012 (Figure 1.5).

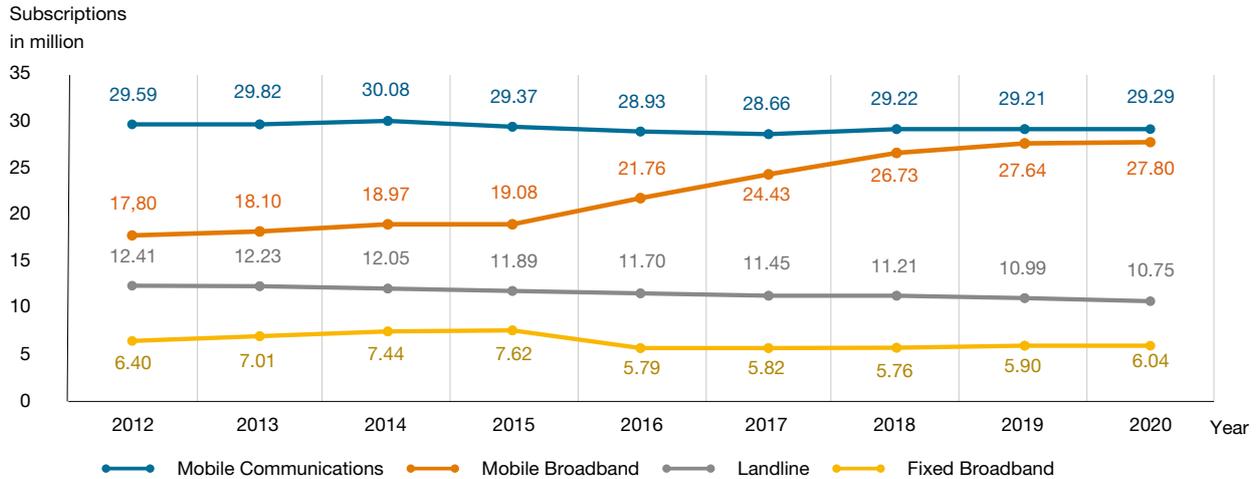


Figure 1.4 Number of Telecom Users

Source: NCC

Note: The number of mobile broadband accounts refers to the number of users who subscribe to data services.

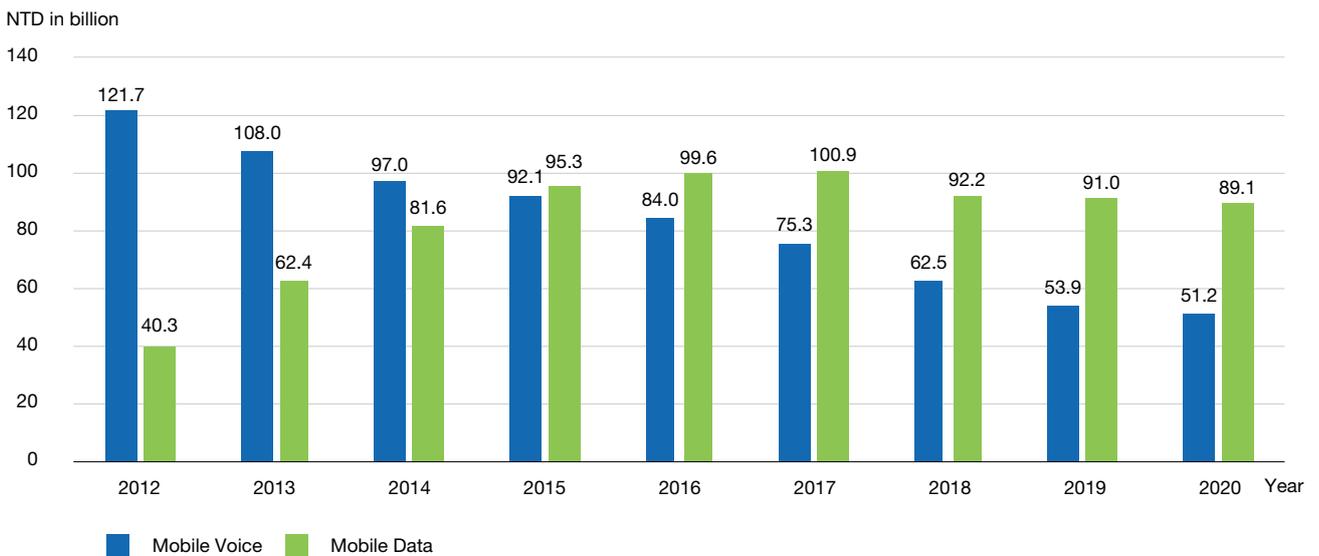


Figure 1.5 Mobile Voice and Mobile Data Revenues

Source: NCC

Note 1: 4G services were added in 2014.

Note 2: The data revenue does not include SMS revenue in accordance with the amended definition by NCC.

Note 3: 5G services were added in 2020.

Following the launch of 4G services in 2014, the ARPUs (average revenue per user) of mobile communications (voice) and mobile data crossed. The ARPU of mobile data grew consistently, reaching a peak of NT\$428 in 2015, before declining each year due to the maturity of technology and increased competition. In contrast, the ARPU of Mobile communications has continued to fall since 2012 from NT\$344 to NT\$144 in 2020 (Figure 1.6).

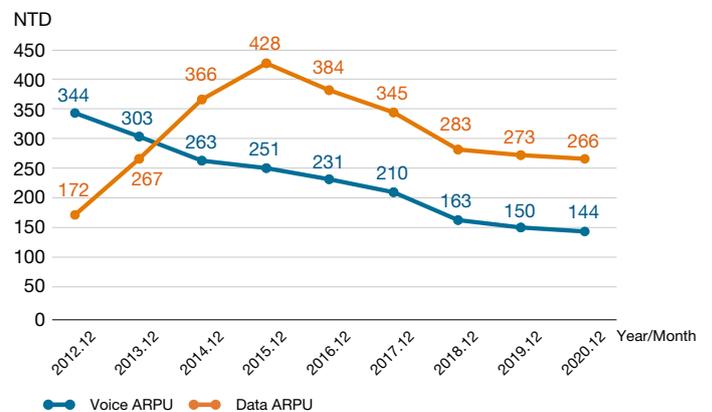


Figure 1.6 ARPU of Mobile Voice and Mobile Data

Source: NCC

Note 1: 4G services were added in 2014.

Note 2: 5G services were added in 2020.

Fixed Communications

As mobile communications became increasingly popular, revenue of landline communications dropped year-on-year. In 2020, total landline revenue fell to NT\$129 billion, a decrease of NT\$33.7 billion from 2012. Mobile communications have decreased the importance of landlines, and the internet has diminished landline communications revenue even more, which was only NT\$36.7 billion in 2020, a decrease of NT\$36.6 billion from 2012. Meanwhile, revenue of fixed network data that once reached NT\$92.7 billion in 2014, thanks to the development of optical fiber and cable broadband networks, fell to NT\$86 billion in 2020 following the launch of 4G and 5G services (Figure 1.7).

The difference between the proportions of fixed line voice revenue and fixed network data revenue of the total fixed communications revenue continues to widen, with fixed network data revenue accounting for 70% of fixed communications revenue in 2020 (Figure 1.8).

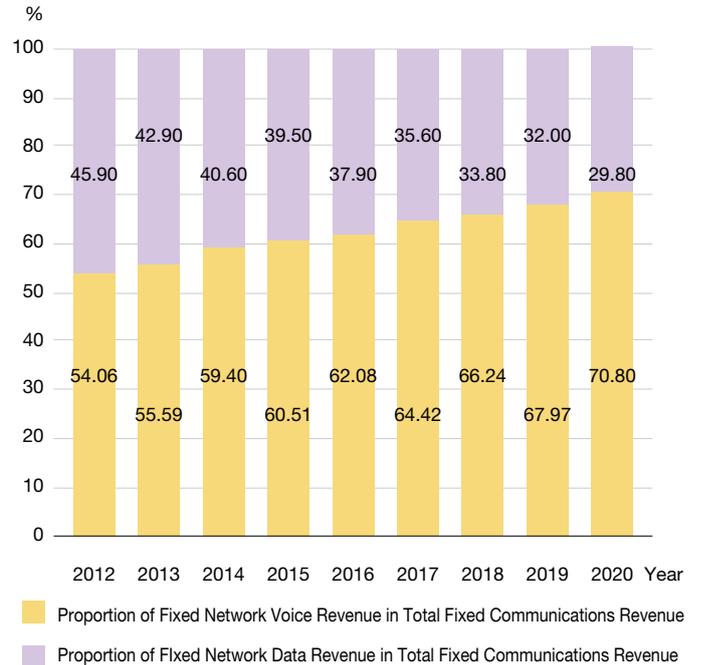


Figure 1.8 Revenue Structure of Fixed Communications

Source: NCC

Note 1: MOD business is not included.

Note 2: Due to rounding, the total value may not equal the sum of all values.

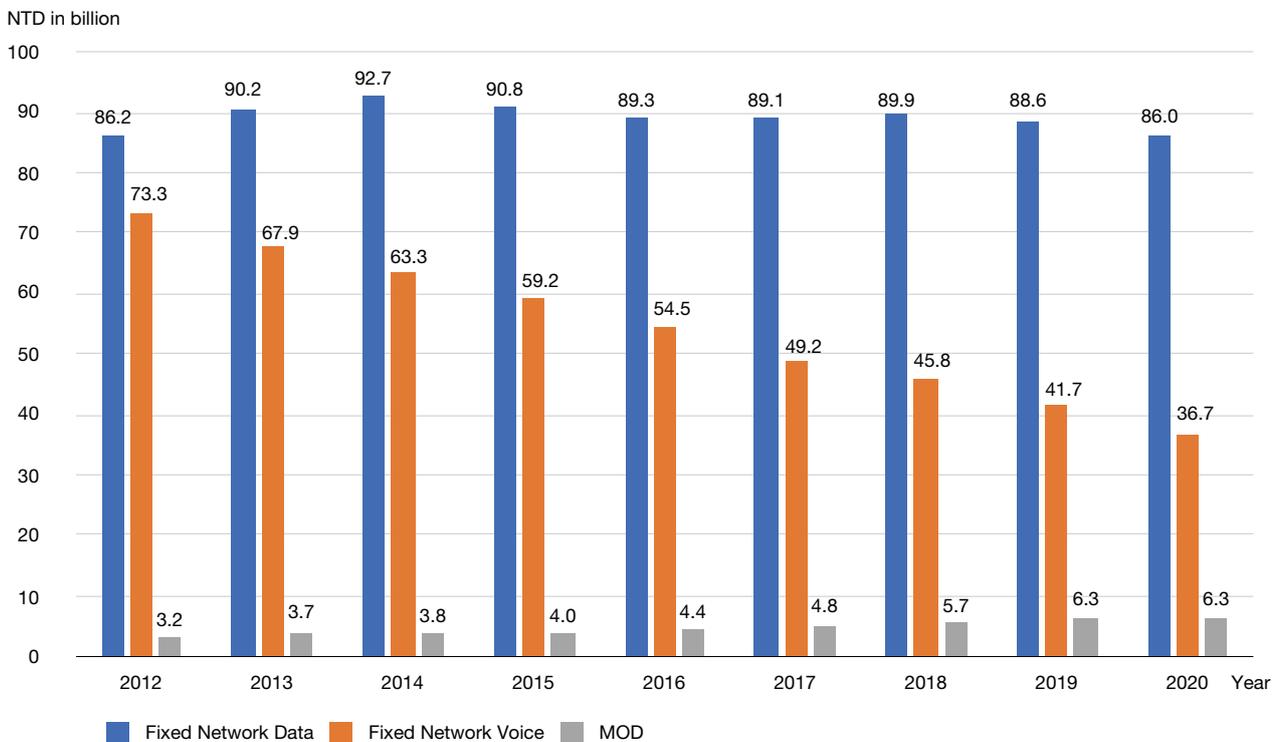


Figure 1.7 Revenue of Fixed Line Communications

Source: NCC

Note: Fixed network data communications revenues include the internet, value-added service and circuit rental revenues. Due to rounding, the total value may not equal the sum of all.

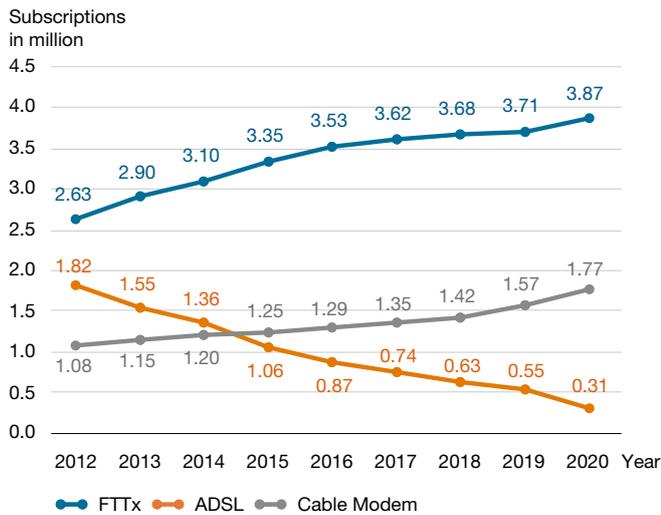


Figure 1.9 Number of Cable Broadband Users

Source: NCC

Broadband Internet

With the development of various broadband internet services, such as optical fiber, cable TV broadband, and mobile broadband, broadband networks have

become an integral part of our daily lives. With the rapid development of high-speed network technologies, such as fiber optic and cable broadband, and the upgrade and promotion packages launched by fixed network operators, the number of Taiwan's ADSL subscribers has fallen significantly from 1.82 million in 2012 to 310,000 in 2020 (Figure 1.9). The number of optical fiber subscribers grew to a record high of 3.87 million in 2020, accounting for 69% of the total cable broadband subscribers. According to the statistics on the number of subscribers to Taiwan's four major fixed network operators⁵, the number of fiber optic subscribers using 100Mbps optical fiber and above has grown from 10,000 in 2012 to 1.76 million in 2020, and the number of 1Gbps subscribers has increased from 148 in 2015 to 8,322 in 2020 (Figure 1.10).

