BOST

2017 · 2018

資訊國力年鑑

TAIWAN E-COMPETITIVENESS
ANNUAL REPORT

Office of Science and Technology, Executive Yuan

BOST

TAIWAN 2017·2018
E-COMPETITIVENESS
ANNUAL REPORT

Zse-Hong Tsai, Chief Editor
Executive Secretary, Office of Science and Technology,
Executive Yuan

Foreword ◉

The convergence of the "5+2 Industrial Innovation Plan" and "the Digital Nation & Innovative Economic Development Program (DIGI+) 2017-2025" is set to help Taiwan towards a "Smart Nation". The idea behind the convergence is to highlight the "innovation" of the "5+2 Industrial Innovation Plan" so that the industry can leverage existing technologies and resources to integrate with emerging technologies outlined in the DIGI+ program such as the artificial intelligence (AI), Internet of Things (IoT), and 5G. Ultimately, the two intiatives can create synergies and accelerate our pace in becoming a "Smart Nation".

Over the past 10 years, the prevalence of mobile broadband and smartphones has changed society and industrial structures. It is the time for Taiwan to transform from a manufacturing economy into an innovation economy. To achieve this goal, we must get a full grasp of industrial needs in Taiwan and picture what the world would be like in the next 30 years (2050) from the social, economic, and environmental aspects to provide our next generation a blueprint for the future.

From the innovation perspective, the past innovation focused on "national innovation", which means that technological and industrial developments were led mainly by the central government. The future innovation will concentrate on "regional innovation", which indicates a seamless cooperation between local government, academia, research, and industry sectors. Taiwan was good at hardware manufacturing in the past 30 years. Recent years, many emerging countries have joined the competition so we have to move forward. Taiwan's advantage lies on our ability to provide the best life experience in food, clothing, medical, housing, transportation, education, and entertainment segments. We also have technological talent, strong hardware manufacturing capability, and outstanding and flexible small and medium enterprises (SMEs) and industrial clusters. Coupled with AI and 5G technologies, as well as the uniqueness in design and aesthetics, Taiwan should be able to provide the world's best testbed for smart living.

To achieve the vision of "Smart Nation", the mission of the DIGI+ program is to harvest the "5+2 Industrial Innovation Plan" through the inter-ministerial and inter-departmental cooperation. With strong manufacturing capabilities and the best testbed for smart living, Taiwan hopes to propel the innovation in the next generation of digital technologies by adopting regional innovation mindset, enhancing digital talent cultivation, and implementing software applications. Looking forward, we anticipate that Taiwan will be digitally upgraded and transformed on a large scale for the expansion of the digital economy and the enhancement of national e-competitiveness.

Tsung Tsong Wu

Minister without Portfolio, Executive Yuan
December 2018

Foreword ◉

In this era of digital transformation, the professions, jobs, products, services, and business models that we are familiar with can all potentially be subject to change through digital technologies. For this reason, establishing a digital framework that meets future needs—creating open innovation programs and nurturing next-generation talents capable of making changes—will provide the foundation that will allow Taiwan to become a more digitally empowered nation.

In recent years, countries around the world have established a number of initiatives to elevate their digital capabilities, promote social innovation, and enhance economic development. For instance, the Executive Yuan of Taiwan has actively promoted the "DIGI$^+$ program" to facilitate the goal of becoming a "smart nations". Two essential concepts are required in getting closer to this goal: "digital inclusion" and "open governances". Digital inclusion is the use of digital technology to provide fair development opportunities for all and to generate more social participation channels, and open governance strengthens the government's ability to use digital technology. That enables the government to utilize open source and open data to respond to social needs in real-time.

From the digital inclusion perspective, future learning is no longer confined to certain subjects. Instead, technology can now surpass conventional learning limitations and become the best learning tool. The next generation will then fully understand that, no matter how complex the world becomes in the future, everyone has the power to make a change! The best example of this is the rise of AI. The future is an era of lifelong learning, which is why primary schools should offer AI-related courses and the elderly should have the right to study in university. Newly developed technology is the tool that will help us achieve both social and life goals.

Moreover, the establishment of open innovation platforms by adopting the concept of open governance can enhance the influence of the government. We are actively seeking to establish an open government by inviting the public to take part in discussion of participatory budgeting and even the revision and adjustment of policies and laws in response to changes in the times. This can all be made possible in a free and open society. Indeed, open source can be used as a driving force for technological innovation, allowing the development of new technologies and possibilities.

When machines begin to affect human lives, many worry that jobs will be replaced by AI in the future. However, the role of AI is to replace repetitive labor, not humans themselves. Let's take airplanes as an example. Commercial flights are already being executed through auto-piloting systems, but a flight captain is still required in case of system failure. Likewise, when autonomous vehicles grow in popularity in the future, taxi drivers need not worry because passengers still need someone to chat with and keep them company. There is warmth in interpersonal interaction, something which AI cannot replace.

Ultimately, in the digital age, the concepts of equal rights and shared prosperity have stimulated us to exceed materialistic pursuit, rethink the value of life, and acquire true well-being!

Audrey Tang

Minister without Portfolio, Executive Yuan
December 2018

Editor's Note ◦

Have you ever imaged what life will be like in Taiwan after 10 to 20 years? The Taiwan's government is aiming to fulfill the needs of people's livelihood in creating a problem-solving digital environment which can address issues derived from changes in the population, economy, technology, and environment, thereby allowing people the enjoyment of convenient, innovative, and smart life. More digital application services will derive from such trend and encourage industry innovation and transformation as well as economic growth. It will be a true testament to our nation's information proficiency and total competitiveness.

The *Taiwan e-Competitiveness Annual Report 2017-2018* provides an overview of Taiwan's performance in several international ICT development indexes, the development of Taiwan's information communication industry, and the latest global trends and policies in the hope of driving Taiwan toward becoming a smart country. Through the analysis of current situations and advantages of Taiwan's ICT industry and market, this report outlines how Taiwan's government has effectively promoted enhancements in responding to current trends and planned the social scene for future digital life, as well as provide details on the results of Taiwan's development of national e-competitiveness.

Between 2017-2018, Taiwan still managed to maintain excellent ranking in major global competitiveness indexes, being ranked within top 5 in the Asia-Pacific region and within top 20 in global ranking. For example, the World Economic Forum (WEF) announced the Global Competitiveness Index 4.0 (GCI 4.0) in October 2018 and Taiwan is ranked 13th out of 140 nations overall and is ranked 4th in "super innovators" score, only next to Germany, the United States, and Switzerland. In addition, the International Institute for Management Development (IMD) in Switzerland announced the 2018 World Digital Competitiveness Ranking in June, in which Taiwan was ranked 16th in the world. Detailed indicators suggest that Taiwan has5 indicators ranked among the top in the world, including: the Total R&D personnel per capita (Ranked 1st), IT & media stock market capitalization (Ranked 2nd), Mobile broadband subscribers (Ranked 2nd), high-tech exports (Ranked 3rd) and Educational assessment PISA-Math (Ranked 3rd).

Other countries have set excellent examples that will benefit it to follow. When it comes to digital economic policies of individual countries, Japan has proposed policies such as the Society 5.0 and connected industries to utilize advanced technologies like AI and IoT to improve the convenience of the society and solve existing social problems. The South Korean government has proposed the Mid- to Long-Term Master Plan in Preparation for the Intelligent Information Society to formulate human-centric strategies for a smart society, in addition to raising public's awareness of the negative impacts of technology and innovation on the society, such as privacy, social, and economic issues. The European Union is in the process of building a digital Europe, enabling member states to reach agreements to strengthen AI, the blockchain and 5G cooperatives in promoting the development of key emerging technologies. These important global economies have all adjusted their digital economic policies to focus on the development of digital economy-related applications so that society can respond better to the impacts brought by new technologies.

E-Competitiveness represents the degree of preparation that a country has in relation to digital transformation and communication infrastructure, as well as its influence on social, economic, and environmental development. The *Taiwan e-Competitiveness Annual Report 2017-2018* not only presents the assessment of global competitiveness in the government's information and communication development but also exhibits the core of our nation's ICT policies and our determination to improve the quality of people's lives and develop digital economy.

To ensure convenient domestic and foreign reading, the *Taiwan e-Competitiveness Annual Report 2017-2018* is a published in both Chinese and English, with the goal of providing readers with understanding of the government's digital policies such as DIGI⁺, Forward-looking Infrastructure: Digital Construction, and AI Taiwan AI programs. Most importantly, this report will also help the people of Taiwan and oversea readers better apprehend Taiwan's ICT readiness and the government's determination in improving the quality of people's lives and promoting comprehensive industry development so as to ensure the well-being of Taiwan's people and businesses.

Executive Secretary
Office of Science and Technology, Executive Yuan
December 2018

Contents

Chapter 3. Countries Learning from Each Other to Gear Up for Competitiveness — How International Policy Responds to Social Needs

Chapter 4. DIGI⁺ Taiwan — Toward a Smart Sustainable Human-centric Nation

References

Contents

Chapter 1

Advancing Ahead —
Taiwan's Global Competitiveness Assessment

**2018 WEF
Global Competitiveness
Index 4.0**

Number of assessed
countries: 140

Pillar:
Enabling Environment
Human Capital, Markets
Innovation Ecosystem

Asia*
4th

Global
13th
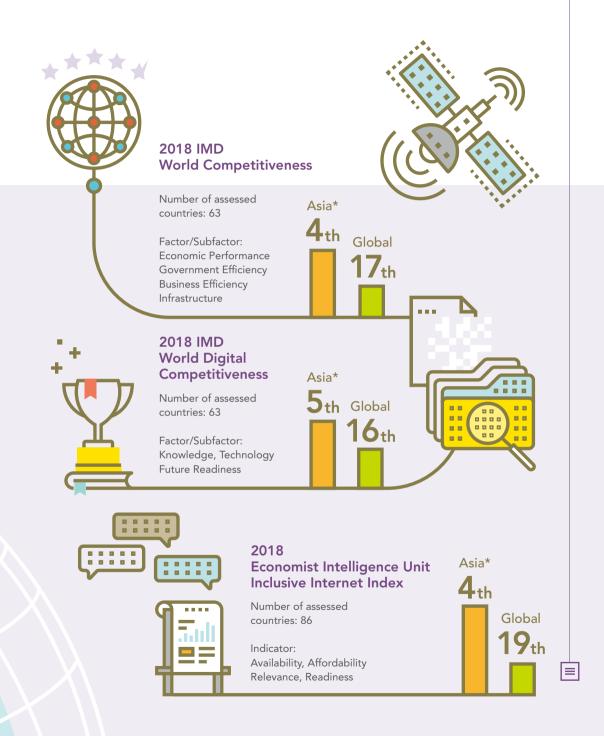
**2017 Waseda University
International e-Government
Rankings Survey**

Number of assessed countries: 65

Indicator:
Network Preparedness/Infrastructure (NIP),
Management Optimization/Efficiency (MO),
Online Services/Functioning Applications (OS),
National Portal/Homepage (NPR), Government
CIO (GCIO), D-Government Promotion (EPRO),
E-Participation/Digital Inclusion (EPAR),
Open Government (OGD), Cyber Security (CYB),
The use of Emerging ICT (EMG)

Asia* **5**th

Global **10**th

2018 IMD World Competitiveness

Number of assessed countries: 63

Factor/Subfactor:
Economic Performance
Government Efficiency
Business Efficiency
Infrastructure

Asia*
4th

Global
17th

2018 IMD World Digital Competitiveness

Number of assessed countries: 63

Factor/Subfactor:
Knowledge, Technology
Future Readiness

Asia*
5th

Global
16th

2018 Economist Intelligence Unit Inclusive Internet Index

Number of assessed countries: 86

Indicator:
Availability, Affordability
Relevance, Readiness

Asia*
4th

Global
19th

Note: *Asia Pacific region do not include the Middle East

Chapter 1. Advancing Ahead — Taiwan's Global Competitiveness Assessment

The ways in which IT is being delivered has dramatically changed in the era of a digital economy. How the countries, enterprises, and individuals can maximize the use of information to bring value-added applications, and change operation and business models have become an important indicator to assess their future competitiveness. In the near future, major countries have worked hard to develop digital economic-related policies to prepare for the impact of the digital economy.

The digital economic development usually requires intangible assets such as a business environment, investment environment, corporate culture, education & training, and investment in R&D, and talent recruitment policy. Tangible assets encompass hardware facilities and platforms, including infrastructure construction, information security and intelligent application platforms, and open-source information systems. Finally is the intelligent construction, which is conducted to fulfill the overall needs of society, including intelligent transportation, national defense, medical care, security, finance, retail and so on. Whether the national and industrial digital economy can effectively operate will highly depend on an invisible environment, tangible hardware and software facilities, and smart construction to meet social needs.

Therefore, national e-readiness is an important indicator to measure a country's overall IT competitiveness and forecast its national economy on the road to be a digital economy. Many global research institutes, including the World Economic Forum (WEF) and the International Institute for Management Development (IMD), have established assessment indicators to conduct global large-scale competitiveness assessments as a basis for an impartial and objective assessment of national e-readiness.

This chapter includes Global Competitiveness Index 4.0 (GCI 4.0) of the World Economic Forum (WEF), World Competitiveness Annual Report and World Digital Competitiveness of the International Institute for Management Development (IMD), International e-Government Rankings Survey of Waseda University, and the Inclusive Internet Index of Economist Intelligence Unit (EIU), as well as some international media coverage about Taiwan's telecom developments in 2017-2018. In the following pages, Taiwan's e-readiness accessed by five leading international indicators will be summarized as follows.

Table 1-1 ┤ Taiwan's Position in Global Rankings

Year of Assessment	Assessment Institute	Assessment Indicator	Taiwan's Ranking		Number of Assessed Countries
			Global	Asia*	
2018	WEF	Global Competitiveness Index 4.0	13	4	140
2018	IMD	World Competitiveness	17	4	63
2018	IMD	World Digital Competitiveness	16	5	63
2017	Waseda University	International e-Government Rankings Survey	10	5	65
2018	Economist Intelligence Unit	Inclusive Internet Index	19	4	86

Note: *Asia Pacific region do not include the Middle East
Source: Individual institutes, compiled by III-MIC, October 2018

⭐ 1-1 ▸ The WEF Global Competitiveness Index 4.0

WEF released the 2018 version of The Global Competitiveness Report 2018 in October 2018. In the midst of rapid technological change, political polarization and a fragile economic recovery, a new index called the Global Competitiveness Index 4.0, was introduced with an emerging set of determinants of productivity and long-term growth in the era of the Fourth Industrial Revolution to assess the future global competitiveness of 140 countries.

In the GCI 4.0, the overall structure of the 12 indicators remains relevant because it captures general concepts that are important. The indicators are organized into four components: Enabling environment, Human capital, Markets, and Innovation ecosystem, which are used for presentation purposes and do not enter into the calculation. After having conceptualized the Fourth Industrial Revolution, the GCI 4.0 provides novel concepts such as entrepreneurial culture, companies embracing disruptive ideas, multi-stakeholder collaboration, critical thinking, meritocracy, and social trust, along with more traditional components like ICT and physical infrastructure, macroeconomic stability, property rights, years of schooling. In addition, the GCI 4.0 also introduces a new score system ranging from 0 to 100 instead of from 0 to 7. This new system will indicate how close a country is to the ideal state.

In 2018 WEF GCI 4.0, Taiwan is ranked 13th in the world and 4th in Asia. The findings show that Taiwan has done exceptionally well compared to other countries in macroeconomic stability, innovation capability, and financial system. See Table 1-2 Taiwan's WEF GCI 4.0 Performance Overview 2018.

Table 1-2 ┤ Taiwan's WEF GCI 4.0 Performance Overview 2018

Pillar	2018		Pillar	2018	
	Ranking	Score		Ranking	Score
Overall Score	13	79.3			
Enabling Environment	19	82.2	Markets	10	74.8
Institutions	25	68.5	Product market	18	65.7
Infrastructure	22	82.6	Labor market	16	71.4
ICT adoption	13	77.9	Financial system	7	87.9
Macroeconomic stability	1	100.0	Market size	20	74.2
Human Capital	26	84.5	Innovation Ecosystem	11	76.6
Health	27	94.2	Business dynamism	21	72.4
Skills	21	75.6	Innovation capability	4	80.8

Source: 2018 WEF GCI 4.0, compiled by III-MIC, October 2018

⭐ 1-2 ▸ The IMD World Competitiveness Ranking

The World Competitiveness Index of the International Institute for Management Development (IMD) in Switzerland currently has more indicators than others. In 2018, Taiwan is ranked 17th in the global, down 3 from the previous year.

Taiwan's performance in corporate effectiveness is the main reason for this evaluation. It is necessary to improve its productivity and efficiency, labor market and management practices. The failure of the corporate environment to attract high-level talents abroad, the decline in population growth, and the low kinetic energy of consumer services exports all affect China's evaluation results.

However, in 2018, Taiwan has grown in terms of stable prices, low long-term unemployment, increased network bandwidth, and increased renewable energy subsidies. At present, Taiwan is relatively attractive to international trade and investment in projects such as high-skilled labor, education standards, cost competitiveness, and corporate governance quality. See Table 1-3 below for Taiwan's overall rankings on the IMD World Competitiveness Index.

Table 1-3 ┤ Taiwan's Overall Rankings on IMD World Competitiveness Ranking, 2017-2018

Factor/Subfactor	2018 Ranking	2017 Ranking	Factor/Subfactor	2018 Ranking	2017 Ranking
Overall Ranking	17	14			
Economic Performance	14	12	Business Efficiency	20	15
Domestic Economy	28	27	Productivity & Efficiency	19	17
International Trade	19	10	Labor Market	38	26
International Investment	41	29	Finance	21	20
Employment	21	22	Management Practices	9	4
Prices	9	11	Attitudes and Values	23	16
Government Efficiency	12	10	Infrastructure	22	21
Public Finance	10	10	Basic Infrastructure	39	30
Fiscal Policy	4	5	Technological Infrastructure	18	15
Institutional Framework	22	15	Scientific Infrastructure	10	10
Business Legislation	30	29	Health and Environment	33	36
Social Framework	22	24	Education	19	25

Source: IMD World Competitiveness Yearbook, 2017 & 2018, compiled by III-MIC, October 2018

⭐ 1-3 ▸ The IMD World Digital Competitiveness Ranking

According to the IMD World Digital Competitiveness Ranking 2018, Taiwan ranked 16, down from 12 in 2017. The decline is attributed mainly to a slight decline in overall rankings on three digital competitiveness factors: Knowledge, Technology, and Future Readiness. Taiwan experiences an improvement on subfactors such as Training & education and Scientific concentration (under Knowledge factor), and Regulatory framework (under Technology factor).

The Knowledge factor has three subfactors: Talent, Training & education, and Scientific concentration. Taiwan's overall rankings on the World Digital Competitiveness fell slightly because the subfactors rankings show a decline on Foreign highly-skilled personnel and Pupil-teacher ratio (tertiary education) grouped under Talent subfactor. However, the mathematics level of students and performance of the national average R&D manpower have continued to grow and become one of the world's leaders in this category.

When it comes to Technology factor, as telecom operators have completed the 4G network deployment, their investment in telecommunications declined to drag the performance. Taiwan's rankings in Mobile broadband subscribers, high-tech exports, and IT & media stock market capitalization have been ahead of many others. See Table 1-4 for Taiwan's Rankings on World Digital Competitiveness Yearbook, 2017 & 2018.

Table 1-4 ⊣ Taiwan's IMD World Digital Competitiveness Performance Overview 2017-2018

Factor/Subfactor	2018 Ranking	2017 Ranking	Factor/Subfactor	2018 Ranking	2017 Ranking	Factor/Subfactor	2018 Ranking	2017 Ranking
Total Ranking	16	12						
Knowledge	19	16	Technology	11	7	Future Readiness	22	16
Talent	25	18	Regulatory framework	21	24	Adaptive attitudes	28	19
Training & education	25	28	Capital	13	8	Business agility	13	6
Scientific concentration	13	17	Technological framework	10	4	IT integration	23	22

Source: The IMD World Digital Competitiveness Yearbook, 2017 & 2018, compiled by III-MIC, October 2018

⭐ 1-4 ▸ WASEDA-IAC International Digital Government Ranking

The Institute of Digital Government at Waseda University, Tokyo in cooperation with the International Academy of CIO (IAC) released the results of its 13th International Digital Government rankings survey for 2017. One of the clear changes of the survey is to recognize the transformation from e-Government to Digital government as the new definition which covers more comprehensive activities. The 2017 ranking survey Taiwan ranked 10th globally, 5th in the Asia Pacific, and 7th among APEC economies. See Table 1-5 below for the International Digital Government Rankings of Taiwan in the recent 5 years.

Table 1-5 ┤ The International Digital Government Rankings of Taiwan in the recent 5 years

	2013	2014	2015	2016	2017
Taiwan Ranking	8	18	17	10	10

Source: The International Digital Government Ranking Surveys, 2013–2017, compiled by III-MIC, October 2018

Ten main indicators are used to conduct the ranking survey. Taiwan ranked 4th and 7th on the indicators of Government CIO (GCIO) and D-Government Promotion (EPRO), respectively, but did not make into the top 10 of other indicators (See Table 1-6). Taiwan's total score was 73.2 in 2017 and stayed at 10th place. Taiwan has a significant improvement on several indicators. For instance, its score on the indicator of Management Optimization/Efficiency (MO) advanced from 8.8 to 9.6 and from 8.8 to 9.1 on the indicator of Online Services/Functioning Applications (OS).

The report revealed that Taiwan has significant gains on the indicators of Government CIO (GCIO) and Open Government (OGD). This implies that the Taiwanese government's years of efforts in promoting digital government have made some progress. However, the report also showed that Taiwan still has much work to do on the Use of Emerging ICT (EMG) indicator.

Table 1-6 ┤ WASEDA-IAC International Digital Government Rankings 2017

Indicator	Ranking	Score	Indicator	Ranking	Score
Network Preparedness/ Infrastructure (NIP)	-	5.4	D-Government Promotion (EPRO)	7	7.4
Management Optimization/ Efficiency (MO)	-	9.6	E-Participation/Digital Inclusion (EPAR)	-	7.8
Online Services/Functioning Applications (OS)	-	9.1	Open Government (OGD)	-	9.0
National Portal/Homepage (NPR)	-	5.6	Cyber Security (CYB)	-	7.6
Government CIO (GCIO)	4	7.7	The use of Emerging ICT (EMG)	-	4.0

Source: WASEDA-IAC International Digital Government Rankings 2017, compiled by III-MIC, October 2018

⭐ 1-5 ▸ The Inclusive Internet Index of the Economist Intelligence Unit

The Inclusive Internet Index has been updated for 2018 by the Economist Intelligence Unit. Taiwan ranked 19th out of 86 countries around the world and ranked 4th among 23 countries in the Asia Pacific. The overall index score based on the scores of the Availability, Affordability, Relevance, and Readiness categories. Of the total 54 sub-indicators, Taiwan managed to make into the top 10 on 28 sub-indicators.

Taiwan performed relatively well in the Relevance category as it ranked 1st on the indicators of Availability of basic information in the local language, Concentration of website using country-level domains, Availability of local language keyboard on devices, and Availability of e-Government services in the local language, which are grouped under Local Content sub-category.

In the Availability category, Taiwan ranked 2nd on the indicator of Bandwidth capacity, Bit/s per internet user and ranked 4th on both indicators of Average fixed broadband latency and Average mobile latency, ms, under the Quality sub-category; Under the Infrastructure sub-category, Taiwan ranked 1st on the Network coverage (min. 2G) and Network coverage (min. 3G) indicators and 7th on the Network coverage (min. 4G) indicator. The overall index showed Taiwan performs relatively well on the Local Content sub-category under the Relevant category. Overall, Taiwan performs strongly in fixed broadband and mobile network deployment, as well as bandwidth capacity and transmission speeds.

Taiwan's overall ranks on Affordability and Readiness categories failed to make into the top 30. In the Affordability category, Taiwan still needs to do much work on the indicators of Average revenue per user (ARPU) and Broadband operator's market share, which are grouped under Competitive Environment sub-category. In the Readiness category, Taiwan performs strongly on Privacy regulations under the Trust & Safety sub-category, which is the area Taiwan still needs to pay more attention into. Taiwan's overall ranks in the Inclusive Internet Index of the Economist Intelligence Unit 2018 are summarized as follows.

Table 1-7 | Taiwan's Overall Ranks in the Inclusive Internet Index of the Economist Intelligence Unit 2018

Indicator	2018		Indicator	2018	
	Ranking	Score		Ranking	Score
Overall Ranking	19	81.1			
Availability	16	78.7	Readiness	32	72.0
Usage	15	85.0	Literacy	20	81.9
Quality	4	59.4	Trust & Safety	59	52.4
Infrastructure	41	71.5	Policy	32	81.8
Electricity	41	98.9			
Affordability	34	81.2	Relevance	12	90.3
Price	25	97.7	Local Content	1	100.0
Competitive Environment	36	48.2	Relevant Content	20	80.7

Source: The Inclusive Internet Index of the Economist Intelligence Unit 2018, compiled by III-MIC, October 2018

⭐ 1-6 ▸ International Media Coverage about Taiwan's Telecom Developments

Taiwan has made outstanding achievements in the telecommunications industry and has also become the focus of international media over the years. Recent developments in information security, innovation and entrepreneurship, Netcom mergers and acquisitions, and semiconductor technology and services have been reported by international media.

Forbes reported in August 2018 that Amazon partnered with New Taipei City to establish Taiwan's first AWS (Amazon Web Services) innovation center. They chose Taiwan because of Taiwan's ability to provide investors with a friendly trading environment, Taiwan's high-quality R&D and skilled talent, making Taiwan a perfect partner to work with AWS.

Another Forbes story in April 2018 stated that global sales of tablets have grown sluggishly due to the cannibalization of large-sized smartphones. The Taiwanese manufacturers as the core suppliers of the supply chain still manage to find a way to survive. The core enterprises of the global technology industry such as Foxconn and Pegatron have come out with detachable tablets and got good results. In the fourth quarter of 2017, Foxconn ranked 1st in detachable tablet shipments, with a global market share of 43%, while Pegatron ranked 2nd, with a global market share of 19%.

Forbes also mentioned that Google, IBM, and Microsoft have been actively recruiting employees and training artificial intelligence talents in Taiwan since 2018. It quoted what William Foreman, president of the American Chamber of Commerce in Taipei, said about Taiwan, "Taiwan has a reasonable cost structure, with reasonable offerings to tech companies in terms of utilities, rentals and labor costs."

The Economist and PC Magazine reported in April 2018 that TSMC is about to become the world's leading chipmaker, while rival Intel is in a period of turmoil. TSMC's latest Fab value will reach USD 20 billion, with a market share of 56%. TSMC has begun shipping wafers fabricated using 7nm process in June 2018 and has invested USD 3 billion in analysis and improvement since 2017, with an aim to reduce costs and shrink nodes.

CNN reported in March 2018 that Foxconn, known for a major assembler for Apple iPhones, acquired US Belkin for USD 866 million (NTD 25.98 billion). Belkin is focused on the production of consumer electronics and smartphone accessories. The acquisition will help Foxconn acquire services and resources of Belkin in wireless chargers, Linksys routers, and smart home system WeMo. Foxconn is expected to spend at least USD 9 billion to build a plant in Wisconsin and hire thousands of employees there. Foxconn has demonstrated its ambitions to advance into the US market with aggressive deployment plans. See Table 1-8 for International Media Coverage about Taiwan's Telecom Developments.

Table 1-8 International Media Coverage about Taiwan's Telecom Developments 2018

Media	Date	News Title
Forbes	2018/8/17	Why Amazon Picked Taiwan For Its Latest Innovation Center
Forbes	2018/4/13	Global Tablet Sales Are Struggling, But Taiwan's Tech Firms Know What To Do
Forbes	2018/4/4	Why Google, IBM & Microsoft Are All Expanding In Taiwan This Year
The Economist	2018/4/5	TSMC is about to become the world's most advanced chipmaker
PC Magazine	2018/4/10	TSMC set to beat Intel to become the world's most advanced chipmaker
CNN	2018/3/27	Foxconn makes another big move in the US with Belkin deal

Source: Media sources, compiled by III-MIC, October 2018

⭐ 1-7 ▸ Conclusion

Taiwan ranked the top 5 in the Asia-Pacific region in terms of international index performance ranking and international media coverage for the period 2017-2018. Among all rankings, Taiwan has the best performance in WASEDA-IAC International Digital Government Rankings 2017 where it ranked 10th, followed by the WEF Global Competitiveness Index 4.0 where it ranked 13th. As for other index rankings, Taiwan all managed to make to the top 20.

Based on indicators of the IMD World Digital Competitiveness Ranking and the Inclusive Internet Index of the Economist Intelligence Unit, the results suggest Taiwan performed strongly in the network infrastructure, including fixed networks, mobile network bandwidth, and network penetration. The government's efforts in implementing digital government have been quite effective; the other competitive advantage is human resources as high-quality R&D talent has been one of the main reasons to attract international big names to invest in Taiwan. Taiwan has played a key role in the global supply chain of hardware production, foundry, and assembly for a long time. Given the solid hardware foundation, this is about time for Taiwan to re-define the role of hardware in the software-defined world.

The findings of the abovementioned international indicators suggest that Taiwan needs to work on enhancing future readiness, international trade/investment, higher education teacher-student ratio, and the domestic business environment. Limitations on political regulations and domestic business environment will impede the performance of Taiwanese enterprises, making it difficult to attract foreign and domestic talent with high-level skills. The decrease in capital investment has also affected the level of R&D expenditure and thus has a greater impact on the industry. The trust & safety are also areas where further improvements are required.

In the face of rapid changes in global Information Communications Technology (ICT), innovative thinking is a must. In addition to promoting the development of telecommunication technology, what the government can do is to promulgate policies that have positive impacts on people's lives, business operations, national economy, and society. In addition, the government can cooperate with enterprises while injecting the investments into upgrading software R&D and fostering talent in the hope of making a significant progress in the overall digital competitiveness. For this reason, Taiwan's launched "DIGI[+] program", "Forward-Looking Infrastructure Development Program", "Taiwan AI Action Plan (2018-2021)" to facilitate the development of telecommunications in Taiwan.

Taiwan's e-Competitiveness Evolves with Time —
Development of Taiwanese ICT Infrastructure

▶ **Fixed Broadband** (Include Leased Line, ADSL, Cable Modem, FTTx)

Fixed Broadband Subscriptions
in July 2018 **5.705 million**
FTTx Subscription Penetration in July 2018 **64.1%**

🏠 FTTx Subscription   🏠 = 0.1 million

🏠 Other Fixed broadband

Household Broadband
Penetration

85.0%

Internet
Penetration

82.3%
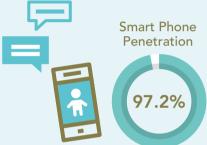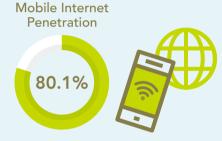
Cable TV Subscriptions **5.157** million
Cable TV Subscription Penetration **99.7%**

Multimedia Content Platforms Subscriptions
1.805 million

▶ Mobile Connection

Smart Phone Penetration

97.2%

Mobile Internet Penetration

80.1%

Mobile Broadband Subscriptions 24.26 million

= 1 million

Wireless Broadband Subscriptions 24.54 million
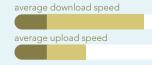
= 1 million

4G LTE Internet Speeds
(Fixed point measurement)

average download speed — **52.39Mbps**

average upload speed — **21.04Mbps**

3G Mobile Internet Speeds
(Fixed point measurement)

average download speed — **9.35Mbps**

average upload speed — **1.67Mbps**

Note: People surveyed were smartphone users aged 12 and above

Chapter 2. Taiwan's e-Competitiveness Evolves with Time — Development of Taiwanese ICT Infrastructure

2-1 ▸ Taiwan ICT Infrastructure Indicators

With the efforts of the government, industry, academia, and research sectors, the construction of the telecommunication construction has been very healthy and stable. This chapter summarizes the important communication infrastructure indicators, including fixed network, mobile network, and the top three sectors of the telecommunication industry, as well as mobile payment and digital life satisfaction surveys. See Table 2-1 for Taiwan's ICT infrastructure indicators.

Table 2-1 ICT Infrastructure Indicators in Taiwan

Category	Indicator	Statistics Data	Release Time	Released by
Fixed Broadband	Fixed Broadband Subscriptions	5.705 million	2018/07	NCC
	FTTx Subscription Penetration	64.1%	2018/07	NCC
	Cable TV Subscriptions	5.157 million	2018/06	NCC
	Cable TV Subscription Penetration	99.7%	2018/06	NCC
	Multimedia Content Platforms Subscriptions	1.805 million	2018/06	NCC
	Household Broadband Penetration	85.0%	2017/11	NDC
	Internet Penetration	82.3%	2017/11	NDC
Mobile Connection	Mobile Broadband Subscriptions	24.26 million	2018/06	NCC
	Wireless Broadband Subscriptions	24.54 million	2017/12	NCC
	4G LTE Internet Speeds (Fixed point measurement): average download speed	52.39Mbps	2017/03	TTC
	4G LTE Internet Speeds (Fixed point measurement): average upload speed	21.04Mbps	2017/03	TTC
	3G Mobile Internet Speeds(Fixed point measurement): average download speed	9.35Mbps	2017/03	TTC
	3G Mobile Internet Speeds(Fixed point measurement): average upload speed	1.67Mbps	2017/03	TTC
	Smart Phone Penetration	97.2%	2017/11	NDC
	Mobile Internet Penetration	80.1%	2017/11	NDC

Note: People surveyed were smartphone users aged 12 and above

Source: National Communications Commission (NCC), National Development Council (NDC), Telecom Technology Center (TTC), compiled by III-MIC, October 2018

2-1-1 ▶ Fixed Broadband

According to the National Communications Commission (NCC), Taiwan's fixed broadband subscriptions have grown at a steady pace in recent years. Fixed broadband devices include leased line, ADSL, cable modem, and fiber (FTTx). Cable modem and fiber subscriptions continued to grow and outperformed ADSL subscription in 2015 and 2011, respectively while the leased line and ADSL subscriptions continued to decline year by year. Taking 2017 as an example, the leased line had the lowest proportion at only 0.05%, while fiber (FTTx) had the highest proportion at about 63.4%. It shows that the people in Taiwan generally prefer internet connection using fiber optic cables.
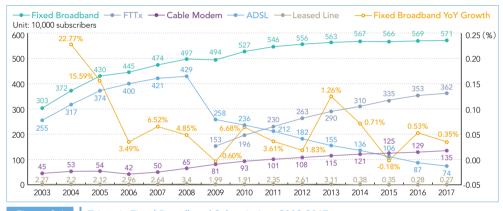
Figure 2-1 ┤ Taiwan's Fixed Broadband Subscription, 2003-2017

Note: Statistics were connected every December for the period 2003-2017
Source: NCC, compiled by III-MIC, October 2018

Looking at the changes in Taiwan's fixed broadband subscriptions, the increase in subscriptions has been stable over the years. Fixed broadband subscriptions peaked 5.723 million in September 2017, (Figure 2-2), and since then the subscriptions have been slowly reduced to 5.708 million in January 2018. In February, it rose to 5.714 million households and then fell again to the lowest point of 5.701 million households in May, 2018. The difference in subscriptions between September 2017 and January 2018 was about 22,000 households, with 5.71 million subscriptions on average.

Figure 2-2 ┤ Taiwan's Fixed Broadband Subscriptions, July 2017-July 2018

Source: NCC, compiled by III-MIC, October 2018

Fiber subscriptions increased from 3.591 million in July 2017 to 3.657 million in July 2018. Fiber subscriptions accounted for 64.1% in July 2018, up slightly from 62.9% in July 2017; ADSL subscribers reduced to 675,000 in July 2018, down from 786,000 in July 2017.

As of the second quarter of 2018, Taiwan's had 5.16 million cable TV subscribers, or 59.37 subscribers for every 100 households. The number of digital TV subscribers stood at 5.14 million, indicating that the digitalization of digital TV reached 99.70 (the proportion of digital TV subscribers to cable TV subscribers). The digital pay-TV subscriptions reached 1.49 million, accounting for 28.99% of the total digital TV subscriptions. Over the past year, IPTV subscriptions increased significantly from 1.36 million to 1.81 million, up 33% year-on-year.

Table 2-2   Taiwan's Cable TV and IPTV Subscriptions, 2Q 2017-2Q 2018   Unit: 10,000 subscribers

	2017Q2	2017Q3	2017Q4	2018Q1	2018Q2
Cable TV subscribers	524.3	524.9	522.5	519.4	515.7
Digital STB subscribers	514.4	520.0	519.7	517.3	514.1
Digital pay TV subscribers	151.2	153.1	155.1	151.4	148.8
IPTV subscribers	135.8	144.5	160.2	170.4	180.5
Average subscribers per 100 households	60.95%	60.77%	60.41%	59.95%	59.37%
Proportion of digital STB subscriber to total cable subscribers	98.13%	99.08%	99.46%	99.58%	99.70%
Proportion of digital STB subscribers to pay TV subscribers	29.38%	29.42%	29.81%	29.21%	28.99%

Source: NCC, compiled by III-MIC, October 2018

According to the survey conducted by the National Development Council (NDC) on the Internet penetration rate and the digital population across Taiwan in November 2017, the findings showed the number of Internet users aged 12 and above in Taiwan increased from 62.7% in 2005 to 82.3% in 2017, equivalent to 17.38 million online users. In addition, 85.0% of the population aged 12 and above have Internet access at home.

2-1-2 ▶ Mobile Broadband Network

According to the NCC, the number of mobile internet users reached 24.26 million as of June 2018. The replacement of 3G mobile internet by 4G has been very profound. 4G mobile internet subscriptions surpassed 3G subscriptions for the first time in September 2015. Since then, the replacement effect has been irreversible, making 4G the mainstream. By June 2018, 4G mobile internet subscribers had accounted for 95% of the total mobile internet subscribers. 4G mobile internet subscriptions have increased significantly within the short time and have replaced 3G ones. With the solid network infrastructure, most Taiwanese people feel quite satisfactory with 4G speeds and will continue to apply for 4G mobile internet services.
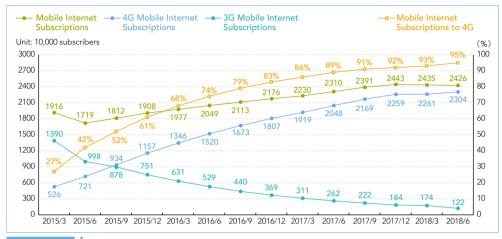
Figure 2-3 Taiwan's Mobile Broadband Subscription Changes, March 2015-June 2018

Source: NCC, compiled by III-MIC, October 2018

When measuring the national mobile broadband speed at the consumer side, the results showed both upload and download transmission speeds increased significantly in 2017. In 2012, the average download speed was 2.52Mbps and the upload speed was 0.45Mbps. As of March 2017, the download speed of 3G mobile network grew to 9.35Mbps, with the average upload rate of 1.67Mbps.

At the same time, the national 4G mobile broadband speed shows an exceptional growth. By March 2017, the average download speed reached 52.39Mbps, and the average upload speed was 21.04Mbps, which is already equivalent to the fixed broadband speed. As of March 2017, the average download and download speed of 4G is 5.6 times and 12.6 times that of 3G, respectively. This has prompted Taiwanese people to adopt 4G telecom services. It indicates 4G network has made the high-speed mobile broadband services possible and also simulated the convenience level for mobile users.

Table 2-3 Mobile Broadband Speeds Measured at the Consumer Side, 2012-2017

Mobile Broadband Speed Record (Unit: Mbps)	2012/ 8-10	2013/ 8-10	2014/ 8-10	2016/ 1-3 (3G)	2016/11- 2017/3 (3G)	2016/ 1-3 (4G)	2016/11 -2017/3 (4G)
Average Download Speed	2.52	4.44	6.27	8.84	9.35	40.87	52.39
Average Upload Speed	0.45	1.13	1.08	1.36	1.67	18.33	21.04

Note 1: Speed data were collected at a fixed point during November 2016 and March 2017
Note 2: No results were released in 2015
Source: TTC, compiled by III-MIC, October 2018

In November 2017, the NDC announced the findings of the survey on the mobile phone penetration rate and mobile broadband access to the general public in Taiwan. Based on the population aged 12 and above, the mobile Internet adoption in Taiwan was 73.1% in 2016 and increased to 80.1% in 2017, growing by 7 percentage points. In addition, among the people aged 12 and over who have been using the Internet, the findings suggest the main IT device they use to access information was smartphones, accounting for 97.2%, and followed by desktop PCs at 68.8%, notebook PCs at 52.1% and tablets at 45.0%.

2-2 ▸ Taiwan's Top Three Communications Industry Sectors

The Taiwanese flat-panel displays, panels, semiconductor, and man-made fibers all have a significant place in the world. In 2017, there were 5 industries/products, including wafer OEM, IC packaging & testing high-end bicycles, functional fabrics, and green algae. The ITIS project team pointed out that Taiwan's flat-panel displays remained the world's first in terms of shipment value during the period 2016-2017, while shipment value of Taiwan's panel sit in the world's second place. In 2016, the Taiwan semiconductor industry's shipment value ranked second in the world, only next to the United States; in 2017, Taiwan ranked third, only next to the United States and South Korea; nevertheless, Taiwan's foundry and IC packaging and testing continued to secure the world's first place, while IC design ranked the world's second in 2017.

Taiwan's Top 3 Industry/Product Global Rankings, 2017 (Excluding Overseas Production)

No.1 (Five Categories)	No.2 (Seven Categories)	No.3 (Ten Categories)
· Wafer OEM	· PND	· Small & Medium TFT LCD Panel (<10")
· IC Packaging & Testing	· Assistive Devices (Power Chair & Power Wheelchair)	· Large TFT LCD Panel (>10")
· Green Algae	· IC PCB	· β-Carotene · ABS
· Functional Fabrics	· IC Design	· Nylon Fiber · TPE
· High-end Bicycle	· CCL	· Polyester · WLAN
	· PCB (Printed Circuit Board)	· Ball Screw · OLED
	· Silicon Solar Battery	

Figure 2-4 ┤ Taiwan's Top 3 Industry/Product Global Rankings, 2017

Source: Industry & Technology Intelligence Service of DoIT, MOEA, compiled by III-MIC, October 2018

Of Taiwan's top five industries/products (excluding overseas production) ranked first worldwide in 2017, the foundry industry performed most outstandingly with a global share of 69.52% and a shipment value of USD 37.7 billion; the IC packaging and testing industry came second, with a shipment value of USD 13.7 billion and a global market share of 48.70%. Wafer OEM and IC packaging & testing industries contributed a majority share of Taiwan ICT industry's total shipment value. In terms of products, high-end bicycles also contributed nearly 30.00% to Taiwan's shipments at 29.31%.

Taiwan's second-ranked industry/product in 2017 was PND (Portable Navigation Device), which had a global market share of 45.00%, and its shipment value contributed to 27.20% of Taiwan's total value, followed by mobility tools (such as electric scooters, electric wheelchairs). Mobility tools' global share was 25.24%, while the IC boards' global share was 23.20%. The industry/product that secured the world's third place was small

and medium TFT LCD panels, which had a market share of 27.39%. See Table 2-4 for the top three Taiwanese industries/products (excluding overseas production) in 2017.