⁵ Taiwan's four major fixed network players are Chunghwa Telecom Co., Ltd., Taiwan Fixed Network Co., Ltd., Asia Pacific Telecom Co., Ltd. and New Century Infocomm Tech Co., Ltd. In 2020, the number of ADSL subscribers of the four major fixed network operators combined was 720,000; the number of fiber optic subscribers was 3.59 million.

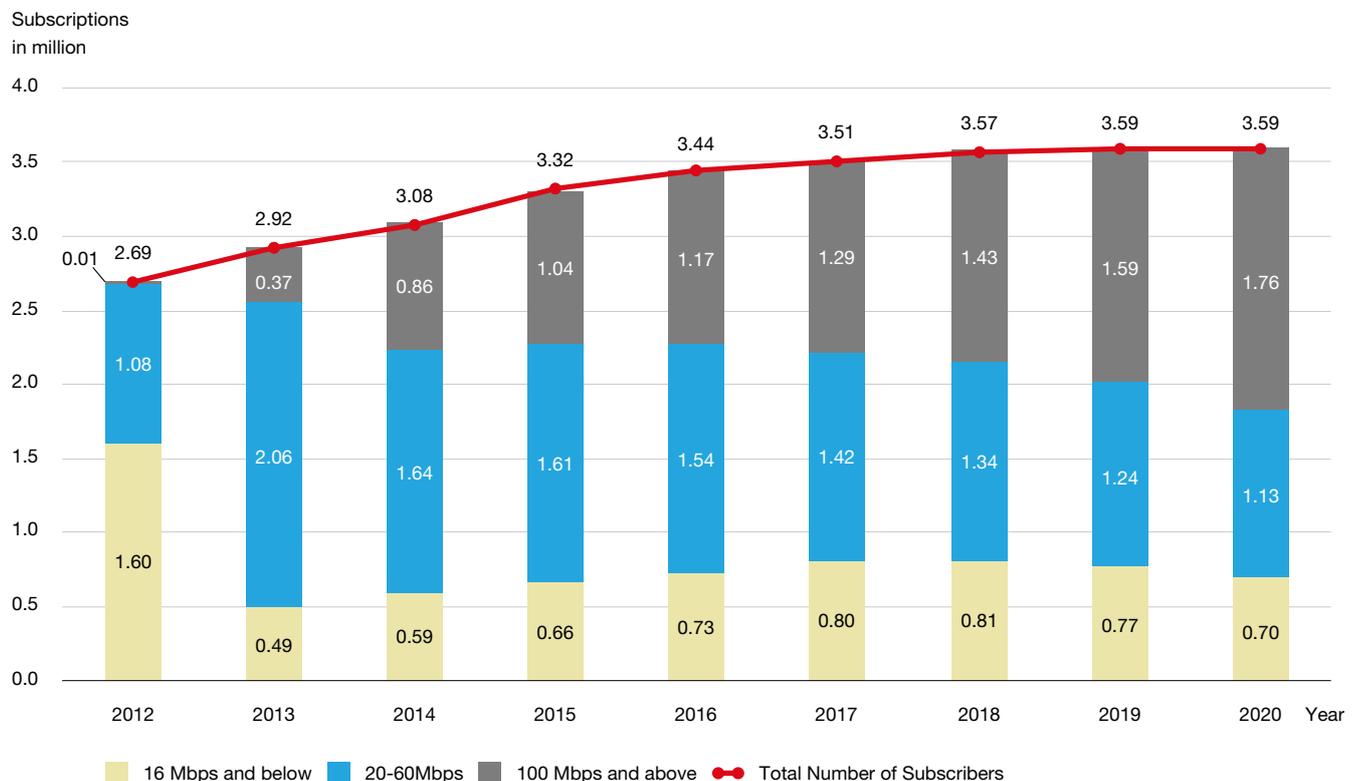


Figure 1.10 Fiber Optic Subscribers of Four Major Fixed Network Operators in Taiwan

Source: NCC

Overall Communications Resources

Mobile Communications

2G services in Taiwan were terminated in July 2017 while 3G services ended in January 2019. Meanwhile, 4G services were launched in June 2014, and 5G services began in July 2020; please note further details in the table below (Table 1.1).

Table 1.1 Spectrum Status

Frequency	Status
700MHz	703-748MHz/758-803MHz assigned to mobile broadband services (4G/LTE) with the license valid until 2030.
900MHz	885-915MHz/930-960MHz assigned to mobile broadband services (4G/LTE) with the license valid until 2030.
1800MHz	1710-1785 MHz/1805-1880MHz assigned to mobile broadband services (4G/LTE) with the license valid until 2030.
2100MHz	1920-1980MHz/2110-2170MHz assigned to mobile broadband services (4G/LTE) with the license valid until 2033.
2500MHz, 2600MHz	2500-2570MHz, 2620-2690MHz and 2570-2620MHz assigned to mobile broadband services (4G/LTE) with the license valid until 2033.
3.5GHz	3300-3570MHz assigned to 5G with the license valid until 2040.
28GHz	27000-29500MHz assigned to 5G with the license valid until 2040.

Source: NCC

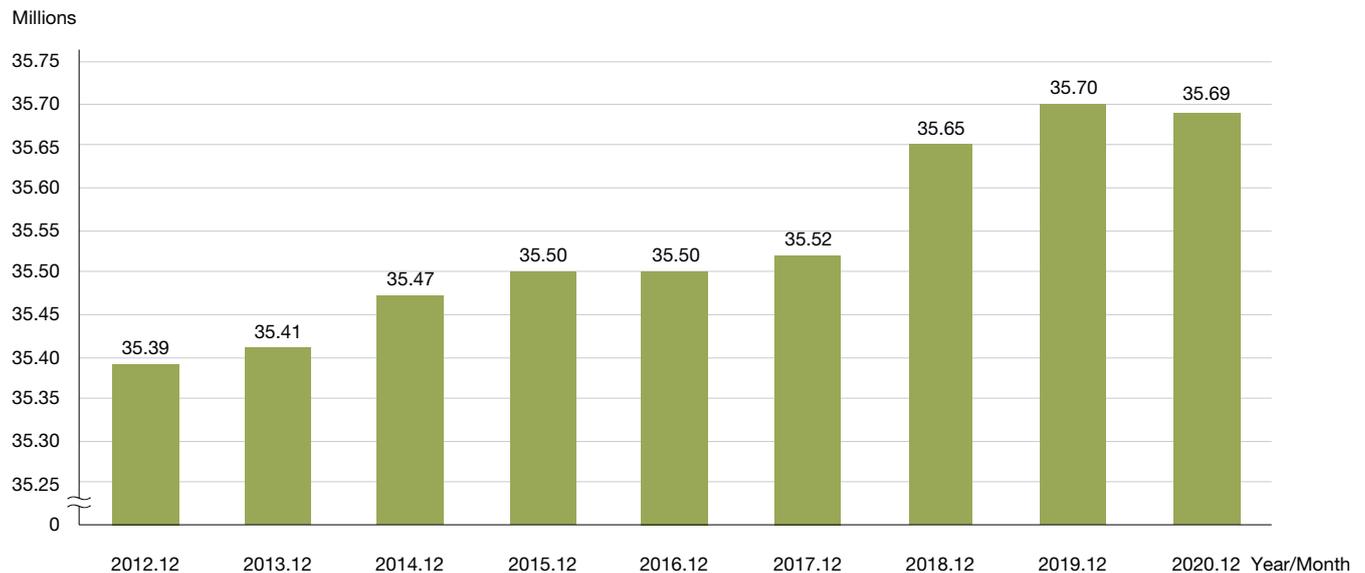


Figure 1.11 Numbers of IPv4 Addresses Issued in Taiwan

Source: Results from TWNIC December 2020

TWNIC Manages Domain Names

Taiwan's country code top level domain (ccTLD) business is currently registered and managed by the Taiwan Network Information Center (TWNIC).

As of December 2020, a total of 35,689,984 IPv4⁶ addresses, 372 autonomous system numbers (ASN) and 2,555x296 IPv6⁷ addresses had been issued in Taiwan (Figure 1.11 and Figure 1.12).

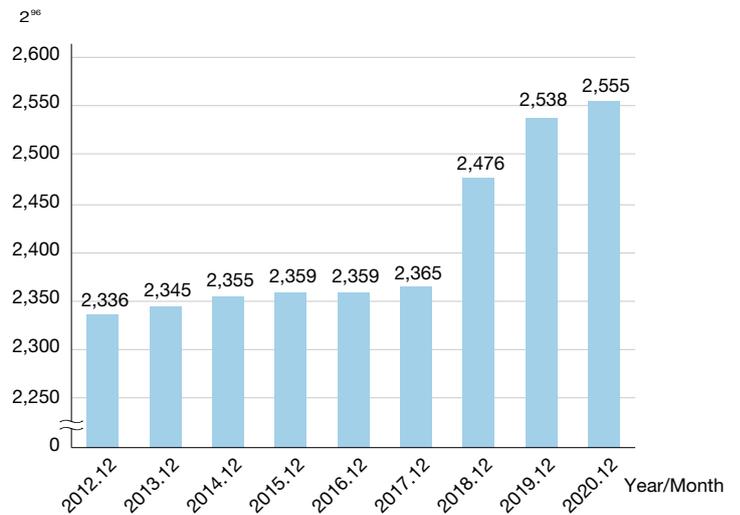


Figure 1.12 Numbers of IPv6 Addresses Issued in Taiwan

Source: Results from TWNIC December 2020

6 IPv4 ranking is based on APNIC statistics (including the number of addresses TWNIC and others have applied to APNIC)

7 IPv6 ranking is based on APNIC statistics (including the number of addresses TWNIC and others have applied to APNIC)

02

Domestic and International Communications Market Trends

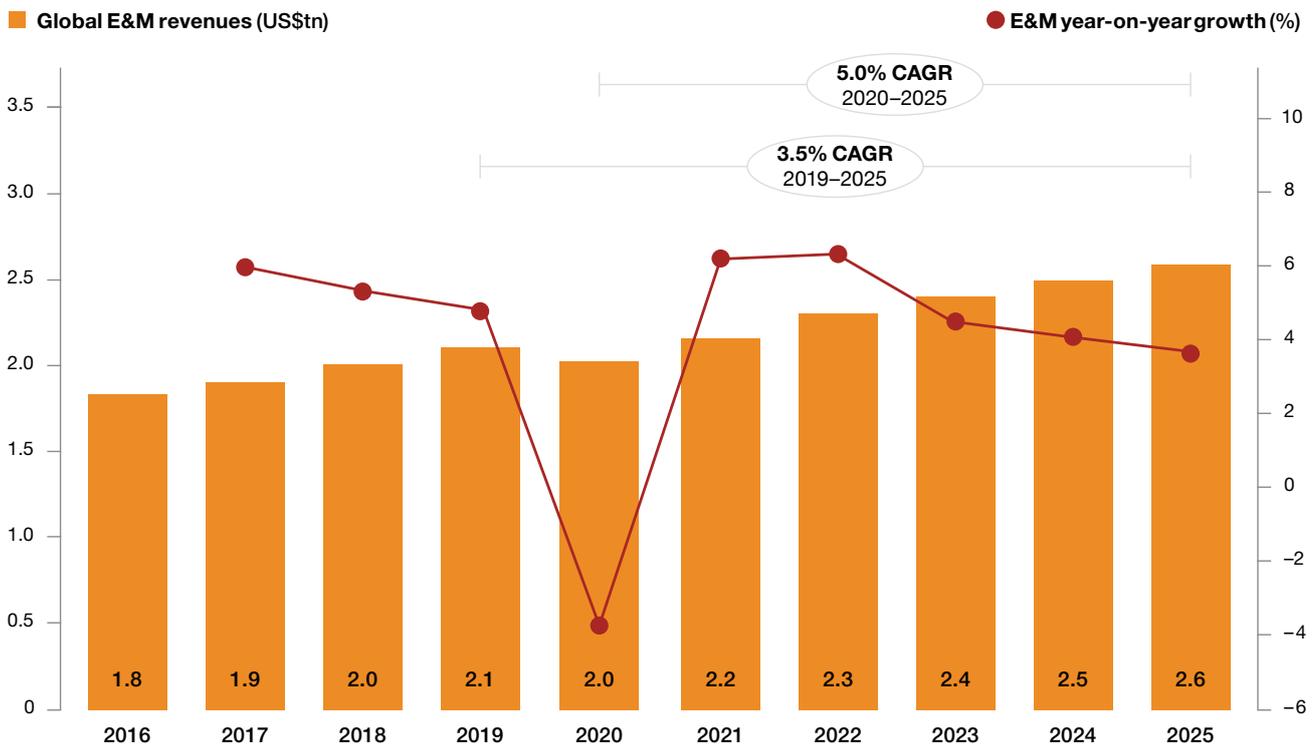


International Communications Markets

According to Global Entertainment & Media Outlook 2021-2025 published by PricewaterhouseCoopers (PwC), the global entertainment and media industry revenue decreased by 3.8% in 2020, falling to US\$2 trillion (approximately NT\$59.16 trillion⁸), with movie theaters and physical exhibitions seeing a huge decline. However, as the pandemic eases, the revenue is estimated to rebound at a compound annual growth rate of 5% over the next 5 years (Figure 2.1).

⁸ The calculation is based on Central Bank's exchange rate in 2020 (NTD: USD = 29.578: 1)

The film industry shrunk sharply in 2020. With the easing of anti-COVID restrictions, revenue is expected to grow at a compound annual growth rate of 29% by 2025. The OTT industry is expected to continue to prosper, growing at an annual compound growth rate of 10.6%, reaching US\$81.3 billion (approximately NT\$2.4 trillion) in 2025. However, revenue from newspapers, magazines, and traditional television industries, affected by the pandemic and different consumption habits, are expected to decline (Figure 2.2). The following is a breakdown of the developments and trends in the communications market in major countries:



Note: 2020 is the latest available data. 2021–2025 values are forecasts.