Table 2-4   Taiwan's Top 3 Industry/Product Global Rankings, 2017 (Excluding Overseas Production)

	Item	Shipment Value		Shipment Volume	
		Units: Million USD	Global Share	Units	Global Share
World's First	**Wafer OEM**	37,700.00	69.52%		
	IC Packaging & Testing	13,683.40	48.70%		
	Green Algae			890.59 MT	48.35%
	Functional Fabrics	4,246.00	24.78%		
	High-end Bicycle			2,149.2 K	29.31%
World's Second	**PND**	811.00	45.00%	5,774 K	27.20%
	Assistive Devices (Power Chair & Power Wheelchair)			182 K	25.24%
	IC PCB	2,244.00	23.20%		
	IC Design	19,690.36	17.42%		
	CCL			72,000 Square Kilo-Meters	18.00%
	PCB (Printed Circuit Board)	7,719.00	11.90%		
	Silicon Solar Battery			10,52 MW	11.20%
World's Third	**Small & Medium TFT LCD Panel (<10")**	7,862.63	27.39%		
	Large TFT LCD Panel (>10")	18,580.10	22.86%		
	β - Carotene			54.23 MT	4.51%
	Nylon Fiber			295 K MT	6.00%
	Polyester			788 K MT	2.10%
	Ball Screw	380.00	13.00%	53,340 MT	15.80%
	ABS			1,334 K MT	15.95%
	TPE			324 K MT	8.30%
	WLAN	43.00	0.70%		
	OLED	333.94	2.53%		

Source: Industry & Technology Intelligence Service of DoIT, MOEA, compiled by III-MIC, October 2018

Taking the industry/product overseas production into account, Taiwanese motherboard's global share in terms of production value and volume was 89.10% and 81.50%, respectively; notebook PC's global share in terms of shipment value and volume was 81.50% and 83.30%, respectively; Taiwanese cable CPE's (cable TV terminal) global share was 80.40% in terms of shipment volume, the golf shaft's global share was 81.10%. In terms of shipment value, Taiwanese cable CPE's global share was 77.11% and the Wafer OEM's global share was 73.16%. Motherboards, notebook PCs, cable CPE, and Wafer OEM are the most representative industries/products in Taiwan with the highest global share. See Table 2-5 for the top three Taiwanese industries/products (including overseas production) in 2017.

Table 2-5 Taiwan's Top 3 Industry/Product Global Rankings, 2017 (Including Overseas Production)

Item	Shipment Value		Shipment Volume	
	Units: Million USD	Global Share	Units	Global Share
World's First — Motherboard	4,062.00	89.10%	84,003 K	81.50%
Notebook PC	59,402.00	81.50%	132,398 K	83.30%
Cable CPE	2,022.63	77.11%	36,119 K	80.40%
Wafer OEM	39,674.34	73.16%		
Instant Noodles			231.2 B Packs	24.00%
Tea Beverages			6758 M MT	16.55%
Functional Fabrics	8,672.32	50.81%		
High-end Bicycle			2,394.3 K	33.21%
CCL			132,100 Square Kilometers	33.22%
※ABS			3,310 K MT	29.36%
IC Packaging & Testing	15,690.79	55.84%		
WLAN	3,974.01	67.14%		
DSL CPE	1,919.08	65.40%	61,238 K	66.30%
PND	1,042.00	57.80%	8,372 K	39.50%
PCB	19,299.00	29.70%		
Mobile mevice optical lens	2,235.00	50.00%		
Desktop	12,606.00	27.80%	48,789 K	49.80%
Golf Shaft			31.5 Million	81.10%
World's Second — ※PTA			12.12 M MT	15.53%
※TPE			986 K MT	19.50%
Silicon Solar Battery	3,608.00	20.30%		
IC Design	20,299.34	17.96%		
Large TFT LCD Panel (>10")	20,876.52	25.69%		
Small & Medium TFT LCD Panel (<10")	9,473.05	33.00%		
IC PCB	2,550.00	26.30%		
Electric/Digital Sphygmomanometer			7,390 K	22.39%
Server	9,085.00	18.00%	3,926 K	35.30%
Assistive Devices (Power Chair & Power Wheelchair)			252 K	35.06%
World's Third — MSG			311.9 K MT	8.93%
Ball Screw	475.00	16.10%	66,675 MT	19.70%
OLED	333.94	2.53%		
LED Element (Only Calculated the Assembly Production Value in Taiwan)	3,044.00	17.70%		

※ This is estimated by production capacity.

Source: Industry & Technology Intelligence Service of DoIT, MOEA, compiled by III-MIC, October 2018

⊕ 2-3 ▸ Taiwan's Mobile Payment Survey

Mobile payment refers to a payment method made using a smartphone by scanning a barcode of the merchant, an NFC-enabled device, and/or sound wave transmission, to obtain goods or services. Most Taiwanese consumers still often pay by cash and credit cards, which account for 70.0% of the total payments, followed by electronic tickets, which account for 30.0%. The penetration rate of mobile payment increased significantly from 4.8% in 2016 to 13.7% in 2017. The proportion of consumer preference for mobile payments also increased from 19.2% in 2015 to 36.2% in 2017, showing an increasing trend year by year.

According to a smartphone consumer survey conducted by MIC (Market Intelligence & Consulting Institute), the awareness of mobile payment among smartphone users increased from 83.6% in 2016 to 90.9% in 2017. NFC-embedded smartphones' share increased from 44.3 % in 2016 to 61.4% in 2017. The results indicate the awareness of mobile payment has improved and the growth potential can be expected. It is estimated that due to the continuous innovation of smartphones and the promotion of preferential packages, the consumer awareness of mobile payments and the use of NFC have increased year by year.

In addition, Line Pay and Apple Pay are the most popular mobile payment methods for consumers using either Android or iOS smartphones, each with a penetration rate of more than 75.0%. The third most popular mobile payment is Alipay, which accounted for 57.7% and still lagged much behind Line Pay and Apple Pay. Android Pay (now known as Google Pay) and O'Pay ranked 4th and 5th, respectively. International mobile payment service providers have higher brand recognition than domestic players in Taiwan as up to 87.0% of iPhone users have heard about Apple Pay, and 80.4% of phone users have heard about Line Pay. This indicates a majority of iPhone users know about Apple Pay. The comparison of smartphone users' awareness of mobile payments is shown in Figure 2-5.

Have you heard any of the above mobile payment? (multiple-choice question)   1,068 valid samples

Overall		iOS		Android	
LINE Pay	79.0%	Apple Pay	87.1%	LINE Pay	78.7%
Apple Pay	76.0%	LINE Pay	80.4%	Apple Pay	71.6%
AliPay	57.7%	Alipay	59.3%	Android Pay	58.2%
Android Pay	55.6%	O'Pay	51.8%	Alipay	57.2%
O'Pay	52.9%	Android Pay	49.3%	O'Pay	53.4%
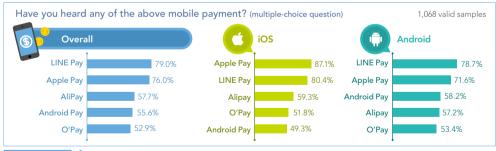
Figure 2-5 ┤ Smartphone Users' Mobile Payment Awareness Rankings

Source: III-MIC, October 2018

In 2015, nearly 80% of mobile payment users were Android smartphone users. However, since Apple launched Apple Pay in Taiwan in March 2017, iOS users' share slightly increased to 30% and Android mobile phone users' share slipped to 64.9%. However, it is observed that 53.4% of iOS users have experience with mobile payments but only 39.8% of Android users have such experience (see Figure 2-6), showing that mobile payment is popular among iOS users compared to Android users.
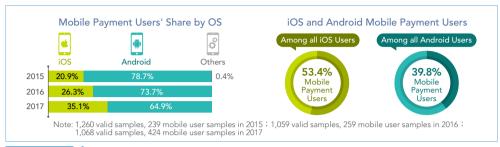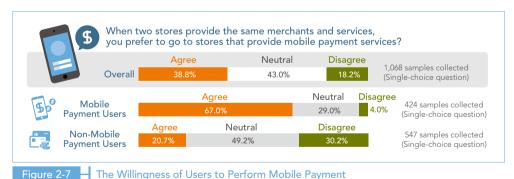
Figure 2-6   Mobile Payment Users' Market Share by Operating System

Source: III-MIC, October 2018

The 2017 survey showed 50.7% of mobile phone users aged 26-35 use mobile payment, which is the highest among all age groups, followed by users aged 18 to 25, which accounted for 39.2%. Meanwhile, only 26.3% of mobile phone users aged 56-65 had mobile payment experience. For the stores that provide the same goods and services, 38.8% of the general consumers prefer stores that support mobile payments, and less than 20% would rather shop at stores without mobile payments; up to 67.0% of mobile payment users prefer to go to stores that support mobile payments, while only 20.7% of non-mobile payment users (who only heard about mobile payments but never used) prefer stores with mobile payment services and 30.2% of them disagreed that stores with such services are appealing to them (see Figure 2-7). The results indicate that once consumers start to use mobile payments, whether stores support mobile payment services will affect their willingness to purchase and this is the reason that mobile payment services are getting common these days.

Figure 2-7   The Willingness of Users to Perform Mobile Payment

Source: III-MIC, October 2018

With more and more foreign players entering the Taiwan mobile payment market, domestic players are facing intense competition when it comes to mobile payment technology, mobile shopping preferential benefits, or distribution channels. Taiwan's consumers hope to have a safe and convenient verification system so domestic players can strengthen biometric verification, such as fingerprint scanning, screen signature, facial recognition, alphanumeric or graphic passwords. These can help them distinguish themselves from foreign players by providing various functions for different users when making mobile payment and transfer, or providing students electronic tickets or bank cards that meet their specific needs.

2-4 ▶ Digital Quality of Life Satisfaction Indicators

The continuous evolution of digital and innovation has gradually changed the shape of the world, and the changes brought about by the ICT technology do not just affect the economic level, but also the national, industry, and society levels. These levels, in particular, have a major impact on the quality of people's life. Therefore, with the support of Board of Science and Technology of the Executive Yuan, Market Intelligence & Consulting Institute (MIC) of III has been able to construct and develop a set of digital life satisfaction indicators to assess the quality of life satisfaction and ICT application services satisfaction to measure and identify ICT application services that have the highest satisfaction score to ensure the quality of life.

2-4-1 ▶ Taiwan People's Quality of Life Satisfaction

Designed based on the OECD Good Life Index, the Taiwanese Quality of Life Satisfaction Survey comprises of 11 indicators: Jobs & Earnings, Public Environmental Quality, Health & Hygiene Management, Education & Learning, Public Safety & Disaster Prevention, Housing & Living Conditions, Income & Consumption, Work-life balance, Civic Engagement & Governance, Subjective well-being, and Social Interactions. The survey was conducted from May 31, 2017, to July 31, 2017, with a total of 6,548 valid samples collected from people aged 15 and over.

According to the survey results, the quality of life of people aged 15 and over in each county and city in 2017 was scored at 63.6 on average, which was not significantly different from the previous years. The indicator with the highest satisfaction score was Social Interactions which was scored at 74.2, followed by Work-Life Balance at 67.3, and Health & Hygiene Management at 66.8. The analysis shows that although there have been slight changes in the rankings of the indicators from 2015 to 2017, Social Interactions, Work-Life Balance, and Health & Hygiene Management remained the top three indicators (as shown in Table 2-6)

Table 2-6 ┤ General Public's Life Quality Satisfactory Rankings, 2015-2017

Indicator \ Year	2015		2016		2017	
	Ranking	Score	Ranking	Score	Ranking	Score
Jobs & Earnings	9	54.4	9	61.0	10	58.2
Public Environmental Quality	5	64.0	8	62.2	7	61.5
Health & Hygiene Management	1	70.1	2	70.5	3	66.8
Education & Learning	7	59.8	6	63.2	8	61.2
Public Safety & Disaster Prevention	4	66.6	5	63.8	5	64.1
Housing & Living Conditions	3	67.8	7	62.3	6	62.5
Income & Consumption	8	59.3	10	60.8	9	60.9
Work-Life Balance	6	62.7	3	67.1	2	67.3
Civic Engagement & Governance	10	53.7	11	60.0	11	57.3
Subjective Well-being	-	-	4	65.1	4	65.6
Social Interactions	2	68.8	1	71.5	1	74.2

Source: III, October 2018

People in different living circles have little difference in the quality of life concerns. They all have concerns over Jobs & Earnings, Public Environmental Quality, and Health & Hygiene Management. In addition to the first three indicators, people living in Central Taiwan, Eastern Taiwan, and the outlying islands care most about Education & Learning, people living in Northern Taiwan about Public Safety & Disaster Prevention, and those living in Southern Taiwan about Housing & Living Conditions.

Figure 2-8 Life Quality in Individual Regions of Taiwan

Source: III, October 2018

As for the overall index scores of the life quality in urban and rural areas, the urban area and the rural area scored at 63.7 and 62.5, respectively, indicating there is no significant difference in the quality of life satisfaction between these two areas. The scores of the people's satisfaction in Income & Consumption and Civic Engagement & Governance between urban and rural areas, however, showed a significant gap.

Figure 2-9 Life of Quality Satisfaction in Urban and Rural Areas

Source: III, October 2018

2-4-2 ▶ Taiwan People's Use of ICT Application Services

ICT application services comprise of Food Nutrition and Safety Information, Digital Healthcare and Health Improvement, Disaster Prevention and Public Safety, Smart Traffic and Transportation Service, Environment Quality Monitoring and Improvement, Digital Education and Continuing Leaning, Employment and Innovative Startup, Instant Messaging and Internet Social Groups, Online Banking and Shopping, Digital Entertainment and Tourism Experience, Digital Family and Smart Services, Digital and Interactive Government. Each service has 3-5 service items. In view of the rapid development of Internet services, the awareness of many users toward ICT application services has gradually increased. This survey continues to make rolling adjustments to indicators with the completion of the two rounds of Delphi questionnaires in 2017 to assess the relevance and satisfaction through indicators to confirm the quality of life. The 12 application services and their service items are shown in Figure 2-10.

Food Nutrition and Safety Information	Digital Healthcare and Health Improvement	Disaster Prevention and Public Safety	Smart Traffic and Transportation Service
· Agricultural product and food traceability · Food nutrition and preservation information · Illegal food reporting and inquiry	· Registration and enquiry · Telemedicine and integrated care · Healthcare and medical care information · Healthcare and management platform	· Natural disaster notification and shelter guidance · Accident notification and rescue service · Personal safety notification and reporting · Public safety prevention and management	· Electronic purse for transportation service · Public transportation movement and timetable · Road safety and transportation diversion guidelines · Intelligent parking guidance service · Internet of vehicles application and services
Environment Quality Monitoring and Improvement	Digital Education and Continuing Leaning	Employment and Innovative Startup	Instant Messaging and Internet Social Groups
· Environment monitoring and danger notification · Energy saving and carbon reduction applications and promotions · Real-time pollution reporting and tracking system · Green space maintenance and inquiry	· Digital collection services and applications · Digital leaning content and service · Interactive digital learning service	· Integrated job matching service · Innovative and entrepreneurship matching service · Workplace information disclosure and rankings · Industrial-academic innovation and application services	· Instant messaging and liaison service · Online community platform for communication and information sharing · Single account, cross-platform management
Online Banking and Shopping	Digital Entertainment and Tourism Experience	Digital Family and Smart Services	Digital and Interactive Government
· Digital finance and mobile payments · Online shopping and consumption information inquiry · Internet transaction safety and management	· Digital integrative entertainment and experience · Mobile video and audio entertainment service · Smart tourism information real-time updates · Travel information rankings and inquiry	· Smart family integrated service · Family and community security service · Community living information service network · Smart building management service	· Human-centric, one-stop service · Government service complaint and reporting · Public issue participation channels

Figure 2-10 ┤ ICT Application Services in Individual Sectors and Categories

Source: III, October 2018

Looking at the impact of ICT application services on individual quality of life in 2017, the top three most important application services with the highest satisfaction scores are: Digital entertainment and tourism experience, Environmental quality monitoring and improvement, and Disaster prevention and public safety. These three application services have a profound impact on people's quality of life, indicating that people care very much about services pertaining to the safety and the environment. When the ICT satisfaction score rises,

the quality of life satisfaction also increases accordingly. This shows that Taiwan has become a high tech society so that if the government continues to invest in ICT services, people's quality of life will effectively improve.

Based on the results of the ICT application service satisfaction survey conducted in 2017, the average score was 64.1. The satisfaction score of instant messaging and internet social groups was 72.6, the highest among all indicators, followed by smart traffic and transportation service scored at 68.5, digital healthcare and health improvement at 67.8, online banking and shopping at 66.7, digital entertainment and tourism experience at 66.4, digital education and continuing leaning at 64.4, digital family and smart services at 63.2, disaster prevention and public safety at 62.6, environment quality monitoring and improvement at 61.2, digital and interactive government at 60.6, employment and innovative startup at 59.8, food nutrition and safety information at 56.0. Comparing the satisfaction score of the application services during the period 2015-2017, the top three services with the highest satisfaction score were smart traffic and transportation service, digital healthcare and health improvement, and instant messaging and social groups. See Table 2-7 for application services with the highest satisfaction score in 2015 and 2017.

Table 2-7 ICT Application Services Satisfaction, 2015-2017

ICT Indicator \ Year	2015		2016		2017	
	Ranking	Score	Ranking	Score	Ranking	Score
Food Nutrition and Safety Information	12	48.8	12	54.6	12	56.0
Digital Healthcare and Health Improvement	2	68.7	3	68.0	3	67.8
Disaster Prevention and Public Safety	10	56.5	10	61.4	8	62.6
Smart Traffic and Transportation Service	1	72.1	2	69.8	2	68.5
Environment Quality Monitoring and Improvement	11	54.9	9	62.6	9	61.2
Digital Education and Continuing Leaning	7	61.7	6	64.4	6	64.4
Employment and Innovative Startup	9	57.0	11	60.2	11	59.8
Instant Messaging and Internet Social Groups	6	62.0	1	73.0	1	72.6
Online Banking and Shopping	4	62.6	5	67.1	4	66.7
Digital Entertainment and Tourism Experience	3	65.8	4	67.8	5	66.4
Digital Family and Smart Services	5	62.3	7	63.8	7	63.2
Digital and Interactive Government	8	57.9	8	63.3	10	60.6

Source: III, October 2018

When analyzing the difference in the use of ICT application services between urban and rural people, the results show the use of ICT application services in urban areas is higher than that in rural areas, especially in transportation, financial banking, education, employment, and healthcare domains. In individual regions, Northern Taiwan has the highest ICT application service satisfaction score compared to others. On top of that, people in Southern Taiwan had the highest satisfaction score in food nutrition and safety information application service (See Table 2-8).

Table 2-8 — Taiwan People's Use of ICT Application Services by Region

	Service Indicator	Food Nutrition and Safety Information	Digital Healthcare and Health Improvement	Disaster Prevention and Public Safety	Smart Traffic and Transportation Service	Environment Quality Monitoring and Improvement	Digital Education and Continuing Leaning	Employment and Innovative Startup	Instant Messaging and Internet Social Groups	Online Banking and Shopping	Digital Entertainment and Tourism Experience	Digital Family and Smart Services	Digital and Interactive Government
	Average Score	28.8	60.7	51.3	77.8	55.5	51.3	38.3	81.9	64.4	69.7	32.0	48.4
By Urban/ Rural Area	Urban Area	29.2	61.5	51.8	78.8	55.8	52.1	39.1	82.3	65.3	70.3	32.6	48.7
	Rural Area	24.6	51.5	45.2	66.5	53.1	42.4	30.0	76.8	55.0	63.2	24.9	44.5
By Region	Northern Taiwan	28.9	64.8	54.7	84.8	56.3	54.3	40.6	83.3	68.1	72.1	33.3	51.2
	Central Taiwan	27.2	56.6	45.3	75.2	55.1	49.0	35.6	83.3	62.2	68.1	30.9	45.1
	Southern Taiwan	30.3	58.4	51.3	69.5	54.9	48.3	38.1	78.7	60.8	67.4	31.4	46.9
	Eastern Taiwan	27.2	54.8	48.0	69.3	52.3	50.5	29.2	77.6	59.9	67.9	27.3	46.4

Source: III, October 2018

Observing the satisfaction scores for ICT application services in urban and rural areas, the results suggest that while people in the rural area seemed to be less satisfied with smart traffic and transportation service, and online banking and shopping service, they were most satisfied with disaster prevention and public safety service compared to people living in urban areas (See Figure 2-11). When it comes to smart traffic and transportation service, the lack of transportation infrastructures such as the poor transport accessibility

and connectivity in rural areas and the longer transportation time compared to urban areas have put rural areas at a disadvantage; as for online banking and shopping service, due to geographical limitations, the transportation cost will increase in rural areas. Moreover, the transportation cost of any long-distance purchases will pass on to customers so they will need to pay more. Therefore, in the future, the rural areas should strengthen their collective transportation service and demand forecasting service.

	Urban Area	Rural Area
Digitalized and Interactive Government	60.6	60.5
Digital Entertainment and Tourism Experience	66.3	66.6
Food Nutrition and Safety Information	56.0	55.7
Employment and Innovative Startup	59.8	59.4
Digital Education and Continuing Leaning	64.4	64.0
Environment Quality Monitoring and Improvement	61.3	60.8
Digital Healthcare and Health Improvement	67.9	67.1
Digital Family and Smart Services	63.1	64.0
Disaster Prevention and Public Safety	62.4	64.1
Instant Messaging and Internet Social Groups	72.7	70.9
Online Banking and Shopping	66.9	64.9
Smart Traffic and Transportation Services	68.8	64.9

Information Application Satisfaction Degree

Urban Area **64.1**%

Rural Region **63.5**%

Figure 2-11 | ICT Application Service Satisfaction Scores in Urban and Rural Areas

Source: III, October 2018

2-4-3 ▶ Imaging How Technology is Changing the Way Young People Think

    Given the fact that digital life service penetration and satisfaction research surveys often focus on the daily digital needs of people aged 15 and over and pay less attention to teenagers aged under 15. But what is in these teens' mind about what future may look like will shed some light on cities of the future and also fuel the imagination about science and technology of the future. Through the collection of drawing and short paragraph stories, the ideas about food, medicine, housing, transportation, education, and entertainment of the future will be visualized as a reference for future development. A total of 295 artworks were collected, 40 of which from kindergarten students, 129 from grade 1 to 4 students, 111 from grade 5 to 6 students, and 15 from grade 7 to 9 students.