Figure 2.1 Global Entertainment and Media Industry Revenue Growth

Source: PwC. (2021). Global Entertainment & Media Outlook 2021–2025. Obtained from <https://www.pwc.com/gx/en/industries/tmt/media/outlook.html>

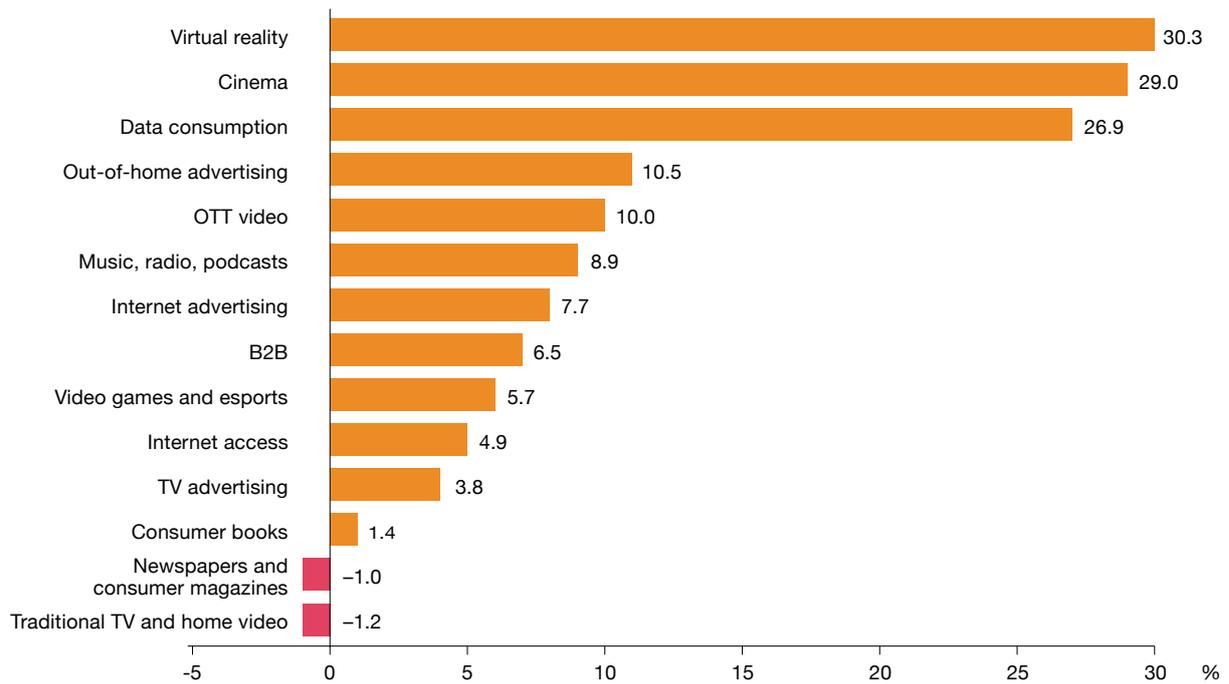


Figure 2.2 Global Revenue Forecast 2020-2025 by Sub-sectors

Source: PwC. (2021). Global Entertainment & Media Outlook 2021–2025. Obtained from <https://www.pwc.com/gx/en/industries/tmt/media/outlook.html>

Domestic Broadcasting Market

The satellite radio and television market in Taiwan can be divided into upstream content providers and downstream transmission platform providers in an industry chain. However, some companies provide both content and transmission platforms. The upstream sector can be further divided into three categories: broadcast television providers, satellite television providers, and internet content providers. The downstream sector can be divided into five categories: broadcast television system, cable television system, satellite broadcasting businesses, internet protocol TV (IPTV), and over-the-top TV (OTT TV).

As for the radio and television sector in Taiwan, five terrestrial TV stations broadcast programs— Taiwan Television (TTV), China Television (CTV), Chinese Television Service (CTS), Formosa Television (FTV), and Public Television Service (PTS) – and five major cable television broadcasters, as well as multiple-system operators (MSOs): Home+, Kbro, Taiwan Broadband,

Taiwan Fixed Network (TFN), and Taiwan Optical Platform. Horizontal mergers and acquisitions have become a phenomenon among cable television providers in recent years. Among the satellite broadcasters, as of the end of 2020 there were 141 satellite broadcast radio and TV enterprises. For IPTV, MOD of Chunghwa Telecom is the major player. Meanwhile, OTT operators are categorized into foreign and domestic platforms. For foreign platforms, Netflix of the US and South Korea's LINE TV are the market leaders. Domestic operators can be grouped by the service offered – television channel operators, telecom operators, emerging video platforms – and device operators, such as OTT video set-top boxes, and so on.

The broadcast radio market includes station on AM, FM radio, and overseas shortwave (SW) radio. As of the end of 2020, there were a total of 185 radio stations. According to the Q1 2021 Media Survey Report by Nielsen, a market research company, the

Police Broadcasting Service (PBS), NEWS98, and UFO Network are listened to most frequently⁹.

Radio and television broadcasters in Taiwan are regulated in accordance with the Radio and Television Act, the Cable Radio and Television Act, and the Satellite Broadcasting Act. As for internet audiovisual services, in 2020, NCC put forward the Draft Regulations Governing Internet Audiovisual Services, with the aim of regulating internet audiovisual services through a voluntary registration system by operators, thereby creating a friendly and fair environment for online audio-visual services while also protecting people's rights and interests. However, this law remains in the draft stage and has not yet been formally enacted.

The following is a more in-depth analysis of the overall broadcasting market, television broadcasting, cable television, radio, satellite broadcasting, as well

as an overview of content and punitive measures and podcasting and the OTT market in Taiwan.

Overall Broadcasting Market

The overall revenue of broadcasting in Taiwan has been falling since 2018; satellite television is the main source of revenue, followed by cable television and then terrestrial television. Radio accounts for the smallest proportion. The revenue of satellite television has exceeded NT\$60 billion since 2017, peaking at NT\$67.7 billion; cable television revenue fell to NT\$34.8 billion in 2020. The revenues of terrestrial television and radio remained at an average of NT\$8.3 billion and NT\$4.2 billion respectively (Figure 2.3).

As of the end of 2020, a total of 583 licenses had been issued to 406 radio and television broadcasters, including 191 licenses for television broadcasters, 64 licenses for cable television, and 328 licenses for satellite television broadcasters (Table 2.1).

9 Nielsen. (2021). Q1 2021 Media Survey Report. Obtained from www.shorturl.at/okT09

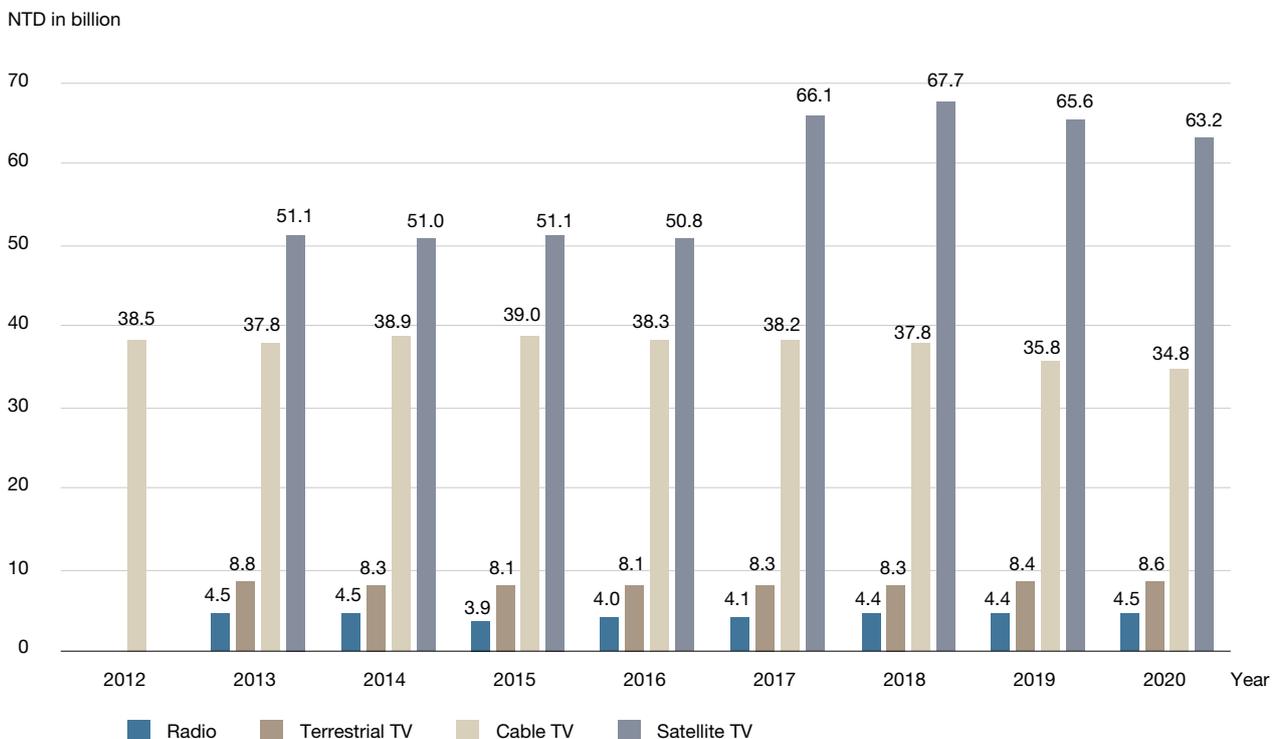


Figure 2.3 Broadcasting Revenues

Source: NCC

Note: The figure of overall cable TV industry revenue is the only data available for 2012.

Table 2.1 Numbers of Radio and Television Broadcasters and Licenses

Classification	Business Type		Number of Licenses	Subtotal of Licenses	Number of Businesses	Total Number of Licenses (Dec 2020)
Terrestrial TV	Terrestrial Station		6	6	5	583
	Radio Station	Comprehensive Radio Station	8	185	185	
		AM Radio Station	19			
		FM Radio Station	157			
		Overseas SW Radio Station	1			
Cable TV	System Operator		64	64	64	
	Broadcast Operator		0		0	
Satellite Broadcast TV	Direct Satellite Broadcasting Television Services		4	328	Total of 4 (1 domestic and 3 foreign)	
	Satellite Channel Program Supplier	Domestic Channel	150		Total of 101 (78 domestic, 27 foreign and 4 dual-status entities)	
		Foreign Channel	104			
	Other broadcasters	Domestic Channel	70		47 domestic broadcasters	

A total of seven domestic dual-status entities providing channels and programs, and one dual-state entity providing a foreign channel and an "other" broadcaster providing a channel and programs; three dual-state entities in the direct satellite television services and broadcasting.

Source: NCC

With the increased prevalence of mobile broadband and smartphones, the revenue of digital advertising in Taiwan has risen in recent years; subsequently, this has led to a decline in revenue of the five major traditional media – radio, television, newspapers, magazines and outdoor media with revenue falling to NT\$25.6 billion in

2020 (Figure 2.4). According to Taiwan Entertainment & Media Outlook 2021-2025¹⁰ published by PricewaterhouseCoopers (PwC), online advertising reached

¹⁰ PwC. (2021). Taiwan Entertainment & Media Outlook 2021-2025. Obtained from <https://www.pwc.tw/zh/publications/topic-report/2021-taiwan-enm-outlook.html>

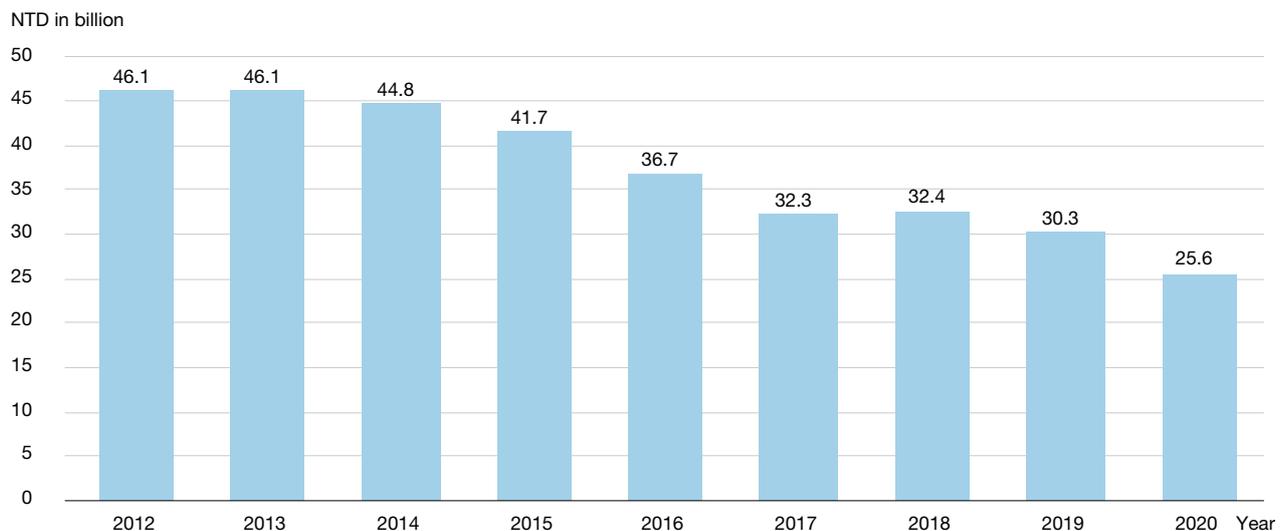


Figure 2.4 Growth in Advertising Output of the Five Traditional Media

Source: Media Agency Association (MAA), (2020). 2020 Media White Paper.

AGB Nielsen Media Research Taiwan. (2021). Statistics on media Advertising Information System (AIS)

Note: Five traditional media includes radio, television (including cable and broadcast television), newspapers, magazines and outdoor media.