    Among all the imaginative artworks of these teenagers about the digital life of the future, it is found that they tended to draw less on objects related to smartphones but more to robots. Robot-related concepts or physical forms can be seen in the home environment, transportation, and daily living scenarios. See Figure 2-12 for the imaginative cities of the future artworks of Taiwan's teenagers:

- The imaginative future living environment is no longer limited to land, as buildings can be floating in the sky, outer space, and the sea, and connect with each other through tunnels or signals.

- The imaginative future transportation is more a mix of sea, land and air transportations, and the capsule-shaped flying vehicles are commonly seen in the drawings.

- In the imaginative future, people could use their mind to control robots which will perform daily activities required, and most robots can perform a hybrid function.

Three main findings of this research are: (1) the ICT application services are highly correlated with people's quality of life. Digital entertainment and tourism experience, Environmental quality monitoring and improvement, Disaster prevention and public safety are the top three ICT application services care most by the people. This indicates although people pay more attention to digital life and entertainment, increasing attention has been drawn towards environmental safety and disaster prevention. Therefore, it is necessary to keep track of the developments and changes of ICT application services amid the rapid evolution of ICT technologies; (2) by comparing satisfaction scores of ICT application services between urban and rural people, the results show there are differences in satisfaction levels smart transportation, online banking, and disaster prevention, indicating that urban and rural people have different expectations for digital life; (3) through the drawing and short paragraph stories, opinions from children under the age of 15 were collected to get a grasp of young people's imaginations about future technology and lifestyle so as to discover their expectations for the future of food, medicine, housing, transportation, education, and entertainment. At the same time, it also outlines the infinite imagination of teenagers towards the future of smart living.

Figure 2-12 The Imaginative "Cities of the Future" Artworks of Taiwan's Teenagers

Source: III, October 2018

Countries Learning from Each Other to Gear Up for Competitiveness —
How International Policy Responds to Social Needs

Japan

Major Planning	Society 5.0, Connected Industries
Objective	The main concept is that both the entity and the virtual interface will be linked and connected by data generated from objects and objects, people and things, people and people, business to business, and production to consumption to enable interdisciplinary connections and create new added value.

South Korea

Major Planning	Mid-to-Long-Term Master Plan in Preparation for the Intelligent Information Society
Objective	Build a human-centered intelligent information society.

Singapore

Major Planning	Security Industry Transformation Map (ITM), SMEs Go Digital
Objective	Guide enterprises to transform, explore new technologies, and strengthen staff training.

United States

Major Planning — Establish an AI Committee

Objective — Serves as a key role to coordinate with US Federal Government while dedicated to integrating the industry and academic sectors to fully exploit the potential of AI.

European Union

Major Planning — Promote the development of emerging technologies such as AI, autonomous vehicle, and blockchain

Objective — EU hopes to take advantage of the power of the member states and agreements signed thereof to revise out-of-date regulations for the provision of comprehensive systems and optimal investment environments to help enterprises increase competitiveness.

China

Major Planning — Made in China 2025, 13th Five-Year Plan

Objective — By prioritizing AI, quantum computing mobile communications, IoT, and blockchain as national strategic industries, China aims to transform itself into an advanced manufacturing economy.

Thailand

Major Planning — Thailand 4.0 program

Objective — Target 10 industries; prioritizes the development of Eastern Economic Corridor (EEC) to build strong connections to its ASEAN neighbors by land, sea, and air; ultimately, to drive the economic upgrade and transformation in Thailand.

Chapter 3. Countries Learning from Each Other to Gear Up for Competitiveness — How International Policy Responds to Social Needs

Digital technology, along with emerging technologies such as IoT, big data, cloud computing, Artificial Intelligence (AI), Augmented Reality (AR)/Virtual Reality (VR), and robotics, continues to evolve and helps enterprises increase productivity and change how they deliver products and services. Meanwhile, the rise of the Internet and startups, coupled with new digital business models, has also prompted the disruptive innovation in the industry by changing how the industry earns and shares profits. Hence, the digital economy transformation will be a major issue that all countries will need to address.

Digital economy transformation refers to how traditional industries and emerging industries introduce or integrate with digital technology to enhance internal productivity, optimize transactions, and create new products and business models. With digital transformation in mind, governments around the world have launched related policies in the hope of creating their super-intelligent society.

The first is the construction of application services. Through interdisciplinary social services in the medical, education, and manufacturing sectors, and/or public intelligence services such as security, transportation, and national defense, the government aims to enhance people's well-being and foster industrial competitiveness.

The second is the construction of infrastructure. A good statewide data system, coupled with complete infrastructure, can help create an optimal information security environment and build core technical strengths such as AI to construct an information highway and accelerate application development.

The last is the construction of an intangible culture and environment, including improving the business and investment environment, personnel education and training, exchange of international talents, and the transforming corporate culture. Creating a well-designed service support system will allow society to minimize the impacts of new technologies.

Under this premise, Japan, South Korea, Singapore, the United States, European Union, China, and Thailand, all have proposed their own emerging intelligence communications policies and are summarized as follows:

Table 3-1	Digital Economy and/or AI Planning of Major Economies	
Country	**Major Planning**	**Objective**
Japan	Society 5.0, Connected Industries	The main concept is that both the entity and the virtual interface will be linked and connected by data generated from objects and objects, people and things, people and people, business to business, and production to consumption to enable interdisciplinary connections and create new added value.
South Korea	Mid-to-Long-Term Master Plan in Preparation for the Intelligent Information Society	Build a human-centered intelligent information society.
Singapore	Security Industry Transformation Map (ITM), SMEs Go Digital	Guide enterprises to transform, explore new technologies, and strengthen staff training.
United States	Establish an AI Committee	Serves as a key role to coordinate with US Federal Government while dedicated to integrating the industry and academic sectors to fully exploit the potential of AI.
European Union	Promote the development of emerging technologies such as AI, autonomous vehicle, and blockchain	With AI, autonomous vehicle, and blockchain technologies, EU hopes to take advantage of the power of the member states and agreements signed thereof to revise out-of-date regulations for the provision of comprehensive systems and optimal investment environments to help enterprises increase competitiveness.
China	Made in China 2025, 13th Five-Year Plan	By prioritizing AI, quantum computing mobile communications, IoT, and blockchain as national strategic industries, China aims to transform itself into an advanced manufacturing economy.
Thailand	Thailand 4.0 program	Target 10 industries; prioritizes the development of Eastern Economic Corridor (EEC) to build strong connections to its ASEAN neighbors by land, sea, and air; ultimately, to drive the economic upgrade and transformation in Thailand.

Source: Open-source information of individual counties, compiled by III-MIC, October 2018

3-1 ▶ Japan

Japan is currently facing many challenges such as an increase in the elderly population, a decline in fertility, the labor shortage, an increase in national fiscal expenditures, the increasing need for disaster prevention, and how to rejuvenate the industry. In light of this, the government has proposed policies such as Social 5.0, future investment strategies, and Connected Industries in order to improve the convenience for people living in the society and solve the existing issues that stem from advanced technologies such as AI and IoT. Hence, these policies have also become the main pillars of Japan's growth strategies. Among them, Connected Industries has been one of the most important foundations for Japan during digital transformation.

3

Chapter 3. Countries Learning from Each Other to Gear Up for Competitiveness —
How International Policy Responds to Social Needs

3-1-1 ▶ From Society 5.0 to Connected Industries

In January 2016, the Japanese cabinet granted the 5th Science and Technology Basic Plan for the period 2016-2020 and proposed the concept of "Society 5.0" The 5th Science and Technology Basic Plan defines a super intelligent society as "a society that is capable of providing the necessary goods and services to those who need them at the required time and in just the right amount; a society that is able to respond precisely to a wide variety of social needs; a society in which all kinds of people can readily obtain high-quality services, overcome differences of age, gender, region and language, and live active, comfortable lives." For Society 5.0 to be well-implemented into the industry, the government promulgated "Connected Industries" in April 2017 to encourage new added value and productivity through the connection of data generated from humans, enterprises, and machinery.

Connected Industries was proposed to overcome technical shortcomings of Society 5.0. The main concept is that both the entity and the virtual interface will be linked and connected by data generated from objects and objects, people and things, people and people, business to business, and production to consumption to enable interdisciplinary connections and create new added value. It also identified five priority industries, including autonomous driving and mobility services, biotechnology and materials, smart living, manufacturing and robotics, and infrastructure safety management.

Connected Industries enable the sharing and utilization of real data between established companies and AI technology companies to facilitate startups to develop advanced AI systems; environmental improvement and further expansion of initiatives will assist the industry in digitalization to export digital services and commodities to the world based on a digital business model.

| Sharing and Using the "Real Information" | · Establish a new business model for information sharing
· Develop support measures to enable the cooperation between big companies, which hold the real information, and the AI industry on jointly developing AI systems
· Create an advanced model and develop rule-based demonstration programs
· Review the Contract Guidelines on Data Utilization Rights |

| Improving Environments for Data Utilization | · Promote the development of AI chips
· Build up the development of the field applicable employees (CPS and AI technologies)
· Establish a framework appealing to global talent
· Enhance cybersecurity indicators | Future Expansion | · Strengthen the international cooperation with European and Asian countries
· Strengthen Japanese system exports via International Collaboration Working Group
· Enhance quality and quantity of employees who meet international standards of excellence
· Establish Japan's investment ecosystem
· Strengthen support measures for local companies and SMEs |

Figure 3-1 ┤ Cross-sector Polices of the Connected Industries

Source: Ministry of Economy, Trade and Industry (METI), compiled by III-MIC, October 2018

3-2 ▶ South Korea

The Ministry of Science and ICT of the Government of the Republic of Korea published the Mid-to-Long-Term Master Plan in Preparation for the Intelligent Information Society in July 2017 in the hope of realizing a human-centered intelligent information society.

The government has formulated this Master Plan to make a humane intelligent information society a reality by conducting four major strategies below:

(1) Foster an intelligent IT society to correct market failures: Enterprises and citizens play a leading role, while the government and the research sector provide support to foster an intelligent information society based on public-private partnerships.

- Foster Korea to be a market pioneer that enables enterprises and citizens to enhance their competitiveness in anticipation of fourth industrial revolution and related innovations.

- The government and the research sector should actively support the private-sector initiatives through the establishment of infrastructure and ecosystems to develop original technologies and human resources, correct market failures, especially for vulnerable groups in society, and come out with a shared vision for the sustainable future.

(2) Formulate adaptable policies to meet social needs: Develop and implement a comprehensive policy system that encompasses the technology, industry, and society, and make a society more human-centric

- Take the needs and innovations brought about by the integration of intelligent IT, industries, and social activities into discreet consideration.

- Balance technology and industrial development policies that not only aim to improve national competitiveness but also to improve the public opinions about social policies for employment, education, welfare, and more.

(3) Establish major applications to strengthen core technologies: Provide strategic support to speed up the assurance of rights and access to intelligent IT and other related resources to ensure and foster industrial competitiveness in advance.

- Intelligent IT should be applied first to industries and services that have the potential to maximize the network effect, such as public services (defense, security, and management), healthcare, and manufacturing.

- Focus on the support for data, technology, and core personnel procurement to enable enterprises to enjoy first-mover advantages in the intelligent IT ecosystem and build up their technological know-how.

(4) Provide security guarantees to prep for the shocks: Policy reforms will be conducted for the expansion of social security networks with social consensus.

- Prepare the society for industry transformation by implementing flexible and effective policies in education, employment, and social welfare with the support of the public.

3

Chapter 3. Countries Learning from Each Other to Gear Up for Competitiveness —
How International Policy Responds to Social Needs

- Raise public awareness of the negative impacts of technological innovation, such as threats to privacy, socioeconomic polarization, etc., and establish an open, public framework to identify and manage risks.

Strategic tasks for the realization of a humane intelligent information society should be implemented from three perspectives: technology, industry, and society.

Table 3-2 | The Implementation of Strategic Tasks for the Realization of Humane Intelligent Information Society

	Technology	Industry	Society
Objective	Establish world-class infrastructure for Intelligent IT	Promote the application of Intelligent IT to all industries	Take proactive steps to reform and strengthen the social support system
Policy Focus	· Strengthen technologies and data as sources of competitiveness · Develop networks that ensure secure access to data	· Drive private-sector innovation based on public-sector examples · Concentrate support on industries with the potential for significant ripple effects (e.g. medicine and manufacturing)	· Reform the education, employment, and welfare policies that form the social basis for Intelligent IT · Reinforce countermeasures against pending issues (e.g. cyber threats and ethical concerns)
Tasks	· Generate value from data, the source of future competitiveness · Develop infrastructure for Intelligent IT · Establish a super-connected networking environment centered on data and services	· Proactively apply Intelligent IT to public services · Support private-sector innovation by forming ecosystems for Intelligent IT industries · Generate new value through intelligent healthcare services · Ensure the digital innovation of manufacturing	· Achieve innovation in education for the future · Proactively manage automation and the diversification of employment types · Strengthen the social security net in response to the rise of the intelligent information society · Reform laws and ethics to ensure harmonious human machine coexistence · Counter downsides (e.g. cyber threats and AI failures)

Source: Ministry of Science and ICT (MSIT), compiled by III-MIC, October 2018

3-3 ▶ Singapore

The Singapore government has invested SGD 4.5 billion (USD 3.28 billion) into the Industry Transformation Programme (ITP) since 2016 to help 23 industries under six clusters of manufacturing, built environment, trade and connectivity, essential domestic services, modern services and lifestyle for economic transformation. Counseling services are provided through guiding the transformation of enterprises, exploring new technologies, and strengthening professional skills of personnel. In 2018, more counseling services will be available for training, certification, counseling a group of Professional, Managers, Executives and Technicians (PMET), and with the SMEs, responsible for the digital transformation of project management to achieve maximum synergies in the digital transformation.

3-3-1 ▶ The Government Set Up an Inter-agency Working Group to Cooperate with the Industry

Under the Industry Transformation Program, Singapore launched the Industry Transformation Maps (ITMs) in March 2016 for 23 industries under six clusters with an aim to create 13,000 new PMET jobs and employ more than 210,000 workers for the Infocomm and Media (ICM) sectors by 2020. To achieve this, the ITM has initiated three strategies:

(1) Guide enterprises and workforces from the other sectors in adopting digital technology: For instance, the Info-communications Media Development Authority's (IMDA) SMEs Go Digital program is designed to provide a more structured support for SMEs to harness digital technologies and promote innovation across departments.

(2) Use forward-looking technology to open up new areas: Promote growth through forward-looking technologies such as information security, AR/VR, Internet of Things, AI and data analysis, and build agile AI ecosystems and leading artificial intelligence centers;

(3) Strengthen ICM professionals and company's core strengths: providing ICM skills training to the people and developing new market opportunities with strategic partners.

3-3-2 ▶ Singapore SMEs Go Digital Program

SMEs contribute nearly half of Singapore's GDP and employ two-third of the country's workforce. Therefore, the Info-communications Media Development Authority (IMDA) proposed the SMEs Go Digital program in 2017 to provide a more structure support and resources for SMEs to harness digital technologies, including manpower, consultancy services, and rising standards. The Singapore government launched the SME Go Digital program, which aims to help SMEs transform, increase productivity, manage corporate costs, find new profit opportunities and expand operations.

Since May 2018, the government has been responsible for conducting programs and plans to drive digital transformation of SMEs through training, certification, counseling PMETs, and cooperating with SMEs. For instance, the IDP (Industry Digital Plan) is designed to assisting SMEs from five perspectives:

(1) Digital Roadmap: Understand the digitalization readiness within enterprises and improve employees' digital skills;

(2) Digital Consultancy: Seek clarity in the digitalized journey with basic advice or in-depth consultancy;

(3) Digital Solutions: Select pre-certified digital solutions to achieve the digitalization goal;

(4) Digital Sector Projects: Participate in the pilot projects led by the industry leaders;

(5) Digital Project Management Services: Implement digital solutions and digital project management services to maximize outcomes.

The Singapore government's approach is to assist the domestic digital solution providers while solving and addressing problems for SMEs to achieve a win-win and balance the domestic supply and demand.
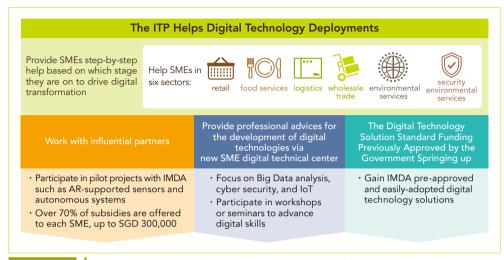
Figure 3-2 | Strategic Measures under Singapore's SMEs Go Digital

Source: IMDA, compiled by III-MIC, October 2018

3-4 ▸ United States

The US government has a 40% increase its investment in non-confidential AI R&D since 2015. In the fiscal year 2017, it invested about USD 2 billion in AI-related technology in 2017 (excluding the Pentagon). The White House plans to prioritize the funds toward AI such as autonomous systems, computing infrastructure, and machine learning, to combine the power of industry, academia, and government to develop AI.

3-4-1 ▸ The Government Increases the AI Budget and Relaxes Supervision

In a meeting initiated by the Office of Science and Technology Policy (OSTP) in May 2018 and chaired by Michael Kratsios, the chief technology adviser of the US President, the participants hoped that the US government could invest more to ensure the United States to continue leading the way in AI technology while at the same time resisting potential threats from China.

The US government is already aware that AI is highly related to military and industry competitiveness. The Deputy Technical Director of OSTP also pointed out it is necessary for the United States to stay ahead in the AI, and the industry also calls on the government to pay more attention to AI, saying that the US is losing its advantage. Since AI technology plays a key role in the next battlefield, many countries have increased their investments. United States Department of Defense (DoD) has concerns that the competition between AI platforms and applications may become a new AI arms race.

The White House program prioritizes AI R&D in areas such as autonomous systems, computing infrastructure, and machine learning. The US government will also reduce regulatory barriers to support the

use of AI in military and civilian activities, allowing AI developers to access information from the US national laboratory network and extract information from taxpayers without violating privacy rights and national security.

3-4-2 ▶ The Government Set Up an Inter-ministerial Group and Cooperated with the Industry

The US government reached a number of policy consensuses and announced achievements at the Summit on Artificial Intelligence for American Industry.

Table 3-3 Key Takeaways from the AI Summit

Consensus	Selected Committee	Objective
Select Committee on Artificial Intelligence (hosted by the National Science and Technology Council)	OSTP, National Science Foundation, the Office of Management and Budget, the Office of the Federal Chief Information Officer, National Security Council, and the Defense Advanced Research Projects Agency.	Help coordinate the development and use of AI between the Federal Government, industry, and academia to support AI R&D efforts.
Establish Joint Artificial Intelligence Center	DoD (Department of Defense), DIUx (Defense Innovation Unit Experimental)	Develop partnerships with the industry to integrate resources for DoD and intelligence systems, and hundreds of AI-related R&D efforts currently underway to accelerate the deployment of AI tools.
Encourage participation of big names	Amazon, Facebook, Google, Intel, Microsoft, Bank of America, Boeing, GE, Ford, Goldman Sachs, and Walmart, etc.	Encourage the participation from diverse industries to achieve a certain degree of balance in the composition of enterprises.

Source: Summit on Artificial Intelligence for American Industry, compiled by III-MIC, October 2018

3-4-3 ▶ Eliminate Shocks and Doubts

Summit on Artificial Intelligence for American Industry has outlined various ways to improve AI development in the United States, including the creation of many robotic startups in Pittsburgh. This can be a positive teaching material on how to make up for the loss of job opportunities due to the automation process. To increase employment opportunities will be the final desired outcome. For example, robotic startups are now hiring engineers, scientists, accountants and executives, meaning that the AI industry will not directly lead to large-scale unemployment. In addition, OSTP will soon announce a five-year strategic plan to improve Science, Technology, Engineering, and Mathematics (STEM) education. The main goal is to increase the size of future AI R&D personnel. The emergence of AI has brought the unexpected increase in job demand.

3-5 ▶ European Union

The European Union (EU) recently has promoted the development of emerging technologies such as AI, 5G, autonomous vehicle, and blockchain. Taking advantage of the power of the member states and

agreements signed thereof, the EU aims to revise out-of-dated regulations for the provision of comprehensive systems and optimal environments to develop relevant industries while stimulating economic growth.

3-5-1 ▶ Planning and Formulation of Blockchain Standards

The European Commission (EC), which intends to become a global blockchain hub, announced the establishment of the EU Blockchain Observatory and Forum, with a purpose of collecting blockchain-related information, monitor and analyze relevant trends to facilitate blockchain technology development in the Europe. To drive the progress of the European financial technology industry and to prevent the impact from the Brexit, EU stated in early 2018 that it plans to develop a common blockchain technical standard and simplify the authorization and registration system of the EU's national financial technology sector.

The EU believes that blockchain technology is promising in finance and other areas, but it must regulate cryptocurrencies. For example, Steven Maijoor, chairman of the European Securities and Markets Authority, said that the initial coin offering (ICO) lack of regulatory protection and thus has a relatively high risk. In addition, the degree of development of blockchain technology in member states will lead to difficulties in the formulation of common standards. For example, Germany and Switzerland have relatively fast pace in the development of blockchain technology, but if they wait for the rest to keep up, it will slow down the EU's development in this area.

3-5-2 ▶ EU Launches "Coordinated Plan on AI" and Regulatory Initiatives Promote Data Openness

In anticipation of the hike in commercial value of AI in the future and in response to many social challenges arising from the rise of AI technology, the EC is trying to raise relevant expenditures, encourage private and public investments, and develop standards and governance frameworks to ensure the ethical use of AI and data by the end of 2018. "Coordinated Plan on AI" is expected to be launched before the end of 2018, and through cooperation with the 28 member states of the European Union, it aims to maximize the investments to national levels, encourage synergies and cooperation across the EU, exchange best practices and collectively define the way forward to ensure the EU as a whole can compete globally in the AI space.

Figure 3-3 ┤ Global Commercial Value Related to AI, 2017-2022 (in USD Trillion)

Source: Gartner, compiled by III-MIC, October 2018

In terms of law and ethics, the EC is to present ethical guidelines on AI development by the end of 2018, based on the EU's Charter of Fundamental Rights and taking into account principles such as data protection and transparency, and building on the work of the European Group on Ethics in Science and New Technologies. It is set to invest about 20 billion euros before the end of 2020 for "AI research and innovation", including public and private institutions. Moreover, an additional 1.5 billion euros will be invested under the framework of the Horizon 2020 project between 2018 and 2020 with an aim to attract 2.5 billion euros from existing public or private partners. The EC is also considering using the European Fund for Strategic Investments to provide additional investment and support for companies and startups in AI-related projects. The total investment in key areas will exceed 500 million euros by 2020.

To stimulate the development of AI, the EC also considers open access to data, such as public sector data for use, and is also committed to creating relevant measures to simplify data sharing, including a new set of recommendations for sharing scientific data, guiding public and Private units carry out data sharing and cooperation, as well as data sharing between enterprises. Other related issues are also listed as priority development projects, such as enabling EU citizens to securely access their own health data and supporting multinational services; personalizing medical care through the EU's data infrastructure; and enabling researchers and other professionals to collect related resources, including data, storage capabilities, expertise and computing, while protecting data privacy rights of EU.

3-5-3 ▶ Formulating a Technical Policy and Aiming to Begin Fully Automatic Driving in 2030

With the continuous development of autonomous driving technology, the EU announced that the new goal is that most of the new cars can have a networking function in 2019. By 2022, all new models can be connected to the network, and the models that do the autonomous driving at a low speed will hit the market prior to 2030. The car will then goes on sale and enter the era of fully automatic driving society in 2030.

At present, most countries' traffic safety regulations are based on the Geneva Convention on Road Traffic signed in 1949. The monitoring obligation of civilized driving is completely incompatible with autonomous driving technology. If the road traffic law is not revised, it will be difficult to test on the general road. Therefore, the EU has formulated a revised policy on road traffic for all member states this year, so that countries can carry out legal revisions. It is hoped that before 2021, 11 new safety systems such as automatic emergency vehicles will be installed in EU countries. And the installation of the driving recorder will be compulsory in order to promote the sale of autonomous vehicles from 2022.

⊕ 3-6 ▶ China

The Chinese government has declared the direction of national strategic development and Chinese president Xi Jinping said in a speech that "A new generation of technology represented by artificial intelligence, quantum information, mobile communications, internet of things and blockchain is accelerating breakthrough applications" and emphasized the need for China to focus on technological development and become the global center of science and technology.

3

Chapter 3. Countries Learning from Each Other to Gear Up for Competitiveness —
How International Policy Responds to Social Needs

3-6-1 ▶ Blockchain is One of the Strategic Industries of China

As early as October 2016, the Ministry of Industry and Information Technology (MIIT) has released the "2016 China Blockchain Technology and Application Development White Paper". In December of the same year, the blockchain was included in the "13th Five-Year Plan." Recently, blockchain technology will be integrated with "Made in China 2025" and the Internet to become a national strategic industry. Once listed as a national strategic development industry, it will be fully supported by the government. Therefore, it is expected that China's blockchain industry will receive a series of government resources including policies and subsidies to promote the overall industry.

Although China affirms the widespread use of blockchain technology, it also cracks down on cryptocurrency and ICO by prohibiting any ICO and cryptocurrency transactions, and forcing all websites involved in cryptocurrency transactions to shut down. In addition to the illegal public financing of ICO, any illegal activities such as the suspected of illegally selling tokens, illegal issuance of securities, illegal fund-raising financial fraud may result in financial risks and cause worried as there are investors or companies who use cryptocurrency to transfer large amounts of funds overseas and have difficulty to trace.

3-6-2 ▶ Industrial Internet of Things (IIoT) Sets the Direction of Development According to Local Industry Characteristics

The "Made in China 2025" is designed to transform China from a manufacturing giant to a world manufacturing power. In recent years, China has continued to promote many policies and incentives. The Ministry of Industry and Information Technology announced in June 2018 the latest development trend for future IIoT. With the continuous introduction of central industrial policies, the development of IIoT has gained more and more attention. The major manufacturing provinces including Shanghai, Beijing, Tianjin, Guangdong, Jiangsu, Zhejiang, Fujian, Anhui and other industries have also issued industrial development policies to accelerate the IIoT application industry. Based on the current situation and advantages of industrial development of various provinces and cities, the development directions can be more clearly defined.

Table 3-4 ┤ IIoT Important Local Industrial Policies

City	Planning Programs and Projects
Shanghai City	Shanghai Industrial Internet Industry Innovation Project Implementation Plan
Guangdong Province	Guangdong Province's Implementation Plan for Deepening Internet and Advanced Manufacturing Industry to Develop Industrial Internet
Zhejiang Province	Zhejiang Province's Implementation Plan for Deepening Internet and Advanced Manufacturing Industry to Develop Industrial Internet
Jiangsu Province	Organizing and Implementing 365 Project of Industrial Internet Innovation and Development in Jiangsu Province

Source: Local Economic and Information Technology Commissions, Shanghai Municipal People's Government, compiled by III-MIC, October 2018

China's local governments plan for the next phase of IIoT development, and also develop a "path plan" based on their respective industry status and characteristics to be in line with local needs. For example, the Jiangsu Province focuses on six advanced manufacturing clusters: new energy equipment, construction machinery, Internet of Things, biomedicine and new medical equipment, core information technology, automobiles and components, and aims to build 50 standard projects by 2020 to enhance the competitiveness of the industry.

3-6-3 ▶ Establishing Parks and Fostering Enterprises to Promote the Development of AI Industry

Through the "Made in China 2025," China has vowed to improve its research and development capabilities in innovation and technology, and AI prospects are promising. Since the 1980s, Zhongguancun, located in Haidian District, Beijing, has transformed into a high-tech R&D center from a suburb that was originally known for its higher education and scientific research. Now Zhongguancun is the cradle of many technology companies and has developed many smart solutions. There are more than 1,000 companies in Zhongguancun, 56% of which are start-ups. The industry covers retail, medical care, education, services and the automotive industry, and is known as China's Silicon Valley. The successful transformation of Zhongguancun demonstrates China's determination to develop a world-class technology industry.

In terms of enterprises, the three giants of technology industry: Baidu, Alibaba, Tencent (also known as BAT) and JD.com, are actively developing creative hubs and investing billions of yuan in funds for AI projects. On the government side, the Beijing government has also actively funded the development of AI technology. In 2017, the Ministry of Science and Technology of China announced that it had commissioned BAT and AI voice recognition technology leader iFlytek to build an AI-based open innovation platform for various fields; in January 2018, it announced an investment of USD 2.1 billion to set up a new AI industrial park on the outskirts of Beijing.

3-7 ▶ Thailand

In 2016, the Thai government presented an economic reform program, called Thailand 4.0, which targets 10 industries; prioritizes the development of the Eastern Economic Corridor (EEC) to build strong connections to its ASEAN neighbors by land, sea and air; providing corporate tax exemption to attract foreign investment to drive the economic upgrade and transformation in Thailand.

3-7-1 ▶ Accelerating the Digital Transformation of Government Agencies

In recent years, the Thai government has aggressively promoted the digital transformation policy Thailand 4.0. In the near future, the government has set up a committee to promote digital infrastructure such as big data, data centers and cloud computing. The participating institutions cover 20 public entities, including the national economy of Thailand. The National Economic and Social Development Board and the Electronic Government Agency of Thailand will adopt digital transformation strategies at the faster pace. Its purpose is to manage the data and information collected by public agencies to assist the government in making future decisions, promoting the digital transformation of Thailand 4.0, and reducing operating costs.

3

Chapter 3. Countries Learning from Each Other to Gear Up for Competitiveness —
How International Policy Responds to Social Needs

3-7-2 ▶ The Central Bank Develops Digital Currency

Governor of the Bank of Thailand Veerathai Santiprabhob said in July 2018 that the bank has been dedicated to developing the application of blockchain technology for cross-border financial flows and licensing. The first phase of the bank's digital currency verification trials are set to complete by March 2019. This aims to make inter-bank transactions with digital currency easier so as to increase the efficiency of Thailand's financial market infrastructure. The bank has been launched a project in cooperation with eight financial institutions in Thailand to create a digital currency on R3's Corda open-source platform. to help achieve domestic transfers in Thailand. In addition, the bank will pay more attention to the adoption of digital payments to improve electronic payment transactions.

3-7-3 ▶ Establishing Several New "True Digital Park"

Thanasorn Jaidee, president of True Digital Park, a large digital campus built by Thailand's largest telecommunications group True Corporation said that Thailand's 4.0 policy and the Eastern Economic Corridor will enable the rapid advancement and deployment of new technologies in Thailand. True Digital Park was founded to become be the country's first Government Digital One-Stop-Service Center to provide government assistance to start-ups and corporate tenants. With an area of 77,000 square meters, it will likely to be the largest digital park in Southeast Asia and officially open in the fourth quarter of 2018.

3-7-4 ▶ Ratio of Enterprises Exploring and Implementing IoT Solutions

Thai companies rank first in ASEAN as they spare no efforts to explore and implement IoT solutions in order to increase productivity and innovation. This should be attributed to the efficient provision of government policies and investment incentives for software and hardware infrastructure. The Asia IoT Business Platform conducted a survey and the findings suggest that up to 89% of companies in Thailand had explored and implemented IoT solutions in 2017. Thailand had the highest ratio among ASEAN countries, followed by Malaysia, Indonesia, the Philippines and Vietnam. The ratio of Thailand's exploration and implementation of IoT solutions in 2018 has risen to 92%, and manufacturing industry accounts for the highest proportion of total industrial value at 27.4%, and the adoption and deployment of IoT solutions is an essential transition to the new economy.
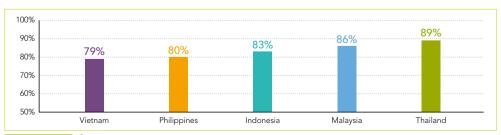
Figure 3-4 ┤ Ratio of Companies Exploring and Implementing IoT Solutions in the ASEAN Region in 2017

Source: Asia IoT Business Platform, compiled by III-MIC, October 2018

🌐 3-8 ▸ Summary

By summarizing and comparing several innovative economic policies of several countries of the world and important trends of major players, how governments around the world have supported their key tasks or have increased budgets for digital translation projects in AI, 5G, and blockchain. The talent cultivation and attraction are extremely important.

For example, China will invest a great deal into AI, robots, and blockchain. The EU focuses on building a digital Europe, enabling member states to reach agreements and cooperation on AI, blockchain, autonomous driving and 5G to spur the development of key emerging technologies. The United States is investing more resources in the AI industry in order to maximize the potential of AI by combining resources from industry, academia, and government sectors. For instance, OSTP will improve STEM education. During the government and industrial transformation, Taiwan needs a new kind of thinking towards innovation. The national communication policy of the abovementioned countries has demonstrated their ambitions to conduct digital transformation and smarten up major science and technology policies. These should have profound influence on Taiwan's major initiatives such as Digital Nation & Innovative Economic Development (DIGI⁺) program, digital construction, and AI Taiwan AI Action Plan.

DIGI⁺ Taiwan —
Toward a Smart Sustainable Human-centric Nation

Promotion Programs ▶ ▶ ▶

Digital Nation & Innovative Economic Development Program (DIGI⁺)

- DIGI⁺ Program
  - DIGI⁺Infrastructure
  - DIGI⁺Talent
  - DIGI⁺Industry
  - DIGI⁺Right
  - DIGI⁺Cities
  - DIGI⁺Globalization
- 5+2 industrial innovation
  - Asian Silicon Valley, Biomedical, Green Energy, Smart Machinery, National Defense
  - New Agriculture, Circular Economy

AI Taiwan

AI Talent Program, AI Pilot Project, AI International Innovation Hub, Open Test Fields and Regulations, AI for Industrial Innovation
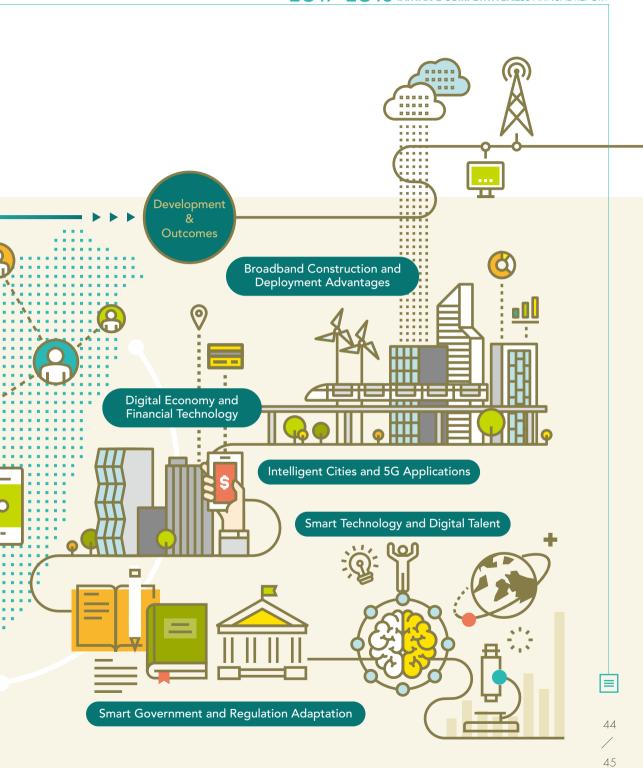
Forward-looking Infrastructure Development Program — Digital Infrastructure

Network Security, Broadband Construction, Content Construction, Service Construction, Talent Cultivation

Promotional Initiatives of Service-centric Government

- Development of cross-domain one-stop integration services
- Creation of a multi-collaborative environment

Development & Outcomes

Broadband Construction and Deployment Advantages

Digital Economy and Financial Technology

Intelligent Cities and 5G Applications

Smart Technology and Digital Talent

Smart Government and Regulation Adaptation

Chapter 4. DIGI+ Taiwan — Toward a Smart Sustainable Human-centric Nation

Taiwan faces the changes in the economic and social structure and encounters challenges associated with aging society, low birth rate, energy crisis, resources depletion, and environmental pollution, and cannot only imitate the German government's "Industry 4.0" which focuses on manufacturing development and the US government's "Advanced Manufacturing." Instead, Taiwan should also take into account Japan's "Society 5.0" that concentrates on balancing economic development and solves social issues by utilizing technological innovation to solve the problems and challenges that it currently encounters. Based on the advanced technologies for the Fourth Industrial Revolution (Industry 4.0) such as IoT, Big Data, AI, and Robotics, cross-domain integration will be applied to social life with science and technology policy support of the government to implement innovations for the future society. This will achieve new values and new services in Taiwan's industry and change people's lives with improved quality and convenience. For this reason, the Taiwan government has promoted a program named DIGI+ which is short for Development, Innovative, Governance, and Inclusive Plus which is designed to transform Taiwan into a digital nation and innovative economy from 2017 to 2025. This program not only aims to enhance the competitiveness of the industry but also to improve the convenience of people's life and solve the problems existing in the current society to make a human-oriented intelligent society a reality.

Figure 4-1 Toward a Smart Sustainable Human-centric Nation with DIGI+ Program

Source: Office of Science and Technology, Executive Yuan, October 2018

The DIGI+ program has succeeded in implementing into five major smart living applications: 5G Development Strategy, Digital Learning, Digital Rural Education, Smart Government, and Smart

Township. Similar to "Society 5.0", the DIGI[+] is able to respond changes in social, economic and industrial structures to help improve people's living environment, develop technologies, and ultimately transform itself into a digital industry before being exported to overseas. In response to future trends, the DIGI[+] program will respond flexibly to domestic and international situations while continuing to consolidate the resources of the central and local governments, as well as the private sector, to promote interdisciplinary communication. The government's actions in adjusting laws and regulations, program planning and implementation, and policy guidance are summarized as follows.

4-1 ▸ Taiwan's Telecommunication Policy Promotions

4-1-1 ▸ Digital Nation & Innovative Economic Development Program (DIGI[+])

Proposed by the Executive Yuan of Taiwan in 2016, the DIGI[+] program is designed to transform Taiwan into a digital economy and to continue former development programs. Through the construction of fundamental infrastructure, the government aims to strengthen the regulatory and talent cultivation environments by building a digital innovation ecosystem and expand the scale of the digital economy and, ultimately, achieve a vision of becoming a high-value digital nation. Aligning with the national policy directory "Digital Nation, Smart Island," the DIGI[+] program is intended to "develop a network-active society, promote high-value innovation economy, achieve a rich digital nation." The goal is to create a reliable digital environment, provide digital government services, protect the rights of individuals within society's network and ensuring digital innovation is introduced to the industries.

Key development strategies of DIGI[+] program include: Constructing a digital environment that benefits digital innovation (DIGI[+]Infrastructure), deepen and enhance previous R&D in acquiring independent technical solutions (DIGI[+]Innovation), create a cross-domain digital talent development platform (DIGI[+]Talents), adjust digital innovation regulations of a digital nation (DIGI[+]Regulations), prompt digital innovation to support industry transformation and upgrading (DIGI[+]Industry), boost digital economy development through the software and hardware integration (DIGI[+]Globalization), encourage youth entrepreneurship and SME re-entrepreneurship (DIGI[+]Incubation), implement "broadband human rights", achieving an open government and inspire internet social energy (DIGI[+]Governance), and collaborate with local government to build smart cities and strength regional innovation (DIGI[+]Cities).

To achieve a vision of becoming a high-value digital nation, the DIGI[+] program has set out three major indicators: "Active Internet Society", "Innovative Digital Economy", and "Advanced Broadband Environment."

(1) **Active Internet Society:**

- By 2020, the digital living service adoption of the general public will reach 60% and further reach 80% by 2025.

- By 2020, Taiwan hopes to acquire top 12 of the global national e-competitiveness ranking and reach top 6 by 2025.

(2) **Innovative Digital Economy:**

- Digital economy is estimated to contribute 25.2%, or NTD 4.8 trillion, of Taiwan's GDP in 2020, up from 20.3%, or NTD 3.4 trillion in 2015 and expected to reach 29.9%, or NTD 6.5 trillion, in 2025.

- Production value of digital software economy will increase from NTD 1.1 trillion in 2015 to USD 1.7 trillion in 2020 and further to NTD 2.9 trillion in 2025.

(3) **Advanced Broadband Environment:**

- By 2020, broadband internet is to reach speeds from the current 100Mbps to 1Gbps (with 90% internet coverage), which is 10 times faster; by 2025, the speeds are to reach 2Gbps (with 90% internet coverage).

- By 2020, Taiwan is set to make the "broadband human rights" a reality while ensuring disadvantaged people have the access to 10Mbps broadband services and further to 25Mbps by 2025.

By implementing the DIGI⁺ program, Taiwan has been able to accelerate its digital economy developments, allowing Taiwan to transform from a manufacturing- to an innovative-centric ecosystem to become a digital government. With higher levels of informatization and intelligence, Taiwan aims to give its people better lives while building an equal and active internet society, and sustainable and active intelligent cities through digital economic development and digital construction.

4-1-2 ▶ AI Taiwan

With the maturity of technologies like Big Data, cloud computing, machine learning, and speech recognition, the development of AI has become a trend that cannot be overlooked. In July 2017, the Executive Yuan held the "Smart Systems and Chip Industry Development Strategy Conference." A total of 500 domestic and foreign representatives from the industry, government, academia, and research sectors participated in the event. Based on opinions from various sectors, the Executive Yuan aims to promote plans to facilitate the industry in overcoming AI challenges.

In terms of strategy, five action plans have been proposed and implemented aligning with 5+2 industrial innovation, forward-looking infrastructure, and smart city projects to jointly promote smart technology applications. Five action plans are as follows:

(1) **AI Talent Program:** Cultivate, train, and attract AI talent. By cultivating 1,000 elites, training 10,000 pioneers, and attracting global talent in AI to ensure Taiwan has sufficient AI talent.

(2) **AI Pilot Project:** Focus on research areas that have niche advantages. Adopt open competitions and announced selection methods in selecting domestic or foreign teams to carry out execution. By combining advanced research, talent cultivation and scientific research projects, we will establish an integrated mechanism with enables information sharing, horizontal communication and vertical integration, which can be used to shape Taiwan's AI advanced research network.

(3) **AI International Innovation Hub:** Foster over 100 AI startups to develop international AI innovation clusters by encouraging international and local collaboration and leading brands to set up R&D centers in Taiwan.

(4) **Open Test Fields and Regulations:** Open fields that encourage AI application testing, forming an ecosystem which allows free flow of open data, while accelerating adjustments of relevant regulations.

(5) **AI for Industrial Innovation:** Establish an AI innovation and demand-driven matching platform to provide talent training and matching services for 5+2 industrial innovation; establish a better AI environment to drive AI-based innovation and transformation in SMEs and help the industry solve issues.

"AI Taiwan" program is an initiative designed to strengthen Taiwan's existing advantages and uses hardware as economic driving force and software as pulling force in combining the momentum from international partners to help Taiwan become a hub for global smart technology and innovation. This will ensure Taiwan to have a front-mover advantage and opportunity in the next wave of intelligence revolution in pushing Taiwan to the higher levels of economic development. Through consolidation resources from all sectors, "AI Taiwan" program aims to achieve three main objectives:

(1) Taiwan aims to cultivate 1,000 high-end AI talents to develop AI technology by 2021, alongside 10,000 pioneers to broaden AI application in different industries.

(2) use the AI Pilot Project to promote AI on Device, allowing Taiwan to become top 3 AI chip manufactures in the world.

(3) the promotion of talent and industry cultivation has helped Taiwan achieve number one in specific AI application industry sectors.