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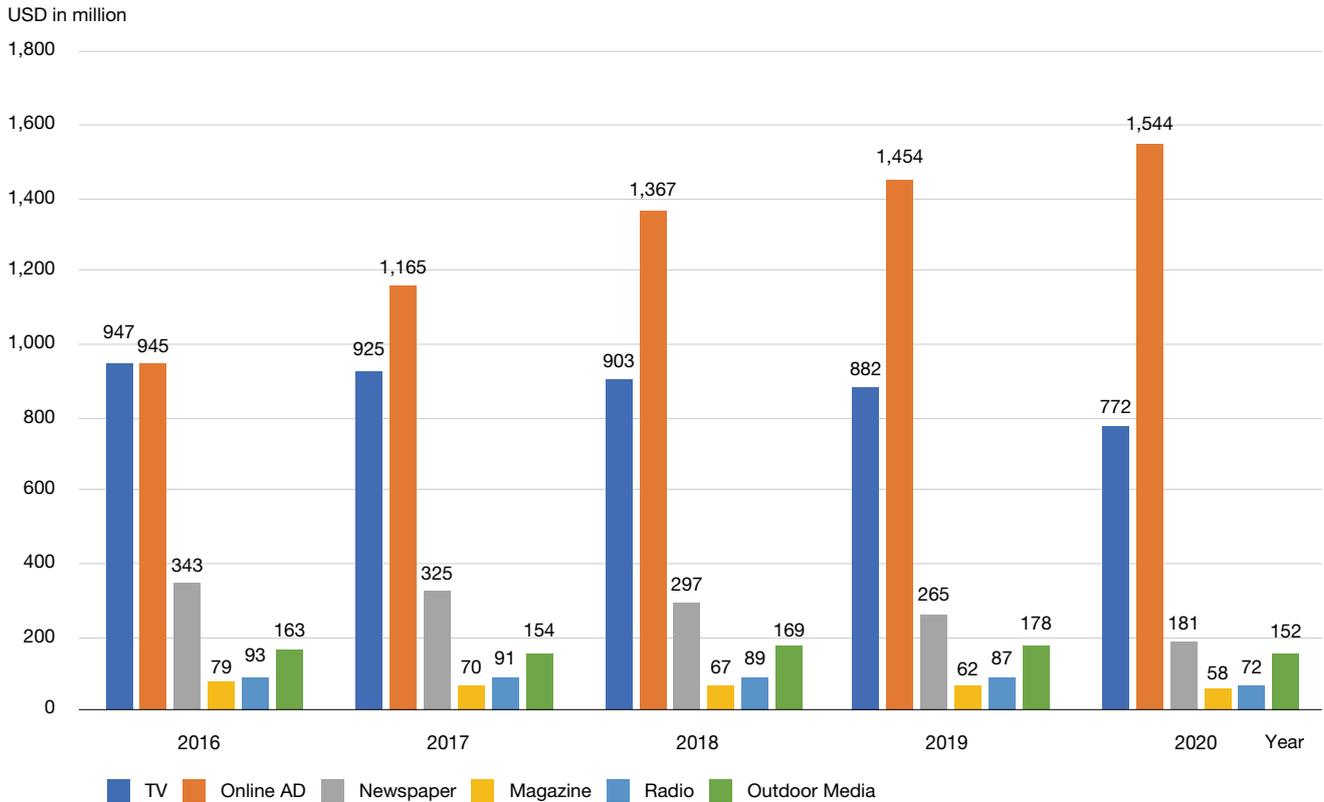


Figure 2.5 Media Advertising Output 2016-2020

Source: PwC. (2021). Taiwan Entertainment & Media Outlook 2021–2025. Obtained from www.pwc.tw/en/publications/assets/taiwan-entertainment-and-media-outlook-en.pdf

Note: Broadcast advertising includes advertising on multi-channel television and broadcast television; out-of-home (OOH) advertising includes digital and practical OOH advertising; online advertising includes mobile internet advertising and cable internet advertising.

US\$1,544 million (approximately NT\$45.668 billion¹¹) in 2020, signifying that online media is certainly the advertising trend in Taiwan (Figure 2.5).

Terrestrial Television

Between 2013 and 2020, the total revenue for television broadcasters declined and then rose, decreasing from NT\$8.8 billion in 2013 to NT\$8.1 billion in 2016, before growing to NT\$8.6 billion in 2020. Advertising revenue meanwhile decreased year-on-year from NT\$3.6 billion in 2013 to NT\$2 billion in 2020 (Figure 2.6).

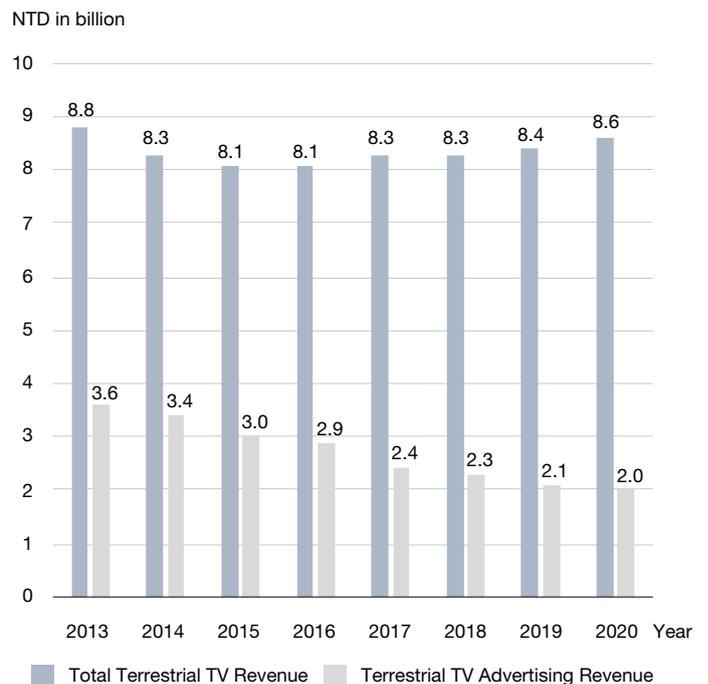


Figure 2.6 Terrestrial Television Revenues

Source: NCC

¹¹ The calculation is based on Central Bank's exchange rate in 2020 (NTD: USD = 29.578: 1)

NTD in billion

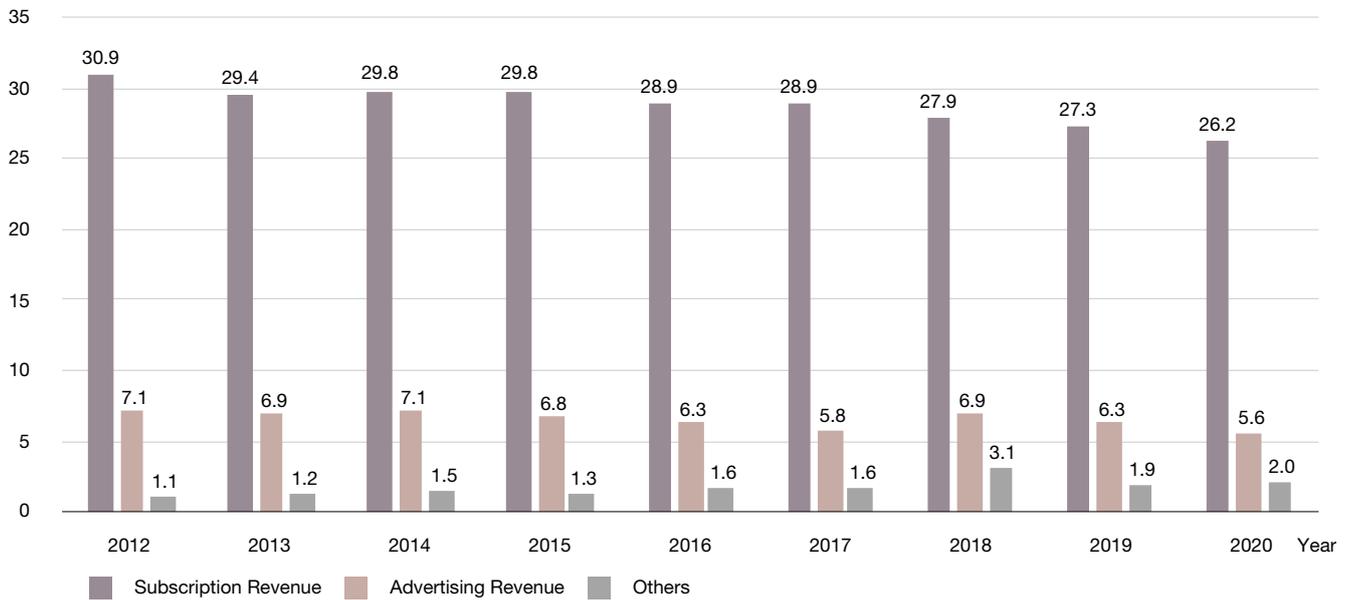


Figure 2.7 Cable Television Revenue

Source: NCC

Cable Television

Cable television market revenue hits record low of NT\$34.7 billion

The revenue of cable television in Taiwan has shown a mainly downward trend over the past nine years, hitting a record low of NT\$33.8 billion (Figure 2.7) in 2020. Subscription fees remain the dominant source, accounting for 75% of total revenue.

Number of cable TV subscribers decreases; penetration declining each year

Prior to 2016, video media revenue in Taiwan was dominated by pay TV subscriptions. Since 2017, emerging video media like OTT TV and multimedia transmission platforms have diminished the number of cable TV subscribers in Taiwan to 4.87 million in 2020, the lowest in recent years.

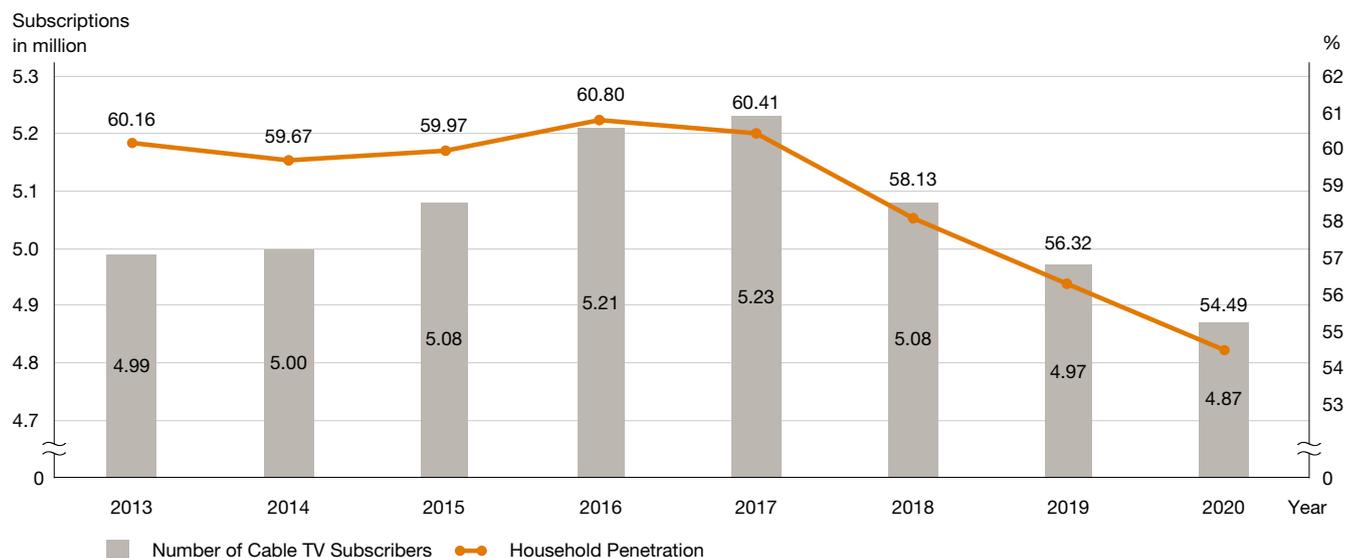


Figure 2.8 Cable TV Subscribers and Household Penetration

Source: NCC

NTD in billion

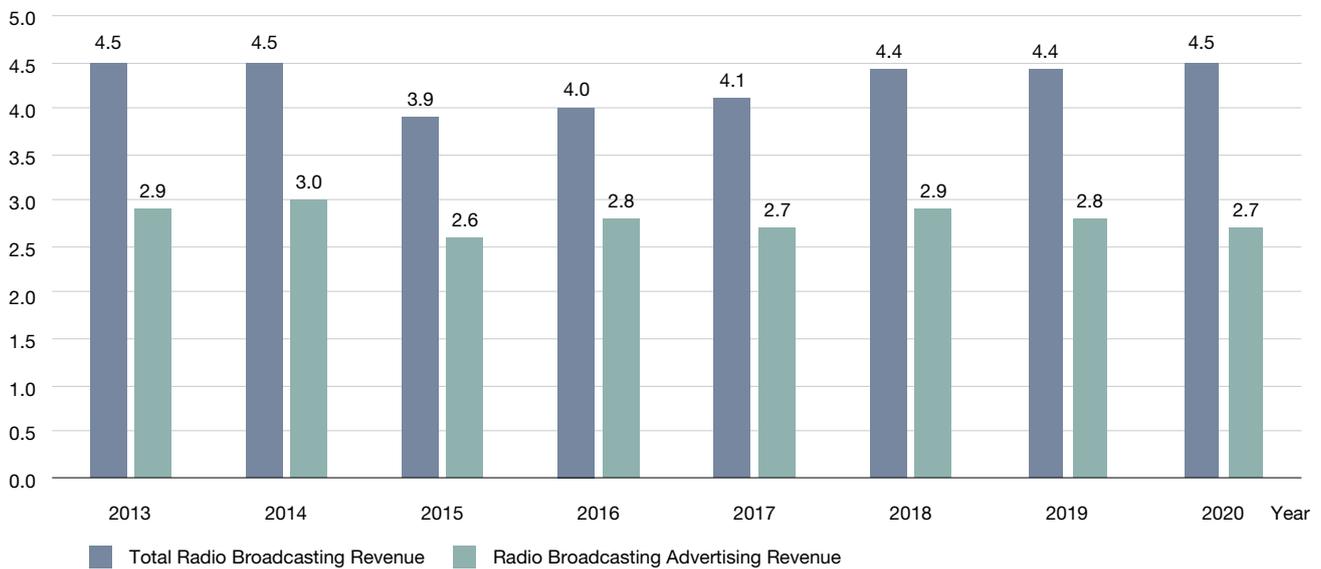


Figure 2.9 Radio Broadcasting Revenue

Source: NCC

Radio Broadcasters

In recent years, the revenue of radio broadcasting has averaged NT\$4.2 billion. Revenue dropped slightly but rose between 2013 and 2020, hitting a low point of NT\$3.9 billion in 2015 and then rebounding to NT\$4.5 billion in 2020. The proportion of advertising revenue in the total broadcast radio revenue fluctuated between NT\$2.6 million and NT\$3 billion indicating no significant changes (Figure 2.9).