Table 4-1 ┤ AI Taiwan's Five Action Plans and Strategies

Action Plan	Strategies	Unit In-charge
AI Talent Program	Cultivating smart technology elites	Ministry of Science and Technology (MOST), Ministry of Education (MOE), Ministry of Economic Affairs (MOEA)
	Training smart technology pioneers	MOST, MOE, MOE, Ministry of Labor (MOL)
	Attracting global AI talent	MOEA, MOST
AI Pilot Project	Focus on research and discover niche advantages	Office of Science and Technology, MOEA
	Develop world-class advanced AI research network	MOST, MOEA, National Center for Cyber Security Technology (NCCST), MOE
AI International Innovation Hub	Foster 100 AI-related startups	MOEA, MOST
	Develop international AI clusters	MOEA, MOST
Open Test Fields and Regulations	Open fields and data for testing	MOEA, MOST, Environmental Protection Administration (EPA), Ministry of Transportation and Communications (MOTC), Ministry of Interior (MOI)
	Research and analyses in AI related laws and regulations	National Development Council (NDC), BOST, Relevant ministries and departments
AI for Industrial Innovation	Match 5+2 industrial innovation with AI talents	MOEA, MOST, NDC, Council of Agriculture (COA), MOE, MOL
	Enable AI-driven innovation in SMEs	MOEA, MOST

Source: Digital Innovation & Governance Initiative (DIGI⁺) Committee, Executive Yuan, compiled by III-MIC, October 2018

4-1-3 ▶ Forward-looking Infrastructure Development Program-Digital Infrastructure

Amid the growing popularity of digital technology, the interaction between people and machines will be increasingly frequent. With such relationship in existence, the government can provide a fair digital environment which allows the public to enjoy convenient digital services without being affected by individual-specific conditions. With the concept of resource allocation and shared prosperity in mind, it is necessary to first consider urban-rural differences to ensure that future construction can effectively improve the comfort, convenience, and security of people's lives.

The positioning of digital construction is to accelerate the construction of domestic infrastructure required in a superfast broadband network society, build civic and public networks to improve the quality and safety of people's lives and promote the development of digital cultural and creative industries to achieve the ultimate goal of the DIGI⁺ program. In the realization of a superfast broadband society and a smart country and becoming a global digital paradigm, the following five priorities of action have been set:

(1) **Promote network infrastructure security and provide secure network services – Network security:** Improve national information environment safety to ensure the security of the country and its people.

(2) **Complete digital inclusion to protect human rights using broadband services – Broadband construction:** To ensure that vulnerable populations have access to basic network bandwidth and cloud resources.

(3) **Development of the digital culture and creativity industry and popularization of high-quality services – Content construction:** Driving the digital culture and creativity industry into a trillion industry.

(4) **Establishing an open government and intelligent city services – Service construction:** The widespread adoption of smart services to improve the quality of people's lives.

(5) **Building the next generation scientific research and smart learning environment – Talent cultivation:** Everyone should have access to innovative digital learning environments.

| Table 4-2 | Five Main Pillars of Digital Infrastructure |

Pillar	Project Name	Scheduled Period	Unit In-charge
Network Security	Establishment of green energy cloud datacenter for civil servants and teachers	2018-2021	NDC, MOE
	Enhancement of information security and regional defense for entry-level civic servants	2017-2020	NCCST
	Enhancement of disaster prevention and mitigation mobile communication infrastructure	2017-2020	National Communications Commission (NCC)
	Enhancement of National information security infrastructure	2017-2020	NCCST
Broadband Construction	Network enhancement for rural health clinics and patrolling medical centers	2017-2020	MOHW
	Rural broadband network prevalence	2017-2020	NCC
	National broadband network prevalence	2017-2020	MOE, MOI, MOEA
Content Construction	National memory database and digital value-added applications	2017-2021	MOC, National Palace Museum, Academia Historica
	Promotion of foresight infrastructure plan for high resolution TV content	2017-2020	MOC
	New media cross-platform content production	2018-2021	MOC
Service Construction	Prevalence of intelligent city applications	2018-2020	MOEA
	Public civic IoT construction	2017-2020	EPA, MOTC, MOST, MOEA, MOI
	Somatosensory Technology Base – Somatosensory Park Project	2018-2021	MOEA
Talent Cultivation	Establishment of smart campus network	2017-2020	MOE
	Enhancement of digital teaching and application environment of information learning	2017-2020	MOE
	High-school academic network optimization and bandwidth improvement	2017-2020	MOE
	Establishment of cloud services and big data computing platforms	2017-2020	MOST
	Self-built, high-end instrument equipment and service platform	2017-2020	Academia Sinica, MOST, MOEA
	Smart robot innovation self-building base	2017-2020	MOST

Source: Executive Yuan, compiled by III-MIC, October 2018

4-1-4 ▶ Promotional Initiatives of Service-centric Smart Government

Since 1988, Taiwan has engaged in the promotion of digital transformation for 20 years. Amid the development of digital technology, interaction between people and the government has changed. Therefore, the government must actively address changes and implement appropriate responses. The mid-term plan- "5th Phase e-Government Program-the Digital Government" proposed by the National Development Council focuses on utilizing big data collected from the clouds the Internet of Things to improve the government's services and become a pioneer among global digital governments.

The National Development Council will use the Executive Yuan's overall planning of the DIGI⁺ program as a guide to transform the "5th Phase e-Government Program" into a "Smart Services Government Promotion Plan", in order to meet the needs of the people and provide a more secure and convenient living environment while enhancing national competitiveness.

This phase will use value of data to expand the depth and scope of public services, integrate information services, and implement transparent governance. The two major strategies promoted under this project are as follows:

(1) Development of cross-domain one-stop integration services:

- Professional decision-making: public-private partnerships collect the wisdom of the people, and analyze the huge amount of data to make wiser decisions.

- Service integration: Provides a government service portal with a unified operation method and enhances the digital service quality across all government offices.

- Data activation: Use personal data safely to provide more convenient and personalized services.

Table 4-3 ┤ Promotional Strategy #1 of Service-centric Smart Government

Strategy #1: Develop Cross-field One-stop Integrated Services	
Professional Decisions	Pubic-private cooperation to gather public wisdom 1. Establish a team of experts and scholars in the specific fields 2. Provide one-stop guidance services for internal affairs, commercial and labor affairs, financial reporting, social welfare, and medical care 3. Each year select three or more digital service scenarios to facilitate the revamping of service processes
	Big data analysis to help good decisions take shape 1. Government affairs decision-making: Consolidate the business information collected from the Executive Yuan and affiliated ministries to integrate with social media data ad research data to improve the quality of a decision 2. Environmental sustainability decisions: Real-time surveillance to monitor environmental data to accurately analyze environmental changes or pollution trends. 3. Industry development decision-making: In response to Taiwan's political promotions of green electricity and e-commerce, business data of the MOEA is used as a basis to combine with government's open data to explore new opportunities from the emerging industries. 4. Human Resources Training Decision-making: Promote the appropriate use of talent by recruiting them via the public servant recruitment method
Service Integration	Develop digital services which can ensure front-end unity and back-end integration, in addition to being able to integrate the resources of government agencies and being able to provide the public with convenient and quality service procedures through one-stop site entry.
Data Activation	Provide the public with data autonomy for better efficiency 1. Offer downloads for virtual integration: Integrate personal information and public service information related to personal life, scattered at various agencies to provide a more convenient and secure personal services. 2. Provide accurate digital services: With the consent of the public, the government or non-government institutions can use the public information to provide online consultation services and provide people-oriented convenient services

Source: NDC, compiled by III-MIC, October 2018

(2) Creation of a multi-collaborative environment:

- Data governance: Establish complete data application specifications based on data, circulation, information, and service aspects.

- Open collaboration: Through central-local one-stop integration service platform to combine with national collaboration to enhance data value.

- Public participation: Information technology is applied to democracy politics and to promote a platform service across agencies and departments.

Table 4-4 ⊣ Promotional Strategy #2 of Service-centric Smart Government

Strategy #2: Create a Multi-collaboration Environment	
Data Governance	Establish comprehensive data application specifications from data, circulation, information, and service aspects to promote the exchange efficiency across platforms and enhance the value of disclosed information to further streamline the quality of government services; after de-identification of personal data, big data applications will be provided while safeguarding the personal data of the people to optimize government administration and personal data of the people to optimize government administration.
Open Collaboration	Emphasize national collaboration, enhance data quality and usage efficiency through the development of one-stop government services 1. Seamless connection of central and local services: Coordinate regional governments to assess internal sharing systems and external sharing services; establish a common business circle, assist central and local governments with data integration to promote service process transformation; provide counselling services to introduce quality information services to local governments such as care for the disadvantaged. 2. Data openness to encourage transparent governance: Establish a cross-ministry data standard working circle to promote data standards for 9 domains such as commercial, finance, and taxation; promote a common application interface as the default function of the government business; promote the quality of the government's data quality and standardization mechanisms by establishing data application evaluation measures and encouraging the innovative applications based on government data.
Public Participation	Information technology is applied to democratic politics to promote more diversified citizen participation with multiple channels and mechanisms 1. Implementation of digital opportunity surveys to shorten digital divide: Regularly conduct personal/household digital opportunity surveys to get a full grasp of the current situations of Taiwan's IT society and to establish a mechanism which allows long-term comparison with international ones, for government agencies to use as reference to assess and promulgate policy to shorten the digital divide 2. Nationwide participation in public policies through the internet: Promote inter-ministry, inter-agency, and country-county connectivity services; expand multiple channels for the public to take part and receive counseling services; complete network procedures and regulations for the digital participation of the public and build a comprehensive network environment that is friendly while encouraging public participation

Source: NDC, compiled by III-MIC, October 2018

🅰 4-2 ▸ Promotion of Taiwan's ICT Policy and Outcomes

4-2-1 ▸ Broadband Construction and Deployment Advantages

Infrastructure is an indispensable part as smartening up a nation requires comprehensive ecosystems. The Executive Yuan has actively promoted the improvement of broadband networks and talent cultivation. The goal of broadband network deployment is to cover 90% of home subscribers with speeds of 1Gbps by 2020 and of 20Gbps by 2025. The central and local governments continue to cooperate in the construction of broadband networks in public service and rural areas, so that each city can progress together and develop more rapidly, thereby accelerating Taiwan's goal of developing a digital economy and become an intelligent country.

Table 4-5 ┤ Broadband Construction Development and Outcomes

Key Tasks	Description and Outcomes
Public Services	• As of August 31, 2018, there were more than 9,100 iTaiwan internet spots with 4.87 million local broadband registers and over 1 million foreign broadband register; more than 330 million people accessed broadband services • As of July 31, 2018, there were 262 national libraries support online services with over 100Mbps uplink speeds • 45% of Taiwan's public high schools and vocational schools in 2018 provide broadband services
Rural Services	• In 2018, 50% of Taiwan's patrolling medical centers and health clinics have a network bandwidth of 100Mbps, providing health information systems and image transmission and storage services to strengthen the quality of health care in rural areas. By 2018, an outdoor wireless broadband environment supporting a network bandwidth of 100Mbps will be set up for 190 tribes in Taiwan, accounting for 25.8% of the total 737 tribes; The long-term nursery care will be integrated to help Taiwan's aboriginal people access health information and improve their health management capabilities
Infrastructure	• By 2020, 90% of Taiwan's households will achieve a Gbps-level broadband network coverage; as of August 31, 2018, the coverage rate was 50.6% (rural areas excluded). • Prevalence of broadband network infrastructure (Gbps-level for townships; 100Mbps-level for villages); As of September 31, 2018, 15 townships reached Gbps-level broadband construction

Source: Office of Science and Technology, Executive Yuan, compiled by III-MIC, October 2018

To demonstrate the determination to promote innovative technologies such as 5G, the government has proactively reviewed laws and regulations to create an environment conducive to the development of 5G and other digital innovations, simplified the 5G experiment application process, and relaxed the entry requirements for 5G experiment applications. The government announced the innovative utilization of spectrum following the confirmation of the "Frequency Supply Plan" while announcing that any experimental labs with eligible experimental testbeds and conditions can apply directly. Under Taiwan's Telecommunication Administration Bill, the restrictions that apply to telecommunications businesses will be lifted to encourage

market participation. Flexible spectrum management regulations encourage the development of innovative communication technologies and services. By removing the restrictions on network construction, enterprises can flexibly combine and set up networks according to their needs, while developing new technologies and equipment, and fulfill their cybersecurity protection obligations to ensure network security.

4-2-2 ▶ Smart Technology and Digital Talent

To stimulate the innovation and R&D of smart technology, and accelerate the innovation of "5+2" industrial innovation, the Executive Yuan passed the "AI Taiwan" program on January 18, 2018, which is implemented mainly by the Office of Science and Technology in cooperation with eight ministries such as the Ministry of Science and Technology (MOST) and the Ministry of Economic Affairs (MOEA). It is estimated that the government will invest a total of NTD 36 billion from 2018 to 2021 to ensure industry's demand for AI applications is met with a loose, open, and investment approach.

Table 4-6 ┤ AI Core Technology Development and Outcomes

Key Tasks	Description and Outcomes	Unit In-charge
Developing AI Core Technologies	The Promotion of the AI Pilot Project: Forming an AI on Chip project preparation team that gathers the experts from the government, industry, universities, and institutes to plan out the future AI chip development in Taiwan; setting out the scope for the 5+2 industrial innovation to first focus on the information security and healthcare; the Ministry will foster AI Innovation startups through the selections of research and development topics that meet the demands of the industry.	MOEA
	Semiconductor Moonshot Project: Selected 20 research teams and signed the LOI (Letter of Intent) with 62 companies including TSMC and MediaTek; set up three to four AI innovation research centers, and 2 advanced 3-nanometer technology node service platforms.	MOST
Building up AI Cloud Platforms	In June 2018, the government jointly set up an AI Cloud Platform with Asus, Quanta, and Taiwan Mobile. Through the one-stop integrated entrance, the platform provides AI calculation, big data analysis, and data storage management to support academic technology node and now its connection with industrial applications has	MOST

Source: Office of Science and Technology, Executive Yuan, compiled by III-MIC, October 2018

Digital interdisciplinary talent training, such as cultivating AI talent, will no longer be done using the traditional model which prepares teaching materials, trains seeds and then students before referring them to enterprises. If this model is continuously used, Taiwan's opportunities may be again falling behind others in the digital competition as the traditional model has been unable to meet the needs of enterprises and markets. Therefore, in the future, the cultivation of AI talent will adopt an innovative model which is to understand the needs of enterprises by directly discuss the problems faced by the industry with scholars and experts, and then identify countermeasures and perform personnel training.

| Table 4-7 | Digital Talent Cultivation Development and Outcomes | |

Key Tasks	Description and Outcomes	Unit In-charge
High-end Talent	• Create a top-notch AI R&D environment to facilitate local talent to connect to the world; in June 2018, signed a MOU separately with NVidia and Synopsys for technical cooperation and training; currently is negotiating with NVidia about cooperation on autonomous vehicles • Has set up 4 AI innovation research centers; in April 2018, Taiwan organized a bilateral exhibition to cultivate 270 graduates; in September 2018, Taiwan University and Stanford University signed MOU to open up a new chapter for biotechnology	MOST
Preliminary Talent	• 2018 university admission for information technology-related courses will include the computer programming capability as the pre-requisite at the first stage • Deepen the K -12 education to complete high school AI education materials in 2019; the teaching goal is to trigger logical and operational thinking using AI recognition technology for students to be interested in learning while connecting to university's talent cultivation program	MOE
Industry Talent	• Use a training mechanism that focuses on industry issues and problem solving capability of talents; based on the demand created from the 5+2 industrial innovation, AI application talent is cultivated to develop AI solutions; as of September 15, 2018, a total of 69 talents from 32 businesses submitted their questions and a total of 50 questions were selected to form 28 problem-solving teams	MOEA
	• In May 2018, Taiwan AI Education platform was launched to connect with international and local AI MOOC programs.	MOE

Source: Office of Science and Technology, Executive Yuan, compiled by III-MIC, October 2018

In addition to talent cultivation, forward-looking technology needs to be connected with the global market. The Ministry of Science and Technology's trip to the United States to attract foreign investments was a successful one. For instance, it helped MEM Dental Technology to sign a technical exchange and cooperation memorandum with uLab Systems, an automated orthodontic treatment planning software company. It has also elicited foreign investments into Taiwan. For instance, it has attracted Aemass, a VR/AR startup company headquartered at Silicon Valley, to set up an R&D base in Taiwan. The company's portable 3D stereo video system can support VR/AR imaging technology to apply to various industries. The government has been assisting the company in accessing the resources of the Taiwan Tech Arena (TTA). In addition, the government has partnered with Richi Foundation on its Richi Entrepreneur platform initiative to help Taiwan's startups by connecting them with Boston's innovation ecosystem.

4-2-3 ▶ Digital Economy and Financial Technology

Amid the boom of the digital economy, it is a must to create a good investment environment for Taiwan to successfully transform into an innovation-driven economy. National Development Council

proposed the "Improving the Startup Investment Environment" initiative at the Meeting of Acceleration of Investment in Taiwan Project on November 14, 2017. It consolidated the specific practices from various ministries and called for "Action Plans for Improving the Startup Investment Environment," which was then approved by the Executive Yuan on February 22, 2018, and was jointly promoted by the National Development Council, the Ministry of Economic Affairs, the Ministry of Science and Technology, and other 12 ministries and commissions to encourage, support and foster the development of new startups to drive industry transformation. It is hoped that at least one unicorn start-up business will be fostered within two years, and that startup fundraising will grow to NTD 5 billion each year in the next five years, making Taiwan a new hub for Asian emerging capital markets.

Table 4-8 ┥ Digital Economic Ecosystem Development and Outcomes

Key Tasks	Description and Outcomes	Unit In-charge
Boosting the Service Commercial Operation	In the first half of 2018, the number of electronic payment tools have reached the transaction amount of TWD 1.8 trillion (USD 59 million; USD 1=TWD 30.8), grew 23% compared to the same time last year. The mobile payment conducted by the domestic financial organizations also reached TWD 18.5 billion (USD 601 million), which exceeded the TWD 14.8 billion (USD 481 million) of the total transaction amount of the last year. The Commission has successfully promoted an electronic payment friendly environment.	Financial Supervisory Commission (FSC)
	By giving e-commerce companies advices on cross-industry business deals, mobile payment, and super high quality TV content upgrades etc., the Ministries have elevated a total of TWD 32.8 billion (USD 1.07 billion) production values for companies in e-commerce and TV industries.	MOEA, MOC
Building a Brand-New Ecosystem	The Council has initiated the TWD 1 billion (USD 33 million) Venture Angel Investment Program and the TWD 100 billion (USD 3.3 billion) Industrial Innovation Transformation Fund to help enterprises on the innovation transformation fundraising. Also, the Council has established a counseling service group to provide a variety of counseling services.	NDC
	Combined with the digiBlock Taipei, the Ministry setup an Industrial Technology Support Center within the park, which provides 661-square-meters R&D testing area for the companies to put in use.	MOEA
Loosening the Digital Regulations	The amendment of Identification Mechanism for the Identity of Users of Electronic Payment Institutions and the Management Measures for Trading Limits regulation promulgated on August 28, 2018, which increased the e-payment accounts paying flexibility and using convenience.	FSC
	After the promulgation of the Reality Somatosensory Application Service Industry Self-Regulation, Vee Telecom Multimedia became the first to pass the national policy guidance on July 20, and the company was therefore the example for operators in the field.	MOEA

Source: Office of Science and Technology, Executive Yuan, compiled by III-MIC, October 2018

The government has constructed a foundation for financial science and technology innovation and promoted innovative experimental mechanisms. For example, since the "Fintech Development and Innovative Experiments Act" was implemented on April 30, 2018, three applications have been accepted and one has been approved while the other two are under review. The annual target of accepting 10 applications this year can be easily reached. The first approval was the application filed by KGI and Chunghwa Telecom which use the telecom mobile identity authentication technology to realize the portability of customer data, handle the online loan and credit card businesses and provide more fair and reasonable pricing to achieve inclusive finance.

The innovation ecosystem is taking shape. For example, FinTechSpace, the first technology innovative space for financial technology in Taiwan, was opened on September 18, 2018, to establish a fintech ecosystem and incubate international talent and startups. A total of 37 startups have entered the space, including two international teams from Singapore, and one each from the United States, Hong Kong, Japan, and the Philippines. The enterprise laboratory has set up by CTBC Bank, DBS Bank, EasyCard Company, and Hua Nan Bank. The "FinTech Taipei 2018" was co-sponsored by the Taiwan Financial Services Foundtable and the Taiwan Academy of Banking and Finance and held from December 7 to 8, 2018, highlighting what has been achieved in the Fintech over the years. Through exhibitions, international seminars and multi-media activities, we will provide a mutual exchange of talent and funds, assist startups and entrepreneurs in expanding business opportunities and cross-industry cooperation, and deepen the Fintech base.

The Action Plan for Enhancing Taiwan's Startup Ecosystem has five major strategies:

(1) Providing sufficient early-stage funding for startups by providing tax incentives for angel investors and strengthening cooperating with international venture capitals to invest in forward-looking industries;

(2) Cultivating talent and adjusting regulations by recruiting foreign professionals and providing foreign high-end professionals of certain employment opportunities, strategically attracting Southeast Asian students and talent to Taiwan and amending the Company Act to provide greater flexibility for startups business operation;

(3) Building partnership between startups and the government by helping startups supply innovative products and services, and open data to the government to promote the participation in government programs;

(4) Providing startups with various distribution channels by relaxing IPO listing requirements and supporting corporate acquisition of startups with tax incentives.

(5) Helping startups tap into global markets by inviting startups, accelerators, and venture capitalists from target countries to visit Taiwan and provide business matchmaking services and by providing soft-landing consultation and matchmaking services for startups through government overseas offices.

Table 4-9 Taiwan's Startup Ecosystem Development and Outcomes

Key Tasks	Description and Outcomes	Unit In-charge
Provide Sufficient Early-stage Funds for Startups	Business Angel Investment Program kicked off in May 2018	NDC
	Provide tax incentives for angel investors according to the amendment of the Statute for Industrial Innovation that kicked start in May and June, 2018	MOEA
Cultivate Talent and Adjust Regulations	Implement Act for the Recruitment and Employment of Foreign Professionals, starting in February 2018; provide foreign high-end professionals of eight fields with Employment Gold Cards and a total of 112 Cards have been issued as of Mid-September 2018.	NDC
	Amend the Company Act to provide greater flexibility with preferential measures for startups business operation in August 2018	MOEA
	Establish dedicated online taxation areas for startups and a window for information such as M&A taxation and goodwill amortization	Ministry of Finance (MOF)
Build Partnership between Startups and the Government	Encourage government's procurement from startups which have provided 51 innovative products and services	MOEA
	Help startups become suppliers of government procurements such as the cooperation between Taiwan Power and Pi Purse and JKoPay to provide multiple payment options	MOEA and relevant ministries and departments
Provide Startups with Various Distribution Channels	Provide diversified market listing qualifications for corporates not yet profiting. Will expand to help startups not yet profitable access capital market in the future since March 2018	FSC
Help Startups Tap into Global Markets	Set up a science & technology division in Israel in March 2018, to assist Taiwan startups with access to resources of Israeli market	MOST
	Set up Youth Startup Innovation Base in Taipei Arena in June 2018 and Startup Terrace at Linkou as a tech innovation and demo site in September 2018	MOST, MOEA
	Lead startups to major global trade shows (e.g. CES, MWC) and subsidize startups for such participation; for instance, Amaryllo won 2018Trailblazer Award in IoT Asia (hosted in Singapore) and ReCactus won the RISE Award in Hong Kong	MOST, MOEA, NDC

Source: Office of Science and Technology, Executive Yuan, compiled by III-MIC, October 2018

4-2-4 ► Smart Government and Regulation Adaptation

The advancement of digital technology has changed the way people and the government interact, the world's advanced countries are also facing the challenges on their road to digital transformation, including how to use fewer resources to enhance government effectiveness, how to provide a wider range of high-quality services, and more transparent, open, responsive, and effective public management, to strengthen public trust in the government. To promote the transformation of digital services in the advanced countries of the world, and to build up the digital competitiveness of Taiwan, the Executive Yuan promulgated DIGI⁺ program. Based on the 5th phase e-government program, the National Development Council (NDC) has positioned the DIGI⁺program as a foundational development guidance to promote digital services based on public concerns to meet the needs of the people and enhance the country's digital competitiveness.

Table 4-10 ┤ Service-centric Smart Government Development and Outcomes

Key Tasks	Description and Outcomes	Unit In-charge
Online Taxation Service	· Simplify Mac-based tax declaration procedure, to be completed within 5 minutes · Online tax declaration rate grew by 3.21% in 2017; the total online and offline tax declaration rate reached 96.34%	MOF
Healthcare Service (My Health Bank)	· Provide information on 4 cancer screening results including colorectal cancer, oral cancer, cervical cancer, and breast cancer from June 2018 · In May 2018, the mobile registration process was activated, and the number of users increased rapidly and reached over 800,000, growing by 1.5 folds compared to the same period last year.	Ministry of Health and Welfare (MOHW)
One-Stop Household Registration Service	· Provide information at one time and use it in multiple places. When people change the household information, the system will notify 8 government agencies such as tax and household registration authorities. · The application days for the general public to apply for labor and national welfare allowances will be reduced to around 2 to 5 working days, down from 15 working days.	MOI
One-Stop Social Welfare Service	· When general public apply for supplementary welfare allowance, the processing time will be reduced from 45 days to 7 days	MOHW
One-Stop Business Registration Service	· In 2018, the government has completed the online registration system to simplify the business registration process, and in accordance with the amendment of the Company Law on August 1, the government is to revise the "Regulations Governing Company Registration and Recognition" to plan for the second phase of the simplification process	MOEA

Source: Office of Science and Technology, Executive Yuan, compiled by III-MIC, October 2018

The use of open data is categorized in accordance with based on the Government Information Disclosure Law to maximize the openness of government information. The freedom of information use means the information will be provided to the general public with electronic form and is free without restriction on the purpose, region and period of use. Conditional use of data means the information is provided with electronic form under some specific conditions, and the list of information is listed on the government data

open platform. In addition, a high-quality environment with a quality reward mechanism will be provided to demonstrate the results of data applications with an aim to generate high-quality government open data and cooperate with the private sector to develop high-quality innovative services.

Startups are a force that cannot be ignored in Taiwan's future economic growth. The government's primary task is to eliminate the uncertainty of laws and regulations for various emerging businesses. The NDC has established a "Startup Regulatory Adjustment Platform" to provide a stable development environment for young entrepreneurs and startups. All agencies have actively cooperated with the NDC to participate in the operation of the platform, and to help clarify any doubts on the laws and regulations to help new startups expand while gearing up economic growth. For this reason, the NDC has also invited government agencies and new entrepreneurs and startups to help them clarify the applicability of existing laws to their new business model. It has clarified and resolved the uncertainties pertaining to different levels of management for shared parking spaces, broader recognition of taxation rates, the applicability of existing laws to online car rental platforms, and the relaxation of the electronic ticket identification distance.

In the era of the digital economy, the use of big data and information sharing has become an irreversible trend, and the data circulation around the world could seriously put in danger personal data protection. In May 2018, the European Union fully implemented the General Data Protection Regulation (GDPR) and established a stricter personal data protection legal framework, thereby prompting many countries to review their personal data protection regulations. In response to the GDPR, Taiwan officials formally established the Personal Data Protection Project Office on July 4, 2018, to oversee the coordination and implementation of data protection laws throughout Taiwan:

- Handle matters related to GDPR and provide adequacy decision to the EU
- Review and coordinate the consistency of ministries in the implementation of the Personal Data Protection Act
- Apply for a GDPR self-assessment report
- Convene expert consultations and forums for central and local government agencies.
- Organize publicity briefing sessions in Northern, Central and Southern Taiwan on September 11, September 14 and September 19, respectively.

4-2-5 ▶ Intelligent Cities and 5G Applications

Amid the digital transformation, the importance of information security is getting high but there is still a huge security gap in various industrial applications. Hence, Taiwan has aggressively promoted the 5+2 Industrial Innovation Plan and DIGI+ program with an objective of assisting Taiwanese enterprises in promoting the digital transformation and economic development that need a good security environment. For this reason, the Executive Yuan promulgates the "Cyber Security Legalization" and "Cyber Security Industry Development Action Plan", and fosters domestic information security industry to help strengthen the cybersecurity of various industries in Taiwan. The Executive Yuan also hopes to make Taiwan a global cybersecurity industry hub to facilitate the formation of many local cybersecurity brands. At the same time,

it expects to serve as a bridge between the security service providers and the industrial security application providers and strives to create a suitable environment for the development of security while enhancing the cybersecurity of Taiwan's various industries.

Table 4-11 ┤ Security Information Industries Development and Outcomes

Key Tasks	Description and Outcomes
Establish a Campus-to-industry Talent Cultivation System	· In 2019 to approve information security master's degree of four university; and one in-service master's program · Organize six short-term in-service programs such as the System Penetration and Attack Defense Practices and the Information Security Incident Identification Survey and long-term programs such as the Information Security Professional Elite Class: Cloud Network System Engineer
Information Security Key Technology R&D	· Promote 33 industry-academia cooperation cases, amounting to NTD 32 million; 7 technology transfer cases, amounting to NTD 5.4 million; 6 patents generated from projects · Handling technology integration and develop homegrown security information and event management (SIEM) software products to replace foreign ones
Development of Industry Standards and Participation in International Standards	· Completed the Smart Bus Telematics Security Standards and Test Specifications Draft, to be announced in December 2018 · Completed the IoT Information Security Certification System-Image Monitoring System and announced the Image Monitoring System (IP CAM V2.0, NVR V1.0, NAS V1.0) Information Security Standards and Test Specifications · Provided IoV malicious behavior detection technology which has been included into the draft of internal standards.
Security Information Marketing and International Marekting	· Organize a Taiwan's information security exchange exhibition to provide match-up services for 30 cybersecurity businesses in Taiwan · Organize 2018 Explore Next Cyber Taiwan to prompt the talent exchange between Taiwan's and Israeli innovative parks; and cooperated with Security Matters form the Netherland. · Participate in Singapore's RSA Conference by setting up APJ Taiwan booth

Source: Office of Science and Technology, Executive Yuan, compiled by III-MIC, October 2018

The "Intelligent City Communication Platform" is an initiative platform set up through the collaboration between the central and local governments. It is an important dialogue mechanism for implementing the DIGI⁺ program's "smart urban and rural regional innovation". The purpose is to establish smooth communication channels between the central and local governments, integrate local and central resources, and accelerate regional cooperation while constructing a regional innovation ecosystem. Aligning with the national policy of "Digital Nation, Smart Island, it is essential to implement local demand-oriented innovation mechanisms to increase the adoption of smart applications in urban and rural areas. This platform will promote issues pertaining to smart urban and rural areas through conferences to identify the policy direction while coordinating the planning between ministries and local governments in central and local resources for smart cities to avoid redundant investment and accelerate smart applications in smart urban and rural areas.

Through the "Intelligent City Communication Platform", local governments can also share the successful smart city experiences in the past to initiate the diffusion so that the ministries can have a dialogue with local governments on important policies. In the future, if the local government encounters problems

related to the promotion of smart urban and rural areas and the coordination or regulatory adjustment is required, there is no need to wait for a meeting to be held once every three months. Local governments can highlight the issues on the online platform to get instant service and response.

Table 4-12 ┤ Intelligent City Startups Participation and Cultivation Mechanisms

Major Demand	Direction	Promotional Mechanism (connected with international brands' resources)
Originality of Creation for City Upgrades	· Integrate with local resources to develop local smart applications · Converge cross-border resources to create a friendly local environment for entrepreneurship · Create a practical integration solution through local practices	· Combine international resources such as AWS cloud services to provide power for entrepreneurial innovation · Entrepreneurial counseling services to combine with competition rewards to increase opportunities for startups to take part

Source: Office of Science and Technology, Executive Yuan, compiled by III-MIC, October 2018

A successful smart city innovation depends on three conditions. First, to understand the needs of the local people and solve problems through smart technology and to impress them; second, to promote by combining the power of the local governments, enterprises, schools, research institutions, and the people. Third, cross-regional resources need to be effectively allocated to provide shared benefits. By combining the strengths of the central and local governments, Taiwan hopes to promote service sustainability, industrial upgrading, and local benefits, and, most importantly, to enhance the people's well beings.

Regarding the development of 5G applications, the government will "encourage 5G vertical application demo fields", "construct 5G new application development environment", "provide 5G technical support and integrate trial platform", and "plan to release 5G spectrums in line with overall interests" and "adjust regulations to create a favorable environment for 5G development." From these aspects, the government aims to come out with specific programs, and coordinate the detailed promotional measures between ministries and departments to formulate plans for future 5G development.

With a goal of completing the first wave of 5G spectrum release in 2020, the National Communications Commission has spared no efforts to work in two directions: "Mobile Broadband Service" and "Vertical Innovation Application". It expects to release 270MHz and 2500MHz in the mid-range section of 3.5GHz and the high-range section of 28GHz, respectively, for 5G.

Under the vision of creating a new era of the 5G+ Internet of Things, the NDC is actively building a new 5G industry base, establishing a shared 5G Internet of Things ecosystem, and focusing on the development and innovation of 5G emerging devices. In addition, it is also dedicated to creating a friendly environment for 5G innovations and entrepreneurship, loosening regulations, focusing on new venture capital investments and talent cultivation, and providing trial fields.

The Ministry of Economic Affairs (MOEA) plans four major strategies for the development of the 5G industry in Taiwan. First, it will develop one-click deployment solutions leveraging homegrown 5G private network systems, and establish an international open source system certification center to ensure the readiness of 5G applications and technologies. Second, it will provide preferential political support for 5G innovative

applications such as spectrum acquisition, field subsidies, regulatory adjustments, and co-creation of 5G innovative applications that are able to reflect the shared industry and social value; third, the establishment of telecom-grade information security technology and the cultivation of the integrated information security service providers to strengthen Taiwan's national cybersecurity strength. Fourth, it aims to combine the energy of the industry players, expand the international social connections, and promote R&D talent cultivation in the areas of communication, application, and open source software development.

The ministries also have plans to promote 5G applications. For instance, the Ministry of Science and Technology (MOST) plans to build a public IoT to improve people's livelihood; the Ministry of Education (MOE) plans 5G campus applications; the Ministry of Culture (MOC) plans to create cultural and technological experimental fields; and the Ministry of Health and Welfare (MOHW) to promote smart medical care services. These are to provide the general public with many new intelligent services to improve their everyday lives.

4-3 ▸ The Future of Innovation

The DIGI⁺ program is designed to promote the development of the digital economy and 5+2 Industrial Innovation Program and add value to applications to improve the quality of people's lives so as to transform toward a smarter nation. At present, laws and regulations have been modified for digital economy, and the government has also allocated the budget for the development of digital technology. In addition, the government has also promoted relevant programs and plans to lay a solid ground to help transform Taiwan into a smart nation.

In terms of the 5G development, the government will continue to make Taiwan an appropriate testbed for multi-functional and innovative 5G applications. The goal is to achieve industrial innovation, drive regional development, and create a smarter lifestyle for the public. The Board of Science and Technology (BOST) is also coordinating with the National Communications Commission (NCC), the Ministry of Transportation and Communications (MOTC), the Ministry of Science and Technology (MOST), and the National Development Council (NDC) to point out strategic directions for the 5G industry, and launch a number of 5G development promotional activities, including spectrum preparation & planning, new experimental spectrum, technology R&D, industry integration, regulatory preparedness, measurement experiments, and innovative entrepreneurship. Taiwan's government has also collected opinions from different industry sectors to ensure policies and measures are fit for use.

In terms of digital learning, the Ministry of Education (MOE) has promoted the prevalence of digital learning by 2030. To this end, the government is set to provide an accessible and convenient learning environment, including infrastructure, wireless classroom networking, network roaming, and connected network management to reduce teacher workload; teaching applications supporting the digital technology, including online credit courses, Massive Open Online Courses (MOOCs), mobile learning, personalized, self and adaptive learning, live streaming teaching, and digital companions. The systematic support for digital learning innovations includes distance education regulations, cross-school electives, credit recognition, and lecturer hours. It also plans to have classrooms and resources that can be accessed anytime and anywhere like open courses, audio-visual materials, educational apps, e-books, e-teaching platforms, and data analysis.

When it comes to developing smart cities, local demand is connected while pooling cross-domain resources is needed to ensure the government can promote smart city applications and solutions to impress the general public before they can be exported overseas. Through the establishment of a smart urban-rural and inter-ministerial platform for central and local governments, issues that require cross-domain integration and coordination can be discussed via the platform through which, the central and local information on shared electricity of smart streetlights and IoT devices, long-term nursery care, and disaster prevention can be connected and open data can be accessed.

To become smarter, the government has three objectives to achieve by 2020:

(1) Establish cross-domain one-stop services, including the completion of five government digital service re-engineering operations in social welfare and other fields; set up five shared systems such as financing system.

(2) Open data, including optimization of data quality so that 60% of data meet level 3 or higher quality and the cumulative downloads of open data to hit 6 million.

(3) Information security, including constructing a national information security warning mechanism and completing the joint cross-domain security defense system; the government has a total of 1,000 full-time information security workforce.

By 2025, there are three objectives to meet:

(1) The one-stop service coverage improvement is to ensure the integration of comprehensive social welfare networks, improvement of national building management and counseling, and intelligent civil servants recruitment; information electronic map and e-governance training certification system satisfaction level to reach 75%.

(2) Open data is to ensure there are a total of 8 government and non-governmental collaboration cases on innovative data applications.

(3) Information security is to ensure a total of 40 new information security startups will be funded for NTD 78 billion.

The future innovation can start from inside out by developing services that are appealing to people, so as to develop a smart sustainable human-centric society. Therefore, the DIGI⁺ program has been implemented from "5G strategy", "digital learning", "smart government", "intelligent cities" and "smart living" aspects. In addition to improving people's living environment and quality, technologies derived from these applications can also be exported overseas. The DIGI⁺ program will respond flexibly to changes in the domestic and international situations and continue to link the central, local government, and private resources to enable active communications across sectors to react fast and effectively to future market trends.

📖 References

1. Bangkok Post (2018), Thailand leads Asean IoT exploration poll.
2. CNN (2018), Foxconn makes another big move in the US with Belkin deal.
3. Economist Intelligence Unit (2018),The Inclusive Internet Index：Measuring Success 2018.
4. Forbes (2018), Why Amazon Picked Taiwan For Its Latest Innovation Center.
5. Forbes (2018), Global Tablet Sales Are Struggling, But Taiwan's Tech Firms Know What To Do.
6. Forbes (2018), Why Google, IBM & Microsoft Are All Expanding In Taiwan This Year.
7. Gartner (2018), Gartner Says Global Artificial Intelligence Business Value to Reach $1.2 Trillion in 2018.
8. Info-communications Media Development Authority (2017), SMEs Go Digital.
9. International Institute for Management Development (2018), IMD World Competitiveness Yearbook 2018.
10. International Institute for Management Development (2018), IMD World Digital Competitiveness ranking 2018.
11. Ministry of Science and ICT (2017), Mid- to Long-Term Master Plan in Preparation for the Intelligent Information Society.
12. Ministry of Trade and Industry Singapore (2016), Industry Transformation Maps (ITMs).
13. PC Magazine (2018), TSMC set to beat Intel to become the world's most advanced chipmaker.
14. The economist (2018), TSMC is about to become the world's most advanced chipmaker.
15. The White House Office of Science and Technology Policy (2018), Summary of the 2018 White House Summit on Artificial Intelligence for American Industry.
16. Venturebeat (2018), Blockchain, AI, and 5G: How the EU wants to compete for the future.
17. Waseda University (2017), 2017 Waseda-IAC International e-Government Rankings Survey.
18. World Economic Forum (2018), The Global Competitiveness Report 2018.
19. Shanghai Municipal People's Government (2018), Shanghai Industrial Internet Industry Innovation Project Implementation Plan.
20. Ministry of Economy, Trade and Industry (2017), Connected Industries Tokyo Initiative 2017.
21. The Cabinet Office of Japan (2018), Japan's 5th Science and Technology Basic Plan (2016- 2020).
22. The Executive Yuan (2018), Digital Nation & Innovative Economic Development Program (DIGI⁺) 2017-2025 – moving towards a more intelligent country. Website: https://www.ey.gov.tw/Page/5A8A0CB5B41DA11E/22a0ad26-653c-4e0e-854a-e53da6f759fc.
23. Executive Yuan (2016), Digital Nation & Innovative Economic Development Program (DIGI⁺). Website: https://www.ey.gov.tw/Page/5A8A0CB5B41DA11E/f4d3319a-e2d7-4a8b-8b55-26c936804b5b.
24. Digital Innovation & Governance Initiative Committee of the Executive Yuan (2018), AI Taiwan.
25. Digital Innovation & Governance Initiative Committee of the Executive Yuan (2018), Digital Nation & Innovative Economic Development Program (DIGI⁺).
26. Jiangsu Provincial Department of Industry and Information Technology (2018), Circular of Organizations' Implementation on the 365 Project of Industrial Internet Development in Jiangsu Province.
27. Zhejiang Provincial People's Government (2017), Implementation Opinions of Zhejiang Provincial People's Government on Deepening the Integrated Development of the Manufacturing Industry and the Internet.
28. National Communications Commission (2018), Cable Broadcasting and Television Subscriber Survey.
29. National Communications Commission (2018), Overview of Communications and Communications.
30. National Communications Commission (2018), Number of Broadband Internet Access Accounts.
31. National Development Council (2017), 2017 Personal Household Opportunity Survey Report.
32. Telecommunications Technology Center (2017), Measurement of Mobile Internet Speed Measurement in the First Half of 2017.
33. Market Intelligence & Consulting Institute of Institute for Information Industry (2018), Taiwan Mobile Payment Consumer Survey-Overall Consumer Analysis.
34. Institute for Information Industry (2017), Digital Nation & Innovative Economic Development Program (DIGI⁺)-Digital Life Service Use Rate and Satisfaction (QoL) Survey Report.
35. IT & Electronics Industry Research Center of Department of Industrial Technology of the Ministry of Economic and Affairs (2018), Top Three Taiwanese Industries/Products in 2017.
36. Guangdong Provincial People's Government (2018), Implementation Plan of Guangdong Province on Deepening the Internet + Advanced Manufacturing Industry to Develop the Industrial Internet.