When it comes to programs broadcast between 2014 and 2020, most were produced domestically, followed by those outsourced and simulcast. Overall, the proportion of domestically produced programs has risen over the last three years, while the proportion of simulcasts has fallen. In 2020, domestically produced, outsourced and simulcast programs reached 63.52%, 26.73% and 9.74% respectively (Figure 2.10).

Satellite Television

Satellite television revenue rose and then dipped between 2013 and 2020, growing substantially in 2017 and peaking at NT\$67.7 billion in 2018, before decreasing slightly in 2018 and declining further to

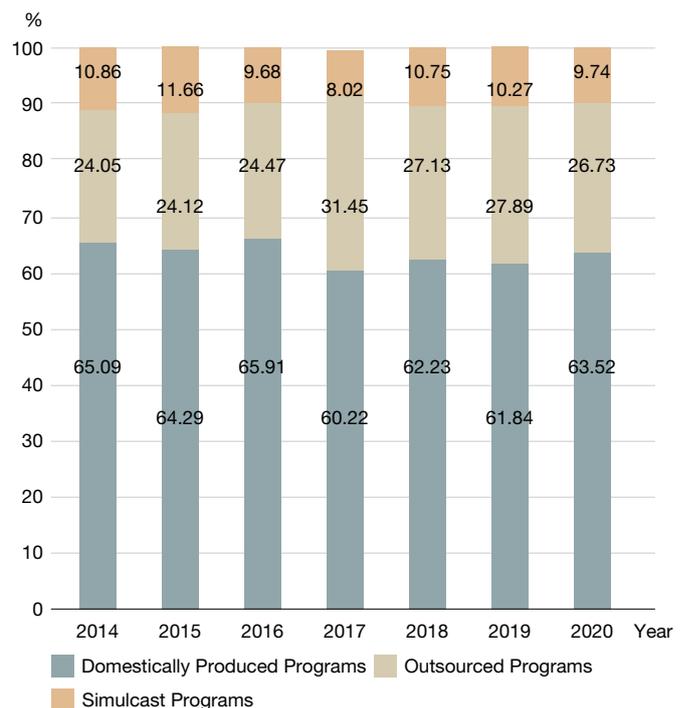


Figure 2.10 Domestically Produced, Outsourced and Simulcast Programs

Source: NCC

Note : Due to rounding, the total value may not equal the sum of all values.

NT\$63.2 billion in 2020. Advertising revenue hit the lowest point of NT\$18.4 billion in 2017, but increased slightly to NT\$18.7 billion in 2020 (Figure 2.11).

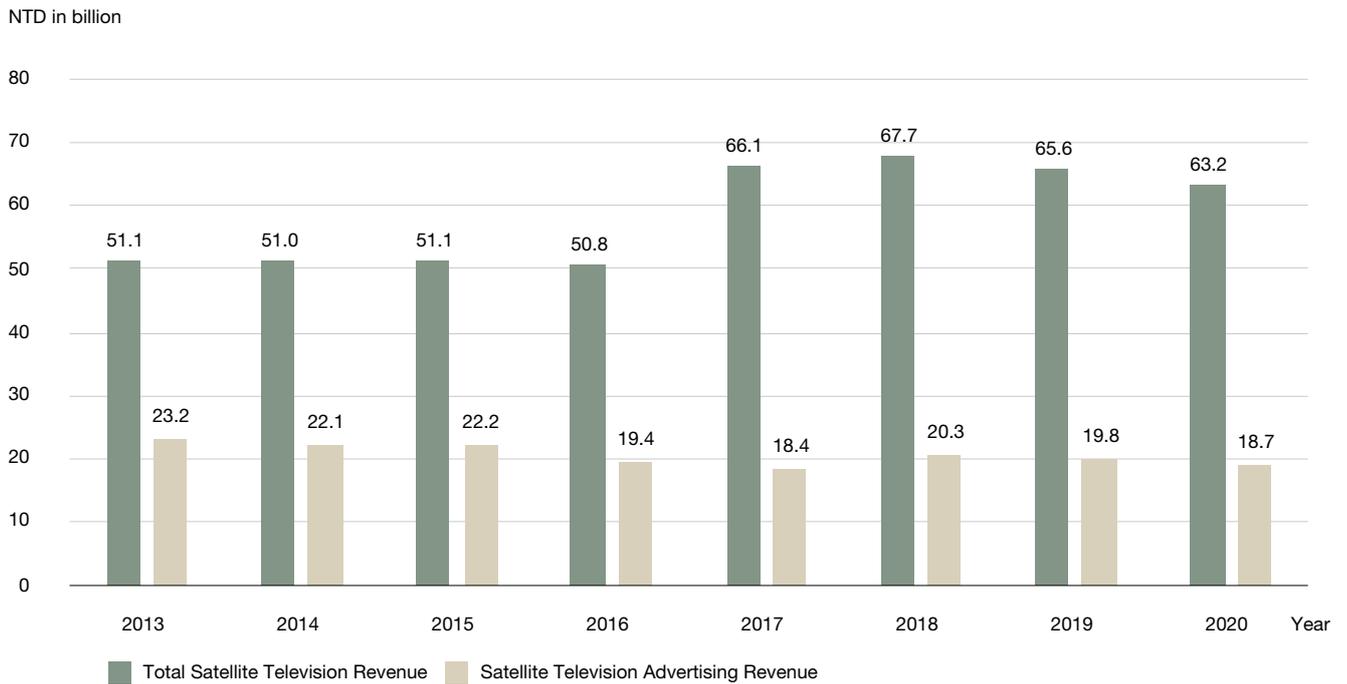


Figure 2.11 Satellite Television Revenue

Source: NCC

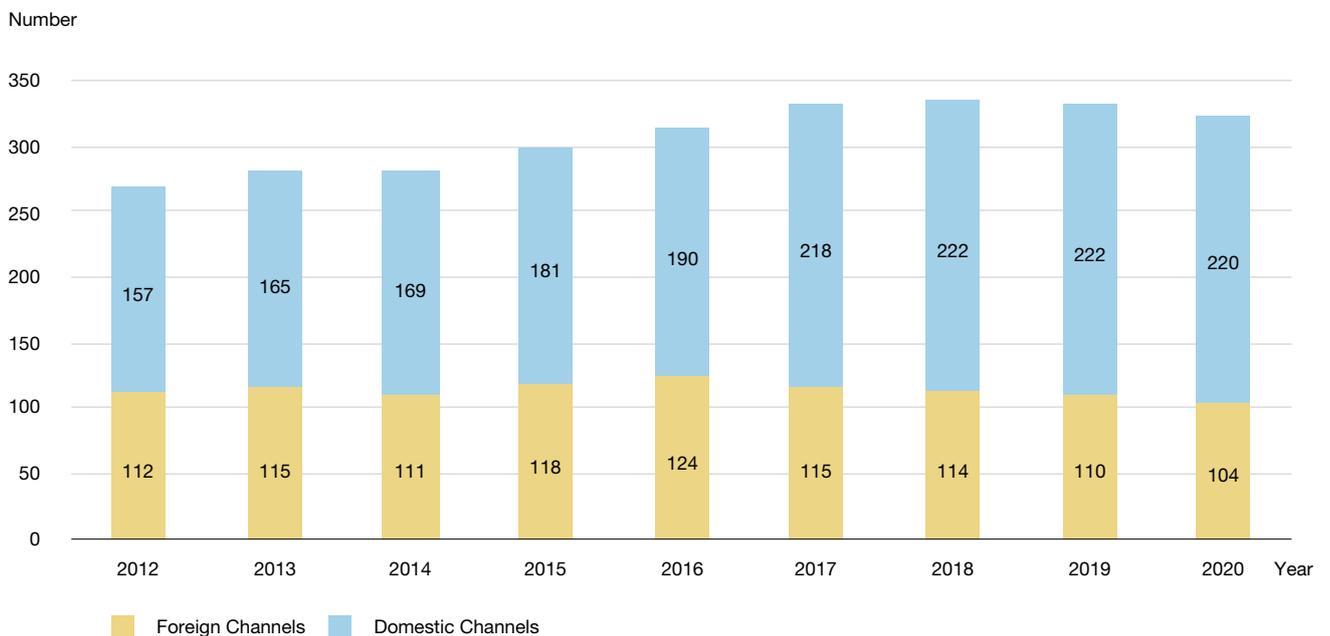


Figure 2.12 Domestic and Foreign Channels

Source: NCC

Note: Data of domestic channels includes "other" channels.

The category of other broadcasters was added to the amended Satellite Broadcasting Act, which took effect on January 6, 2016. By the end of 2020, there were a total

of 141 satellite television broadcasters, 150 domestic satellite television channels, 104 foreign satellite channels and 70 domestic "other" channels (Figure 2.12).

Radio and Television Programs

Analysis of production and broadcasting of radio and television programs

Throughout 2019, broadcast television and radio in Taiwan were mainly domestically produced programs, with 94.76% and 99.3% respectively, while satellite television programs were dominated by foreign programs, at 54.89% (Table 2.2).

Table 2.2 Ratios of Domestic and Foreign Programs in Radio and Television during 2019

Unit: %

Radio and Television Enterprise	Percentages of Domestic and Foreign Programs	
Broadcast Radio Enterprise	Domestic Programs	99.30
	Foreign Programs	0.70
Broadcast Television Enterprise	Domestic Programs	94.76
	Foreign Programs	5.24
Satellite Television Enterprise	Domestic Programs	45.11
	Foreign Programs	54.89

Source: NCC

Note: Data of 2019 remains the most recent.

The following is an analysis of the ratios of locally produced programs, premieres, new broadcasts and reruns. We can note an upward trend in locally produced programs, rising from 45.13% in 2012 to 51.77% in 2020. Over 60% of programs were dominated by reruns and grew year-on-year. Premieres reached a peak of 22.36%

in 2018, but decreased slightly thereafter. New broadcasts saw a downward trend, dropping from 19.31% in 2012 to 10.08% in 2020 (Table 2.3).

Since the three amended radio and television related laws took effect on January 8, 2016, all programs broadcast on channels on cable television systems have been regulated in accordance with the Satellite Broadcasting Act. The NCC has also amended related subordinate regulations, to handle any content violations by television broadcasters. Breaches from applicable regulations where NCC is defined as the competent authority shall be handled by NCC. Data like penalties for breaches, number of penalties and amount of fine are published on the NCC official website.¹²

Podcasting and OTT Markets

Podcasting

Analysis

With increased ubiquity of devices, such as Bluetooth earphones, podcasts have become increasingly popular. The podcast industry has been flourishing with many new podcasters emerging during 2020, which has been dubbed “the year of the podcast.” In addition, in times when the anti-COVID measures such as social distancing and isolating at home, the sense of a companionship provided by podcasts resulted in a surge of listeners.

¹² Note: Accumulative Table of Penalty and Fine concerning Broadcasting Contents www.ncc.gov.tw/chinese/gradation.aspx?site_content_sn=2735&is_history=0

Table 2.3 Production and Broadcasting of Satellite Television Programs 2012-2020

Unit: %

Item	2012	2013	2014	2015	2016	2017	2018	2019	2020
Domestically Produced Programs	45.13	47.78	43.72	43.37	46.25	49.96	50.99	52.15	51.77
Premieres	17.83	18.23	17.79	15.91	18.81	20.93	22.36	21.10	20.30
New Broadcasts	19.31	18.25	18.36	19.59	16.81	12.89	11.21	11.15	10.08
Reruns	62.86	63.52	63.85	64.50	64.39	66.18	66.43	67.76	69.63

Source: NCC

Note: Premieres refer to the first performance of programs on any audiovisual platforms and new broadcasts refer to the first performance of programs on a specific channel.

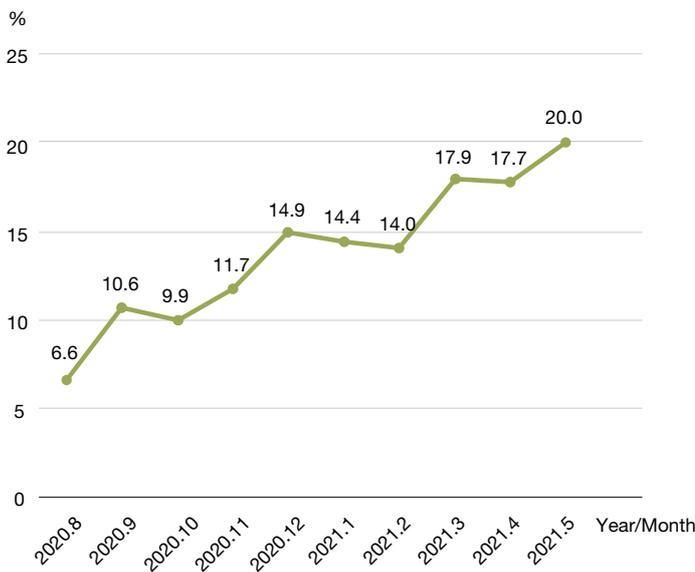


Figure 2.13 Ratio of Podcasts Listeners in Taiwan

Source: Data has been reproduced from the magazine Common Wealth (2021). The report 2021 Survey on Audio Economy. Obtained from www.cw.com.tw/article/5115003?template=transformers

According to the report 2021 Survey on Audio Economy co-published by Common Wealth Magazine, the streaming music platform KKBOX, and the market research organization Eastern Online in May 2021, podcast listeners in Taiwan climbed from 6.6% in August 2020 to 20% in May 2021, indicating that one out of five Taiwanese listens to podcasts (Figure 2.13).

According to the H1 2020 Taiwan Podcast Industry Survey Report, co-published by the podcast platform and content creator SoundOn and the internet media INSIDE, nearly 60% of females of podcast listeners were female, while males represented approximately 40%. The largest share of podcast listeners at 60% were people aged 23-32, while 66.9% of listeners have a bachelor's degree, and 27% a master's. As for the monthly salary, over a quarter of listeners have a higher average salary than Taiwan's average, NT\$42,947.¹³

13 National Statistics, R. O. C. (Taiwan) (2021). "In 2019, the average total employees were 7,955 thousand," "the average total earnings was NT\$54,320, increased by 1.24%." Obtained from www.dgbas.gov.tw/ct.asp?xItem=46898&ctNode=5624&mp=1

Structure and future trends of podcasting

In terms of the development, local digital media expand and share resources through vertical or horizontal cooperation, trying to enlarge the scale of their businesses to compete against foreign businesses such as Apple Podcasts and Spotify. For example, KKBOX, an online music streaming platform, acquired a stake in the podcast hosting platform Firstory in October 2020 and coordinated with it to establish an incubation center and a professional recording studio. What's more, KKBOX provides creators on the Firstory platform with an exclusive music copyright library, and creators are allowed to directly put their shows on KKBOX.¹⁴ Another example is the acquisition of SoundOn by the live streaming platform operator M17 in January 2021, which aims to create a voice community platform SoundClub to develop diverse sound services by investing heavily in original programs.¹⁵

As for turning a profit, podcast platforms collect a certain percentage of fees from creators, and creators make a profit both directly and indirectly. The direct and most important way of making a profit is by product placements in a creator's shows. It also drives the flow of money into podcasting, as well as other industries. The indirect ways of profiting include selling peripheral products, creating online courses, delivering physical lectures and offline events, etc.¹⁶

Thus, it can be noted that traditional radio broadcasting is no longer the only media to provide voice-based content. With the prevalence of the internet and maturity of related applications and hardware, listening content has gradually been developing into an emerging "listening economy."

14 Business Next. (2020). With Funds from Established KKBOX, Will Firstory Become Taiwan's Podcast Alliance? See How the Cooperation Started. Obtained from www.bnxt.com.tw/article/59725/podcast-kkbox-firstory-hosting-investment

15 CommonWealth Magazine. (2021). Is Last Year the First Year of Podcast? 40% Is No Longer Updated! How to Turn Voice into a Cash Cow behind the Exponential Growth? Obtained from www.cw.com.tw/article/5115061?template=transformers

16 FINDIT. (2020). Emerging Field: June Focus 2—Sound Storm Is Approaching! How Many Opportunities Have You Heard? Obtained from findit.org.tw/researchPageV2.aspx?pagelD=1440

OTT Industry

Total market value

According to PwC's Taiwan Entertainment & Media Outlook 2021-2025, video revenue in Taiwan grew year-on-year at a compound annual growth rate of 31.6% between 2016 and 2020. The total revenue in 2020 was US\$710 million (approximately NT\$21 billion¹⁷). The revenue from subscription video on demand (SVoD) accounted for more than 95%, while transactional video on demand (TVoD) represented less than 10%. PwC estimates that the total revenue will continue to grow at a compound annual growth rate of 11.4% from 2020 to 2025 (Figure 2.14).¹⁸

Current status of the industry

The OTT industry in Taiwan can be divided into foreign and domestic platforms. The latter can be further classified into television channel operators,

telecommunications operators, emerging audiovisual platforms, and OTT audiovisual set-top box operators by the initially offered service. OTT TV contents can be divided into user-generated content (UGC) and professional-generated content (PGC) according to the method the content is produced.

Faced with asymmetric competition and threat of international OTT operators entering the domestic market and vying for resources, along with the issue of movie and music piracy, Taiwan's OTT operators have forged an industry association to ensure the fair development of the domestic OTT industry and the interests of movie and music creators, as well as to assist the government in developing relevant policies by identifying industrial needs. On November 2, 2017, LiTV and KKTV, together with telecommunications and broadcasting media operators, established the Taiwan OTT Association. As of the end of 2021, twenty-three enterprises had joined.¹⁹

17 The calculation is based on Central Bank's exchange rate in 2020 (NTD: USD = 29.578: 1)

18 PwC. (2021). Taiwan Entertainment & Media Outlook 2021-2025. Obtained from www.pwc.tw/zh/publications/topic-report/2021-taiwan-enm-outlook.html

19 Taiwan OTT Association. (2017). The profile of Taiwan OTT Association. Obtained from www.taiwanott.org/introduction

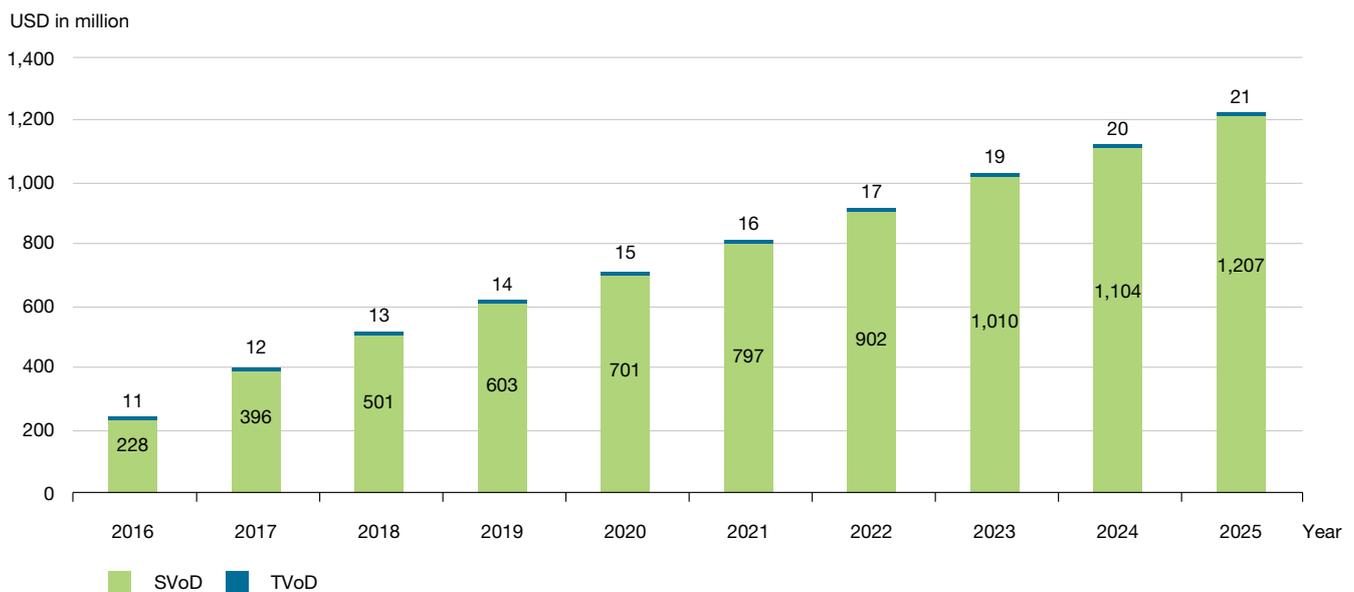


Figure 2.14 OTT Revenues in Taiwan

Source: PwC. (2021). Taiwan Entertainment & Media Outlook 2021-2025. Obtained from www.pwc.tw/en/publications/assets/taiwan-entertainment-and-media-outlook-en.pdf

Note: Due to rounding, the total value may not equal the sum of all.

Table 2.4 OTT TV Operators in Taiwan

Domestic OTT TV Operators				
Content Production (UGC: User-generated content; PGC: Professional-generated content)	Type (initially offered service)	Operator	OTT TV Services	Established
PGC	Broadcast Television Operators	Public Television Service Foundation	PTS+ on PTS OTT Audiovisual Platform	2017
		Online Media Corporation (Subsidiary of Formosa TV)	4G TV	2015
		Taiwan Television Enterprise	TOUCH TTV	2017
	Satellite Channel Operators	Sanlih Entertainment Television	Vidol	2016
	Cable Television Operators	Kbro Co., Ltd.	SuperMOD (partnering with Taiwan Mobile's myVideo services)	2017
		Homeplus Digital Co., Ltd.	bbMOD (partnering with CATCHPLAY)	2017
	Telecommunications Operators	Chunghwa Telecom.	IPTV: MOD ²⁰	2004
			Computer and mobile devices: Hami Video	2014
		Far Eastone	friDay Video	2014
		Taiwan Mobile Telecom	myVideo	2014
	Emerging Audiovisual Platforms	Li TV (Taiwan) INC.	LiTV	2007
		CatchPlay	CATCHPLAY ON DEMAND	2016
		KKTV Co., Ltd.	KKTV	2016
		Portico Media	GagaOOLala	2016
		Coture New Media	Coture.com	2014
		Choco Media Co., Ltd.	CHOCO TV ²¹	2011
		Yahoo! Taiwan Holding Ltd., Taiwan Branch	Yahoo TV	2016
	OTT Audiovisual Set-top Box Operators	Hawsing Co., Ltd.	FainTV	2018
		Hon Hai Technology Group	BANDOTT 4K Smart TV Box	2017
	Foreign Operators (Multi-national Operators Providing Services in Taiwan)			
Content Production Model	Parent Company	Operator	OTT TV Services	Launched in Taiwan
PGC	(US) Netflix	Netflix Services Taiwan Limited	Netflix	2016
UGC	(France) Vivendi	Dailymotion	Dailymotion	2016
UGC	(US) Google	Google International LLC Taiwan Branch (U.S.A.)	YouTube	2006
UGC	(US) Meta	Meta	Facebook (operating as a community)	2006
PGC	(South Korea) Naver	LINE	LINE TV	2015
PGC	(US) Disney	The Walt Disney Company (Taiwan) Ltd.	Disney+	2021

Source: Tsai Niann-chung et al. (2018). An Exploratory Research on How Taiwan's OTT Audience Measurement Mechanism Works for Business in a Digital Economy. 2018 Research Reports Commissioned by National Communications Commission.

20 Chunghwa Telecom's MOD is Multimedia on Demand of Chunghwa Telecom, a kind of IPTV. The data is transmitted within intranets, so it requires a set-up box to receive data. Technically speaking, MOD is different from OTT TV services.

21 After receiving an investment of US\$10 million from Japan's LINE company, a subsidiary of South Korea's NAVER Group through Mirai Fund in 2018, the OTT provider Choco TV was added to the Naver Group, with Choco TV services incorporated into LINE TV services.

Regulatory policies and industrial response

After putting forward the draft OTT TV Act in 2020, NCC organized two public hearings to solicit opinions from all circles of society. The draft bill focuses on big issues rather than the small and has a light-touch approach. It requires telecommunications operators to register for a business license and regulates online audiovisual services on an as-needed basis. The draft bill is yet to be enforced; consequently, the New Media Entertainment Association (NMEA) with more than 150 foreign and domestic members, including OTT operators, television and movie businesses, and production companies, published the Taiwan Video-on-demand Service Industry Self-Regulations (the Taiwan OTT TV Self-regulations) on October 19, 2020 in response to the legislation. The first self-regulations developed by the private sector for the OTT industry will serve as standards for the industry until the draft is officially passed.^{22, 23, 24}

Future Trends

The OTT industry in Taiwan continues to face the problems of movie and music piracy from both within Taiwan and international OTT platforms with a huge amount of funds from outside. With view to sounder development, the industry has suggested four proposals: capitalization, digitization, globalization, and localization. The NMEA also launched Project X on March 2, 2021, to recommend investment holdings in the content industry and heavy investment in local movies, television, music, publishing, and game creation, as a means to prevent domination of international OTT platforms and foreign IPs.^{25,26}

22 INSIDE. (2020). Taiwan OTT Self Regulations Released by NMEA! Obtained from www.inside.com.tw/article/21254-taiwan-ott-tv-industry-self-discipline-regulations-drafted-by-nmea-are-released

23 Business Next. (2020). Endorsed by Netflix, Taiwan's first OTT TV Self Regulations Released! With Approval of NCC, Will Anything Happen to the Dedicated Bill? Obtained from www.bnext.com.tw/article/59682/taiwan-vod-self-regulation-code-netflix-nmea

24 DIGITIMES. (2020). Divided Opinions on OTT, NMEA Self Regulations Announced First. Obtained from www.digitimes.com.tw/iot/article.asp?-cat=158&cat1=20&cat2=132&id=0000596421_8615QGXXQ12CMP22X-IE750

25 Sina. (2021). NMEA Launches Project X with PwC, Formosa Transnational Attorneys at Law, Activator, and LnData Initiates to Promote Investment Holding in Taiwan's Content Industry. Obtained from news.sina.com.tw/article/20210302/37776196.html

26 Business Next. (2021). The Era of Convergence Arrives! NMEA Promotes Investment Holding in the Content Industry. Obtained from www.bnext.com.tw/article/61683/ott

03

Communications Markets during the COVID-19 Pandemic



Comparison and analysis of domestic and international telecommunications markets during COVID-19

Generally speaking, major countries were the hardest hit by the COVID-19 pandemic during 2020. Governments and the private sectors in all these countries put forward countermeasures. In contrast, Taiwan managed to prevent a major outbreak and suffered less than many other nations; despite this, its market was affected, especially during the first half of 2021 when a nationwide level 3 alert was imposed.

Still, since outbreaks in Taiwan were generally less severe, the impact on industry, as well as the intensity of policies has differed from most other nations. During this time, communications policies in the world's major countries, as well as Taiwan, can generally be summarized as intending to ensure telecommunications subscribers receive basic communications rights by urging telecommunications operators to appropriately delay deadlines for the payment of charges and provide preferential programs. Policies also called for the monitoring of network traffic control at peak and off-peak periods to prevent bandwidth congestion. However, due to the less severe situation in Taiwan, the government allowed more flexibility in the market while other major countries actively intervened. For example, Australia formulated regulations to require fixed network operators to subsidize broadband services in remote areas or increase the required obligation for infrastructure suppliers, and the United States, South Africa, and Ireland all passed legislation to broaden the use of bandwidth resources.

Meanwhile, anti-COVID measures in Taiwan focused on collaboration with the private sector. For example, in response to the COVID restrictions of the Central Epidemic Command Center (CECC), the NCC coordinated with five telecommunications operators to

make possible a real-name registration system via text message so that people can scan QR codes with their smartphones, and send a text to provide their contact information, all within five seconds. Convenient, quick and effective, this system has attracted international attention as a good example of the government working with the industry in fighting COVID-19. Moreover, telecommunications operators in Taiwan provided free mobile phone accounts or network services in response to the Ministry of Education's call to assist students in remote areas and economically disadvantaged students with distance learning during the pandemic.

When compared with other industries during the pandemic, communications markets in the world's major countries, as well as Taiwan, have been relatively unaffected. In fact, in certain countries the communications industries even saw robust growth in total revenue. As COVID-19 raged around the world, the communications industry mitigated the impact by delivering mobile communications and broadband services to help people maintain a somewhat normal life and enabled industries to continue operations.

In terms of operations, we can note that communications operators in other countries, with view to balancing revenue and expenditure, reduced short-term investments to maintain the availability of capital while expanding digital services to fulfill the surging need for digital consumption. Operators in Taiwan extended their telecommunications collection services to respond to a surge in need for digital services, such as mobile and broadband internet connection and home entertainment. These collection services have become an important source of revenue for enterprise. For example, after the nationwide level 3 alert was imposed in Taiwan, the

number of Taiwan Mobile's subscribers using collection services increased by 20%. The transaction volumes of Chunghwa Telecom and Asia Pacific Telecom's collection services have also increased by 10-20%.²⁷ In addition, in terms of the preferential programs launched by Taiwanese telecommunications operators during this time, operators generally provided free digital services of their own to boost the number of digital services. For example, Chunghwa Telecom provided new applicants and existing subscribers who upgraded their internet speed with the privilege to watch videos on their video app Hami Video during the pandemic. Similarly, Taiwan

²⁷ Yahoo! News. (2021). Staying at Home Drives the Performance of Telecommunications Collection during Pandemic. Obtained from www.shorturl.at/moLLN7

Mobile offered subscribers of certain programs the benefit of using the music streaming platform MyMusic on a trial basis, which was launched by one of their affiliates. The fact that telecommunications operators promoted the online digital services of their own company or group through telecommunications charges indicates that telecommunications operators in Taiwan no longer limit their business to voice communications and broadband services. In other words, they have moved in the same direction as their counterparts worldwide, stepping into online digital services and exploring the upstream of the service business to unfold a new landscape in convergence through industrial transformation.

Comparison and analysis of domestic and international broadcasting industries during COVID-19

Due to the impact of the pandemic, film and television industries, both worldwide and in Taiwan have seen a decrease in total revenue from the previous year. In terms of demand and supply, as consumers spent more time at home, movie and television consumption changed. Namely, the demand for movies and television programs has risen. However, the production of movies and dramas has been interrupted by the pandemic, resulting in a shortage of content. Still, even though the global film industry slowed to a halt, and theaters around the world were closed, consumers in Taiwan still enjoyed movies in theaters with COVID-safe measures, such as checkerboard seating arrangements and social distancing. In the absence of newly released Hollywood blockbusters, older movies could still be screened. Thanks to that opportunity, the box office revenues from domestic movies also grew. According to movie market

statistics from the Ministry of Culture, the box office of domestic movies reached NT\$877 million, an increase of 26% from the previous year, accounting for 17% of the total box office, the highest proportion in many years.²⁸

In terms of COVID policy, to prevent the dissemination of fake news on COVID that may lead to public unrest, in the major countries, as well as in Taiwan, broadcasters have been urged regulate themselves and fact-check information prior to it being shared. The Taiwan Government coordinated with civic groups to establish an anti-misinformation network, providing accurate information through traditional media and emerging digital platforms in the battle against fake news.

²⁸ Ministry of Culture. (2020). 2020 Overview of the Film Market. Obtained from https://www.bamid.gov.tw/information_243_114221.html

Moreover, to help the communication industry weather the COVID storm, major countries have provided specific financial relief measures and expanded support and investment to accelerate recovery. However, since Taiwan's public awareness and preparedness of COVID-19 brought the pandemic under control shortly after the outbreak, the domestic film and television industry was affected by the pandemic only for a relatively short period of time when compared with the lasting and severe impacts in other countries. Hence, the government did not offer relief funds or employment development programs for the film and television industry like in other countries. Instead, it provided comprehensive relief plans for individuals and enterprises, including NT\$3,000 stimulus vouchers, NT\$5,000 stimulus vouchers, and arts and culture vouchers, as well as relief loans and relief subsidies. Affected enterprises were entitled to apply for applicable relief.

Meanwhile, the audiovisual media in many countries failed to produce the required percentage of programs due to the difficulty of producing programs during the pandemic. Therefore, the United States eased restrictions on the news simulcast ratio and Australia has relaxed the limit on local shows. Although the NCC in Taiwan did not implement such policies, it allowed satellite radio and television enterprises to have longer advertisement breaks than before, as long as the required amount of COVID-19 related advertisements are broadcast at a certain time slot and period, based on the principle of equality to minimize the impact of COVID advertisements on the operation of these enterprises. Furthermore, the NCC has designated the channel PTS 3 to broadcast educational programs during the pandemic to offer more digital learning content and options to learners at home in response to the educational policy "Learning Never Stops."

Turning to a comparison between Taiwan and other countries in terms of the countermeasures taken by the communication industry. As COVID-19 disrupted physical exhibitions, performances, and sports events, caused the closure of cinemas, and prevented many

people from working in movie and television, the broadcasters brought their communication services online to minimize the impact.

For example, movie distributors cooperated with video streaming platforms to play movies online that were originally planned to premiere in theaters. Also, television companies featured broadcasts of sports events remotely in real time with the 5G network and communications equipment in a virtual broadcast room. News interviews in television news were also conducted online rather than in a studio. Since the nationwide level 3 alert was imposed in Taiwan, domestic radio and television broadcasters have reduced their manpower by rotating the staff that come to the office; archived content was rerun by television stations; and programs were produced in an unconventional way by online recording. For example, CTV has produced a variety show by means of a video conference. Some television shows were transformed into online live shows to attract the attention of film and television consumers.²⁹

As for the emerging media, as the stay-at-home orders have caused a surge in use of streaming video and audio during the pandemic, international OTT operators like Netflix and YouTube have temporarily reduced the video image quality in some countries and areas to save the speed of the internet broadband, while telecommunications operators in Taiwan, responding to public demand for online video and audio, have also launched successive preferential programs to promote their own video streaming services.

In conclusion, although the pandemic has significantly impacted the communications industry, both at home and abroad, we can also note that an accelerated digital transformation has taken place within.

29 Up Media. (2021). TV Program Recording Suspended As Pandemic Worsens – TV Stations Plays "Reruns," Joy Su Interviews Car Expert Online. Obtained from https://www.upmedia.mg/news_info.php?SerialNo=115602

04

Key Trends in Domestic and International Communications Markets



Comparison of key 5G indicators

According to the 2021 World Digital Competitiveness Ranking published by the International Institute for Management Development (IMD) in Lausanne, Switzerland, Taiwan ranked eighth out of 64 major countries and economies, moving up three places from 2020.³⁰

The IMD ranking utilizes three major factors, nine sub-factors, and 52 criteria to measure the capacity and readiness of economies worldwide. The three major indicators are knowledge, technology, and future readiness. Taiwan improved three spots from last year in the three indicator ranking (Table 4.1). Taiwan's successive improvements in the overall IMD ranking since 2019 can be attributed to the government's assistance to industry, sound industrial infrastructure, and stable investments and revenue. The rankings indicated that the overall environment is conducive to the innovation and advancement of the communications industry.

30 IMD. (2021). World Digital Competitiveness Ranking. Obtained from <https://worldcompetitiveness.imd.org/rankings/digital>

Table 4.1 IMD 2021 World Digital Competitiveness Ranking - Overall Ranking of Taiwan 2019-2021

Year		2019	2020	2021	Change in Ranking
World Digital Competitiveness Ranking		13	11	8	↑ 3
Three Indicators	Knowledge	17	18	16	↑ 2
	Technology	9	5	2	↑ 3
	Future Readiness	12	8	7	↑ 1

Source: IMD. (2021). World Digital Competitiveness Ranking. Obtained from <https://worldcompetitiveness.imd.org/rankings/digital>

According to the Benchmarking the Global 5G Experience 2021 published by OpenSignal, an international mobile network speed measurement agency, Taiwan ranked first in average upload speed, peak download speed, and audiovisual experience, and ranked only second to South Korea in download speed (Figure 4.1). The results indicate that, when compared to South Korea and the United States, where 5G services were launched in 2019, 5G services in Taiwan, which were launched later in July 2020, have shown excellent results within a short period of time.

5G Global Top 15:Speed

OPENSIGNAL

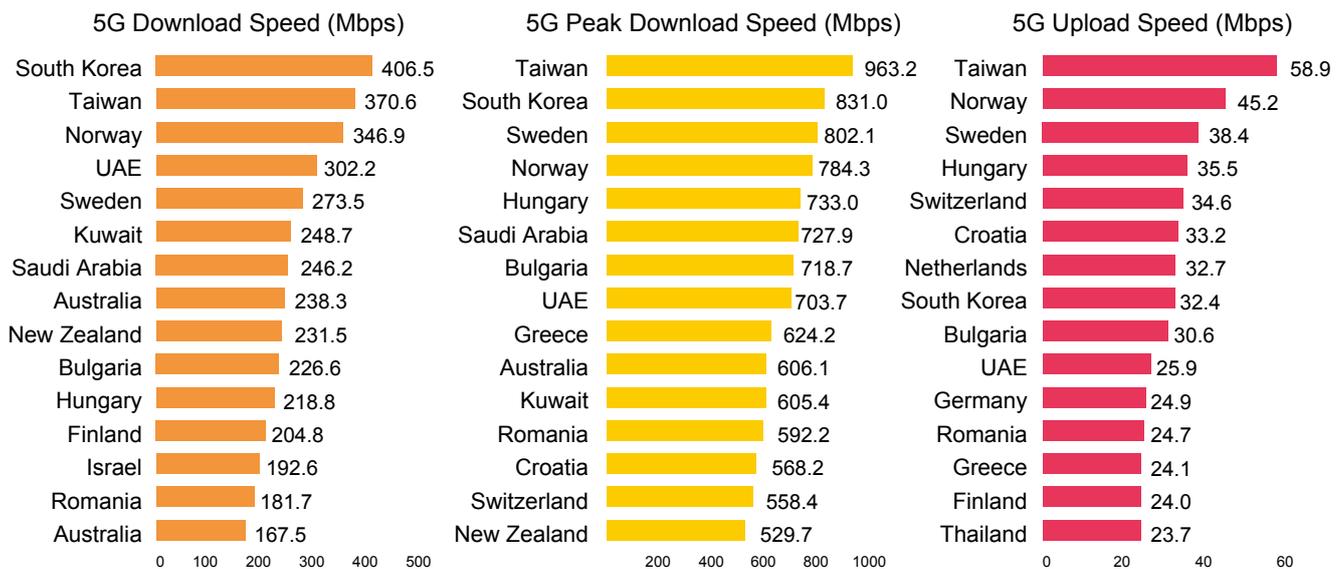


Figure 4.1 5G Global Mobile Network Experience Awards

Source: OpenSignal. (2021). Benchmarking the Global 5G Experience 2021. Obtained from www.opensignal.com/2021/09/09/benchmarking-the-global-5g-experience-september-2021

Major trends of international low-orbit satellites; opportunities for Taiwan

Despite the fact that 5G communications and industrial applications have attracted much attention from all sectors of society, internet service is still unavailable in many areas of the world since the high cost of deployment, inaccessibility, and extreme weather make it almost impossible to cover the whole planet with terrestrial communications systems. However, low-orbit satellites can make up for the above shortcomings and provide stable network services and, as a result, have become the focus for development in international communications markets. The four low-orbit satellite operators – SpaceX, OneWeb, Amazon, and Telesat – are deploying satellites to accelerate the time frame for commercial operations.

Currently, international satellite operators Starlink and AERKOMM Inc. have contacted authorities in Taiwan to express their intention to enter the domestic satellite communications market. Whether participation in Taiwan's market will have an impact on existing local telecommunications operators deserves greater attention. Mobile communications services are highly competitive and with a high coverage rate. Local telecommunications operators have comparative advantages, especially in connection speed and fees. With the government continuing to devote many resources to building network infrastructure in remote areas, the coverage ratio of fixed broadband in Taiwan is over 90%. Yet, communications services are still required in mountainous and remote areas, as well as outlying islands; as such, satellite broadband services can be offered as a viable alternative.

In market terms, the domestic low-orbit satellite industry is still dominated by original equipment manufacturers of ground equipment components, and many of them have become suppliers of the Starlink satellite system. Due to the US-China trade issues, international low-orbit satellite operators are concerned about information security, making Taiwan the preferred partner in the industrial chain. As the country is located

in East Asia, it is also in a key geographical and strategic position, connecting Northeast Asia in the north and Southeast Asia in the south and is therefore in potentially a hub in the East Asia region. Equipped with regional resources, the ability to develop technology, and related business opportunities, Taiwan has the potential to be a test site for low-orbit satellites.

Analysis of the domestic and international governance of misinformation

Since people have been relying more heavily on online media and digital platforms during the pandemic, an increasing amount of misinformation has been imparted online, ultimately causing detrimental effects and harm to people worldwide. Consequently, both governments and non-governmental organizations worldwide have been striving to ascertain how such content, especially pandemic-related misinformation, can be contained. For example, the government of South Korea has been coordinating with relevant departments to develop anti-fake news measures; the UK government hosted virtual roundtable discussions with large digital platform operators, took a series of actions in response to vaccine misinformation, and played an active role in informing the public how to verify information; meanwhile, the United States put forward the Health Misinformation Act to hold digital platforms operators accountable for misinformation on vaccines and health issues published on their sites.

At home, although Taiwan drafted the Digital Communications Act in 2018, addressing the hazards caused by misinformation and stipulating specific obligations of digital communications operators to manage it, the bill was not passed by the Legislative Yuan. Currently, misinformation is mostly dealt with by the actions of civil groups and the self-regulation of the media; the Code of Practice on Disinformation Prevention released by the Taipei Computer Association and major digital

platform operators in June 2019 is one example of this, which is similar to the Code of Practice on Disinformation in the EU and the Australian Code of Practice on Disinformation and Misinformation, with large digital platforms such as Facebook, Google, LINE, Yahoo, and PTT expressing support.

Unlike the Code of Practice of the EU, which prompts operators to offer individualized commitments, and the Australian code, which provides a number of specific measures for operators to choose from and requires a minimum commitment from media, the Code of Practice in Taiwan is generally more abstract and lenient. When handling such misinformation, government-led mechanisms are always considered to be a more appropriate and effective means of to do so, but they can still stir controversy. Thus, enhancing the information literacy of the public is the key in the battle against misinformation. In the meantime, platform operators should be encouraged to regulate themselves more assertively and discuss such actions in a transparent manner.

Trends in digital platforms and the media industry bargaining for news

In response to the digital age, the traditional media industry has had to transform in order to survive; today, most rely on large digital platforms or news aggregation platforms such as Google, Facebook, and LINE TODAY for news exposure and traffic. However, these digital platforms collect the vast majority of online advertising revenue, leaving comparatively little for the media companies that produce the news, and even pushing journalism to the verge of collapse.

As governments worldwide have become more aware of this situation, certain countries have tried to act. For instance, Spain amended its Copyright Act in 2014, requiring digital platforms to pay licensing fees to news media companies, but the move caused Google to shut down the news site in the country. In February 2021, Australia officially released the News Media and Digital

Platforms Mandatory Bargaining Code, which drew international attention and triggered discussions as the world's first legislation on payment agreements between digital platforms and news media companies.

In Taiwan, on August 31, 2021, NCC held a consultation meeting on negotiations between digital platforms and radio, television, and news media. The industry believes that as digital platforms are more dominant, whether the news media industry makes a reasonable profit is worth consideration, and proposed that their loss in advertising revenue, and the subsequent impact on news value, be assessed by quantitative and qualitative means. Experts and scholars expressed the view that although large international digital platforms would probably not be too concerned about of the formulation of a bill to bargain for news since Taiwan is a relatively small communications market, lessons can still be taken from the Directive on Copyright in the Digital Single Market of the EU, which places focus on copyrights and requires digital platforms to pay licensing fees to news media companies for providing news and excerpts. It was also suggested that the government help establish a fund to provide subsidies to media companies depending on their scale and nature.³¹

The objective of News Media and Digital Platforms Mandatory Bargaining Code of Australia, as well as similar policies in other nations, is to prevent monopolies, ensure fair competition, and protect values and democracy and freedom of news by creating reasonable co-operative competition between digital platforms and news media companies. Likewise, in order to ensure fair competition and with the aim of helping all industries achieve sustainability, the Fair Trade Commission in Taiwan formed an investigative team to look into profit allocation among digital platform operators, the media industry, and digital advertisers, as well as to analyze the industrial structure from the perspective of competition law.

³¹ Legislative Yuan. (2021). Analysis of Problems with Fee-based News on Digital Platforms. Obtained from money.udn.com/money/story/5612/5722581

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Conclusions and Suggestions



As 5G drives the digital transformation of industry and the nation, the advancement and development of emerging communications technology, such as low-orbit satellites, have not only created opportunities for industry, but also exposed regulatory gaps. Likewise, while technological progress, such as the deployment of broadband infrastructure and innovative online applications, have brought numerous benefits, regulatory frameworks lag far behind.

With working or studying from home and social distancing becoming a necessity during the COVID-19 pandemic, a range of digital applications have been brought sharply into view. As a result, more nations have paid greater attention to the digital divide and to those left behind in digital convergence.

This report has outlined recent developments in the communications market in both the international community and in Taiwan and provided an analysis of the impact and changes caused by COVID-19; it also hereby provides certain suggestions that could shape future trends.

Assist small- and medium-sized businesses with digital transformation and 5G technology

Although Taiwan has remained relatively safe during the pandemic, the lives of people have still been affected by COVID protocols, leading to many more people working or studying online, as well as shopping online, too. According to statistics from the Ministry of Economic Affairs, as of November 2021, more than 17% of the population chose to receive their NT\$5,000 stimulus vouchers digitally, a 10% increase from when the 7.6% chose to digitally receive NT\$3000 stimulus vouchers in 2020.^{32, 33} The difference was caused by the

inclusion of e-commerce platforms, indicating a greater demand for digital applications. Hence, it is suggested that all industries accelerate digital transformation by developing digital services to meet such demands.

With the pandemic bringing the key role of telecommunications technology and digital transformation sharply into focus, some countries have launched programs to assist industry in developing 5G applications. Since 98% of Taiwan's businesses are small and medium-sized, it is recommended that 5G technology and the digital transformation in these businesses also be actively promoted. First, the government should assist businesses in identifying operational issues, define the need and effectiveness of digital transformation, and ascertain gaps and opportunities in the market. Then, highly flexible and expandable digital services should be developed with the help of big data, artificial intelligence, cloud services, and 5G technology. For example, the government could help the local traditional tourism industry detect the number of visitors with 5G technology and assist it in exhibiting local cultural features through virtual reality. Also, synchronous online learning can be achieved and the image quality of learning videos can be optimized and lag reduced through the 5G network to improve its effectiveness.

Reach out to the international low-orbit satellite industry with short- and long-term plans

As the cost of satellite production and launching has significantly reduced, the international low-orbit satellite market has developed rapidly over recent years. Both the world and Taiwan are faced with the challenge of the low-orbit satellite giant Starlink, which is attempting to enter the international satellite market. Regulations are supposed to ensure fair competition for existing players and protect national security and user information. Currently, low-orbit satellite communications and existing telecommunications are not interchangeable. But

³² Yahoo! Finance. (2021). Only 7.6% Digital NT\$3,000 Stimulus Vouchers Used, Taiwan People's Party Urges Government to Improve NT\$5,000 Stimulus Vouchers Penetration. Obtained from www.shorturl.at/gqK12

³³ udn.com. (2021). Over 2 Million People Receive NT\$5,000 Stimulus Vouchers While Number of Digital Voucher Users Remains 4.16 Million. Obtained from www.udn.com/news/story/120974/5864809

in remote areas or mountains, where the deployment of broadband networks is difficult and the cost prohibitive, satellites may be an alternative. It is expected that the two will complement each other. Although Taiwan, a non-ITU country, is unable to obtain international satellite frequency bands and lacks the potential to become a leading player in the international low-orbit satellites business, it actively seizes opportunities for industrial development.

Passed on May 31, 2021, the Space Development Act is Taiwan's first space law. The bill clearly states that Taiwan should actively develop the space supply chain, promote space science, and develop related talent on the premise that Taiwan follows international conventions and that the industry is developed sustainably. To help Taiwan connect to the world's low-orbit satellite industry, five frequency bands have been allocated for innovative satellite applications.

With the release of global low-orbit satellite information security guidelines and network communications equipment specifications, low-orbit satellite operators worldwide are vying for a stable and reliable satellite supply chain. Thus, component suppliers, in the short-term, should be assisted in developing products that meet international standards and establishing a safety-certified testing laboratory to conduct safety tests and product safety assessment in a professional and objective manner. In the long-term, it is suggested that the government lead the planning of a sustainable multi-year space program, develop local talent and recruit international talent, integrate the capacity of industry, academia, and research institutes, and work closely with international laboratories to optimize the effectiveness of technology research and development. Taiwan's advantage in semiconductors and precision manufacturing should be complemented with technological research and development to greatly enhance its overall competitiveness in the international low-orbit satellite market.

In terms of regulations and application procedures for foreign low-orbit satellite operators, major countries amended legislation to simplify application procedures and adjust charging fees and entry models, etc., with licenses mostly valid for one year. At present, Taiwan's competent authorities is determining whether to open the local communications market to international satellite service providers through an evaluation system. It is suggested that the application form and process include the applicant's detailed information, application type, service type, platform information, system description, and foreign ownership, and that a checklist be provided for operators to check whether the relevant documents are ready to ensure that the application procedure goes smoothly without delay or applications returned due to missing documents. Concerning the validity period for licenses, it is recommended that short-term licenses be issued first and that policies be reviewed and adjusted on a rolling basis depending on the "cooperative-competition" between low-orbit satellites operators and Taiwan's communications market. Regarding the frequency utilization fees, they are currently classified as commercial and non-commercial radio, and television satellite earth stations, with their calculations based on the number of fixed-satellite earth stations and mobile-satellite earth stations. The competent authorities should consider adjusting the charging standards, calculation mechanisms and formulas of the frequency utilization fees to meet market demand.

Generally, Taiwan is situated in a key geographical position in wider East Asia region as a potential hub, connecting Northeast Asia and Southeast Asia. With the US-China relations intensifying, the unique location is beneficial to Taiwan's development of low-orbit satellites and becoming an Asian satellite test site.

Develop frameworks for governance of misinformation, strengthening regulation both outside and inside the industry

Since the global outbreak of COVID-19, pandemic misinformation has increased. In March 2019, false information spread on the internet caused public panic in Taiwan and triggered a rush to buy certain supplies. The Taiwan government promoted health education and combated disinformation through social media such as Line and Facebook. It has also held online live press conferences daily to provide accurate information, offered health education on radio and television, and cooperated with digital media to create an anti-rumor zone to contain disinformation. According to the Digital News Report 2021 released by the Reuters Institute of the University of Oxford, UK, the Taiwanese public's confidence in media reached 31%,³⁴ an increase of 7% from the previous year, thanks to the close cooperation between the government and the communications industry. It indicates that the key to disinformation and fake news strategy and the implementation lies in the overall planning by the government, the cooperation between the industry and government, and the self-regulation of the communications industry.

With the big threat caused by disinformation, the traditional argument that digital platforms need not be responsible for user content is no longer acceptable to society. The EU, Australia, among other nations, have developed legal frameworks, provided guidelines to be followed, and require digital platforms or digital advertising-related operators to sign and follow these requirements. In terms of false information policy, it is advised that the government of Taiwan first pass a specific law, then gradually intensify both self-regulation and governance at the same time through that law. The legal framework should clearly define the minimum

commitments for signatories and allow operators to choose applicable measures from a list, and provide individualized commitments to encourage them to sign. Also, specific key performance indicators (KPI) should be included in each measure. The competent authority could also require operators to submit annual reports so as to ascertain how disinformation measures are being implemented.

When addressing the issue of false information, effective cooperation between the government and the industry is important, but people's information literacy and participation are even more so. Thus, digital platform operators should be encouraged to cooperate with academia to promote media literacy education to all while conforming to the regulations.

Reduce the digital divide

In accordance with anti-COVID measures, all schools in Taiwan temporarily closed during an outbreak of COVID-19. During that period, teachers gave online lessons and students took online exams. However, economically disadvantaged students or those in remote areas did not always have the required hardware and software for distance learning. In order to help these students learn online, the five major telecommunications operators in Taiwan provided free mobile phone accounts or unlimited data plans. In summary, as face-to-face learning shifted to online learning, a digital divide has emerged.

According to the 2020 Taiwan Internet Report published by the Taiwan Network Information Center, the internet usage rates in non-remote and remote areas are 83.9% and 69.8%³⁵ respectively, indicating the former has more internet resources than the latter. Schools with sufficient internet resources and hardware are more capable of developing and implementing

34 Reuters Institute. (2021). 2021 Digital News Report. Retrieved from www.reutersinstitute.politics.ox.ac.uk/digital-news-report/2021/taiwan

35 Taiwan Network Information Center. (2021). 2020 Taiwan Internet Report. Obtained from www.twnic.tw/doc/twrip/202012e.pdf

comprehensive distance learning programs. For rural and smaller schools, however, they have only a limited number of computers, tablets, and other devices to lend to disadvantaged students with no network cables or devices at home. Additionally, some students may not be so adept at using digital platforms or video conferencing software as others. Distance learning with a digital divide may lead to unsatisfactory learning effectiveness and greater differences in outcomes.

Furthermore, when people are required to adhere to certain measures, such as registering online for masks, vaccines, and real-name registration through the internet, senior citizens and inexperienced internet users find it a challenge — another indicator of the digital divide. The same report by the Taiwan Network Information Center pointed out that the 2020 Taiwan internet usage rate for people aged 25-30 was 100% but only 40.1% for those aged 65 and above. This indicates the senior citizens use the internet less frequently and are less familiar with digital services.

To summarize, changes in everyday lives in Taiwan during the pandemic has made the differences in equipment, skills, and information and media literacy among people more obvious than before. In order to reduce this digital divide, besides from allocating physical resources, local community counselors should be actively trained with individual guidance provided, and the needy assisted to learn, shop, or access public services effectively through digital devices. At the same time, media literacy should be improved with view to ensuring online security.

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