2017·2018

資訊國力年鑑

TAIWAN E-COMPETITIVENESS
ANNUAL REPORT

蔡志宏　編
行政院科技會報辦公室執行秘書

序言

　　5+2產業創新結合數位國家・創新經濟發展方案（簡稱DIGI⁺方案），是臺灣要邁向「智慧國家」的兩大方案，如果各自分開，任何一個都是代工經濟的思惟。以5+2產業創新而言，重點是在「創新」兩個字，如何讓產業利用既有的優勢知識，結合DIGI⁺方案中所規劃的人工智慧（AI）、物聯網（IoT）、5G等數位科技，兩者攜手合作，發揮綜效，才能實現「智慧國家」。

　　最近十年，因為行動寬頻和智慧型手機的發展，不僅讓社會改變，也翻轉產業結構。臺灣從代工經濟，轉型到創新經濟，要從臺灣本身的需求出發，更要進一步前瞻30年後（2050年）社會、經濟、環境的情境，為我們的下一代，擘劃臺灣未來發展的藍圖。

　　另外，從創新的觀點，過去的創新是「國家創新」，指的是科技與產業發展係由中央政府主導，而未來的創新必須結合「區域創新」，將地方政府、在地的學研與地方產業做緊密結合，強化地方的角色。進一步而言，臺灣過去30年做代工，為先進國家創造了價值。現在眾多新興國家加入競爭，我們必須往前走，強化對生活細節的體驗，包括食、衣、醫、住、行、育、樂，再加上臺灣有優秀的科技領域人才，強大的硬體製造能力，傑出靈活的中小企業與產業群聚，再有AI和5G的加持，甚至是設計與美學的融入，應可創造全球最佳的「智慧生活」實驗場域。

　　為了達成「智慧國家」願景，DIGI⁺方案為5+2產業創新之數位沃土，從跨部會計畫中逐步具體落實，希望能在臺灣強大硬體製造基礎與最佳的智慧生活實驗場域，以區域創新思維，加強數位人才培育和落實軟體應用，真正帶動國家創新，打造並引領臺灣進入下一世代的數位科技創新與發展，期待全方位推動數位轉型，以及擴大數位經濟規模，以提升臺灣的「資訊國力」。

行政院政務委員

吳政忠

2018年12月

序言

　　面對劇烈變動的時代，現在大家熟悉的職業、工作、產品、服務，或合作模式，未來都有可能被數位科技顛覆。因此，建立符合未來需求的資通訊建設架構、創造開源共享的平臺、培育擁有改變世界力量的下一代人才，是臺灣累積未來數位實力不可忽視的基礎。

　　近年來各國以提升資訊國力，驅動社會創新與經濟發展等議題，行政院積極推動「DIGI⁺方案」，以實現「智慧國家」為施政目標，其中，有兩項不可或缺的基本理念，分別是「數位涵容（Digital Inclusion）」，是指透過數位科技運用，提供所有人公平發展機會，以及更多元的社會參與管道；「開放治理（Open Governance）」，則是強化政府部門運用數位科技的能力，透過開放資料與開源精神即時回應社會需求。

　　從數位涵容的觀點，未來的學習，則不再局限於科目，而是打破框架，讓科技成為最好的學習工具，讓下一代可以充分瞭解，無論未來世界變得如何複雜，每個人都是參與者，擁有改變的力量。如AI崛起，代表未來是一個終身學習的時代，為了學會和AI共處，不僅小學應該有AI課程，銀髮族也有權利進大學進修AI。新科技就是幫助我們的工具，讓我們達成社會使命與人生目標。

　　透過開放治理的理念，建立開源共享的平臺，可以擴大影響力，我們也積極建立開放的政府，包括邀請大家一起討論參與式預算，連政策及法律，都可以因應時代的變遷而修正、調整。這都奠基於自由開放的公民社會之上。讓開源成為驅動科技創新的力量，讓許多新科技、新機會可以自由展開。

　　當機器開始參與人類的生活，許多人擔心，未來會有愈來愈多的工作是否遭AI取代？AI扮演的角色，是把人類工作中「不假思索」的部分，交給AI做，人類不會因此被淘汰。如同，目前我們所搭的飛機早已進步到「自動駕駛」階段，但機長未被淘汰，因為當機器出事了，人類可以補救。同理，無人車普及後，計程車司機也毋須擔心「沒頭路」，因為乘客依然需要有人跟他聊天；且人和人之間溫暖的互動，是AI無法取代的。

　　相信在數位時代下，平權與共好的概念，讓人們在追求物質之外，重新思考生命的價值，看見幸福！

行政院政務委員

唐鳳

2018年12月

　　臺灣10年、20年之後的生活場景會是什麼？政府希望從民眾生活需求出發，因應臺灣未來人口、經濟、科技、環境等變遷，打造一個能夠解決問題導向的數位化環境，讓國人可以享受便捷、創新的「智慧生活」，進而衍生出多元豐富數位應用服務，促進產業創新與轉型，並帶動經濟成長，同時彰顯我國的資訊國力與國家總體競爭力。

　　《2017-2018資訊國力年鑑》，是從臺灣在各國際知名機構評比排名、我國資通訊建設發展現況表現、借鏡國際趨勢與政策，以及期許臺灣邁向智慧國家等四大方向，描繪我國資訊國力。透過解析我國目前資通訊之現況與優勢，描述政府如何應對趨勢並有效地推動升級，以及規劃未來數位化生活的社會場景，並從中分享臺灣資訊國力的發展成果與經驗。

　　我國於2017至2018 年間，在各項主要資通訊國際評比中仍能保持優異的排名，亞太地區皆在前五名之內，全球排名也都在前20名之內。例如世界經濟論壇（World Economic Forum，WEF）今（2018）年10月公布全球競爭力評比4.0（New Global Competitiveness Index 4.0，GCI 4.0），我國排名全球第13名，創新能力排名第4，WEF更指出我國與德國、美國、瑞士4個國家是「創新大國」（super innovators），創新能力分數遠高於其他國家。此外，在瑞士洛桑管理學院（International Institute for Management Development，IMD）今年6月公布2018年世界數位競爭力評比（The World Digital Competitiveness Ranking），我國排名全球第16名。其中細部指標方面，我國有5項指標位居世界頂尖，包括全國平均總研發人力（第1）、IT與媒體股票市場資本額占GDP比率（第2）、3G和4G行動寬頻用戶（第2）、高科技出口百分比（第3）、學生在數學上之表現（第3）都有優異表現。

　　他山之石可以攻錯，在各國數位經濟政策方面，例如日本提出社會5.0、互聯產業（Connected Industries）等政策，利用先進科技（活用AI、IoT）提高社會生活等各層面的便利性及解決社會存在的問題。南韓政府則提出「實現智慧資訊社會的中長期規劃」，擬定以人為本的智慧資訊社會之策略，並提高民眾對技術創新所造成負面影響的認知，例如對隱私的威脅、社會經濟衝擊等。歐盟則著墨在共建數位化的歐洲，使成員國達成AI、區塊

鏈、5G之協議與合作，以推動關鍵新興技術發展。這些全球重要國家，無不調整其數位經濟政策，聚焦於發展數位經濟的相關應用上，讓社會可以因應新技術帶來的衝擊。

「資訊國力」代表一個國家數位轉型與資通訊基礎建設的整備度，以及對社會、經濟與環境發展之影響力。《2017-2018資訊國力年鑑》不僅呈現政府資通訊建設所展現之國際競爭力，亦向國內外宣達我國資通訊政策推動主軸以及企圖改善民眾生活品質與發展數位經濟的決心。

為了方便國人及國際人士參閱，本書採取中英文雙語版本，期許能提供閱讀本書的國內民眾與企業，理解並認同政府推動「DIGI⁺方案」、「前瞻基礎建設計畫之數位建設」及「臺灣AI行動計畫」等重要數位政策。更重要的是，呈現政府為提升民眾、企業享有最佳生活品質與產業健全發展之努力，期許藉由本書的出版與國際人士進行資訊交流，將臺灣資訊國力展現於國際。

行政院科技會報辦公室 執行秘書

2018年12月

目錄

第三章、他山之石，各國競逐資訊巧實力— 國際政策如何呼應社會需求

第四章、運籌帷幄，DIGI⁺方案讓人民有感— 邁向人本永續的智慧國家

目錄

01

決勝千里，資訊國力位領先群—
臺灣在資通訊國際評比表現

2018
世界經濟論壇
全球競爭力評比4.0
評比國家數：140

評比構面：
環境便利性、人力資本、市場、
創新生態體系

亞太地區
4th

全球
13th
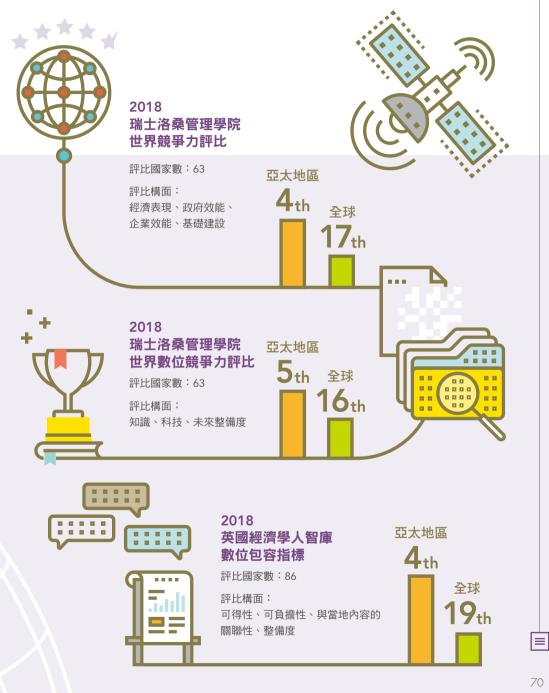
2017
日本早稻田大學
電子化政府評比
評比國家數：65

評比構面：
網路覆蓋率、管理優化、網站介面功能應用、國家
入口網、政府機關資訊長、數位化政府行銷推廣、
電子化參與、開放政府、資訊安全、運用新興資通
訊科技

亞太地區 **5**th

全球 **10**th

2018
**瑞士洛桑管理學院
世界競爭力評比**

評比國家數：63

評比構面：
經濟表現、政府效能、
企業效能、基礎建設

亞太地區
4th

全球
17th

2018
**瑞士洛桑管理學院
世界數位競爭力評比**

評比國家數：63

評比構面：
知識、科技、未來整備度

亞太地區
5th

全球
16th

2018
**英國經濟學人智庫
數位包容指標**

評比國家數：86

評比構面：
可得性、可負擔性、與當地內容的
關聯性、整備度

亞太地區
4th

全球
19th

註：此處亞太地區不包含中東地區

第一章、決勝千里，資訊國力位領先群─
臺灣在資通訊國際評比表現

面對數位經濟時代變革，國家、企業與個人，是否可以活化運用資料，帶來加值型的應用，改變作業與營運模式，成為累積未來競爭力的重要指標。近期主要國家皆努力發展數位經濟相關政策，為國家未來面對數位經濟變革所帶來的衝擊做預備。

觀測各國數位經濟發展，通常需要無形的基礎環境與支援體系，包含經商環境、投資環境、創新文化、教育與科研制度、人才政策等進行支援，以及有形的軟硬體設施與平臺相關建設，包含基礎設施建設、資訊安全、智慧應用平臺與開放資料等，最後則是涵蓋滿足社會整體需求的智慧建設，包含交通、國防、醫療、安全、金融、零售等。國家及產業數位經濟能否發展，需要上述要素同時被滿足，才能有效地運作。

因此，資訊國力的強弱，是用來衡量一個國家，在邁向數位經濟的過程中，總體競爭力與預測國家經濟走向的重要依據。許多全球學研機構，包含世界經濟論壇（World Economic Forum，WEF）、瑞士洛桑管理學院（International Institute for Management Development，IMD）等，都建立評量指標，進行全球性大規模的競爭力評量，作為公正客觀評量各國資訊國力的評估依據。

本章節整理包含世界經濟論壇全球競爭力評比4.0（New Global Competitiveness Index 4.0，GCI 4.0）、瑞士洛桑管理學院世界競爭力年報揭露的世界競爭力評比（World Competitiveness）與世界數位競爭力評比（World Digital Competitiveness）、日本早稻田大學（Waseda University）電子化政府評比（International e-Government Rankings Survey）、英國經濟學人智庫（Economist Intelligence Unit，EIU）數位包容指標（The Inclusive Internet Index），以及2018年國際媒體對於臺灣在資通訊發展的重要報導。以下整理五項資訊國力相關國際指標評比，說明臺灣在各國際指標評比的最新表現。

表1-1 ┤ **臺灣在重要資通訊相關國際評比的排名**

評比年度	評比機構	評比名稱	臺灣排名		評比國家數
			全球	亞太地區	
2018	世界經濟論壇	全球競爭力評比4.0	13	4	140
2018	瑞士洛桑管理學院	世界競爭力評比	17	4	63
2018	瑞士洛桑管理學院	世界數位競爭力評比	16	5	63
2017	日本早稻田大學	電子化政府評比	10	5	65
2018	英國經濟學人智庫	數位包容指標	19	4	86

註：此處亞太地區不包含中東地區
資料來源：各機構，資策會MIC整理，2018年10月

⭐ 1-1 ▸ 世界經濟論壇全球競爭力評比4.0

2018年10月世界經濟論壇（WEF）公布新版的全球競爭力報告（The Global Competitiveness Report 2018），有別於過往的版本，為了順應科技的快速變遷、政治的分化與脆弱的經濟復甦，而建立一套評估第四次工業革命生產力的指標，稱之為「全球競爭力評比4.0（GCI 4.0）」，藉此具體評估140個國家的未來全球競爭力。

GCI 4.0所使用的評比架構，涵蓋各項能提高各國競爭力及生產力的影響因素，本次調整為四大構面（環境便利性、人力資本、市場、創新生態體系）。GCI 4.0透過有形的基礎設施、宏觀經濟穩定、學校教育等傳統指標，以及創新企業文化、多方合作、批判性思考、菁英管理、社會信任等創新指標，來衡量第四次工業革命的能力。各指標的分數也從滿分7分，改為滿分100分，每一個國家都可以看到其在各項指標上發展的進度。

臺灣在WEF公布的2018年報告中，整體排名為全球第13名，亞太地區第4名。進一步研析細部指標，臺灣在總體經濟穩定、創新能力以及金融體系這三項指標，都有領先全球的優良成績。2018年WEF GCI 4.0的表現參見表1-2。

表1-2 ╫ 臺灣在WEF 2018年全球競爭力評比4.0各構面表現

構面	2018年		構面	2018年	
	排名	分數		排名	分數
整體排名	13	79.3			
環境便利性	19	82.2	市場	10	74.8
體制	25	68.5	產品市場	18	65.7
基礎建設	22	82.6	勞動市場	16	71.4
資通訊使用	13	77.9	金融體系	7	87.9
總體經濟穩定	1	100.0	市場規模	20	74.2
人力資本	26	84.5	創新生態體系	11	76.6
健康	27	94.2	商業活力	21	72.4
技能	21	75.6	創新能力	4	80.8

資料來源：WEF 2018全球競爭力報告，資策會MIC整理，2018年10月

⭐ 1-2 ▶ 瑞士洛桑管理學院世界競爭力評比

瑞士洛桑管理學院（IMD）的世界競爭力評比，目前為評比涵蓋範圍最廣、評比指標數最多的國家競爭力評比。臺灣在2018年的排名居全球第17名，較前一年下滑3名。

臺灣在企業效能中的各項表現，是影響本次評比的主要原因，在生產力與效率、勞動市場及管理實務等面向，均有待精進。企業環境未能吸引國外高階人才、人口成長幅度減少、消費性服務出口動能低等要素，都影響我國評比結果。

不過，2018年臺灣在物價穩定、長期失業率低、網路頻寬增加、再生能源補貼比率增加等項目都有成長。而目前臺灣在高技能勞動力、教育水準、成本競爭力以及公司治理品質等項目上，對國際貿易與投資來說，皆具有相對的吸引力。臺灣近兩年在IMD世界競爭力評比的表現參見表1-3。

表1-3 ┥ **臺灣在IMD 2017及2018年世界競爭力評比各構面表現**

構面	2018排名	2017排名	構面	2018排名	2017排名
整體排名	17	14			
經濟表現	14	12	**企業效能**	20	15
國內經濟	28	27	生產力與效率	19	17
國際貿易	19	10	勞動市場	38	26
國際投資	41	29	金融	21	20
就業人口	21	22	管理實務	9	4
物價	9	11	態度與價值	23	16
政府效能	12	10	**基礎建設**	22	21
政府財務	10	10	基本基礎建設	39	30
財稅政策	4	5	技術基礎建設	18	15
制度架構	22	15	科學基礎建設	10	10
商務法規	30	29	衛生與環境	33	36
社會架構	22	24	教育	19	25

資料來源：IMD世界競爭力年報，資策會MIC整理，2018年10月

1-3 ▶ 瑞士洛桑管理學院世界數位競爭力評比

　　根據IMD世界數位競爭力評比，臺灣總排名從2017年的第12名退步至2018年的第16名。在三大評比構面，包含知識、科技、未來整備度（Future Readiness）皆呈略微退後趨勢。不過在教育訓練、科學濃度（Scientific concentration）、規範架構（Regulatory framework）排名上升，是其中表現較優良的部分。

　　知識構面細部指標排名中，國內經商環境吸引國外高技術人才的程度及高等教育師生比是造成排名下滑主要原因，使得臺灣在數位競爭力之知識類略為退後，不過學生數學程度，以及全國平均研發人力的表現持續成長，成為世界領先之項目。

　　另外在科技構面，由於電信業者4G網路普遍已經布建完成，於2018年的電信資本投資較低，拉低整體表現，然而行動寬頻用戶比重、高科技占出口百分比，以及資訊科技（Information Technology，IT）類股資本額占GDP比率，都領先世界排名，具有世界頂尖實力。臺灣近兩年在IMD世界數位競爭力評比的表現參見表1-4。

表1-4 ┫ 臺灣在IMD 2017及2018年世界數位競爭力評比各構面表現

構面	2018排名	2017排名	構面	2018排名	2017排名	構面	2018排名	2017排名
總排名	16	12						
知識	19	16	科技	11	7	未來整備度	22	16
人才	25	18	規範架構	21	24	適應態度	28	19
教育訓練	25	28	資本	13	8	企業敏捷度	13	6
科學濃度	13	17	科技架構	10	4	IT整合度	23	22

資料來源：IMD世界數位競爭力年報，資策會MIC整理，2018年10月

1-4 ▶ 日本早稻田大學電子化政府評比

　　日本早稻田大學調查和分析全球各國數位政府的推動現況和績效，2017年的調查，正式從「電子化政府」轉為涵蓋更廣的「數位政府」。此次的評比結果，臺灣整體表現居全球第10名、亞太地區排名第5、在亞太經濟合作會議（APEC）成員國中第7名。臺灣近五年在早稻田大學電子化政府評比的表現參見表1-5。

表1-5 ┤ 臺灣近五年在早稻田大學電子化政府評比排名					
	2013	2014	2015	2016	2017
臺灣排名	8	18	17	10	10

資料來源：日本早稻田大學2013-2017年間電子化政府評比，資策會MIC整理，2018年10月

　　評比中僅公布前10名之各構面分數，臺灣在十大構面中「政府機關資訊長」（Government CIO，GCIO）、「數位化政府行銷推廣」（D-Government Promotion，EPRO）分別獲得第4名及第7名，其他構面則未進入前10名（參見表1-6）。臺灣2017年度總分數為73.2分，名次維持在全球第10名，相比2016年，在管理優化（Management Optimization / Efficiency，MO），從8.8分進步到9.6分，與網站介面功能應用上（Online Services / Functioning Applications，OS），從8.8分進步到9.1分，分數有較明顯地成長。

　　報告中指出，臺灣在「政府機關資訊長」表現特別突出，另外在「開放政府」的指標上亦表現優異，可以顯示臺灣在數位政府政策方面的推動成效，不過在「運用新興資通訊科技」（The use of Emerging ICT，EMG）構面則有待精進。

表1-6 ┤ 臺灣在早稻田大學2017年電子化政府評比各構面表現					
構面	排名	分數	構面	排名	分數
網路覆蓋率	-	5.4	數位化政府行銷推廣	7	7.4
管理優化	-	9.6	電子化參與	-	7.8
網站介面功能應用	-	9.1	開放政府	-	9.0
國家入口網	-	5.6	資訊安全	-	7.6
政府機關資訊長	4	7.7	運用新興資通訊科技	-	4.0

資料來源：日本早稻田大學2017年電子化政府評比，資策會MIC整理，2018年10月

★ 1-5 ▶ 英國經濟學人智庫數位包容指標

　　英國經濟學人智庫（EIU）公布2018年數位包容指標，臺灣在全球86個國家中，總排名第19名，亞太地區23個國家中排名第4。包含四大評比構面：可得性（Availability）、可負擔性（Affordability）、與當地內容的關聯性（Relevance）及整備度（Readiness），共54個細部指標，其中，28項表現優等（排名前10名），18項排名第1。

四大評比構面中又以「與當地內容的關聯性」表現最優異。項下指標「當地內容」（Local Content）表現最佳，如基礎資訊當地語言的可得性（Availability of basic information in the local language）、國家級網域建設（Concentration of website using country-level domains）、裝置使用當地語言的可得性（Availability of local language keyboard on devices）、電子化政府當地語言服務的可得性（Availability of e-Government services in the local language）均排名第1。

可得性評比構面，每位網路使用者頻寬容量（Bandwidth capacity, Bit/s per internet user），排名第2，平均固網寬頻延遲時間（Average fixed broadband latency）、平均行動寬頻延遲時間（Average mobile latency, ms）均排名第4；基礎設施（Infrastructure）項下，臺灣有相當高的網路普及率（Network coverage），2G、3G排名第1，4G排名第7。綜上所述，臺灣在與當地內容的關聯性表現最佳，固網、行動網路的布建、傳輸及頻寬容量等表現均達水準以上。

然而臺灣在可負擔性和整備度評比排名在30名之後。可負擔性評比構面，競爭環境（Competitive Environment）表現不佳，用戶平均收入（Average revenue per user，ARPU）、寬頻營運商市場占有率（Broadband operator's market share）評分較低，影響整體競爭環境。整備度評比構面，即使擁有相當好的隱私規範（Privacy regulations），但信任與安全（Trust & Safety）則有待加強。臺灣2018年在EIU數位包容指標的表現參見表1-7。

表1-7 臺灣在EIU 2018年數位包容指標各構面表現

構面	2018年		構面	2018年	
	排名	分數		排名	分數
總排名	19	81.1			
可得性	16	78.7	整備度	32	72.0
用途	15	85.0	素養	20	81.9
品質	4	59.4	信任&安全	59	52.4
基礎設施	41	71.5	政策	32	81.8
電力	41	98.9			
可負擔性	34	81.2	與當地內容的關聯性	12	90.3
價格	25	97.7	當地內容	1	100.0
競爭環境	36	48.2	相關內容	20	80.7

資料來源：EIU 2018年數位包容指標，資策會MIC整理，2018年10月

⭐ 1-6 ▶ 國際媒體對於臺灣在資通訊發展之重要報導

臺灣在資通訊產業發展成績卓著，歷年來也成為國際媒體關注的對象。近期在資訊安全、創新創業、網通併購、半導體等技術與服務發展，都被國際媒體報導。

富比士2018年8月報導指出，亞馬遜與新北市合作，成立AWS（Amazon Web Services）於臺灣第一個創新中心。為何選擇在臺灣發展研發創新中心，除了因為臺灣可以提供投資人友善的交易環境以外，臺灣的研發設計人才素質很高，可以與AWS共同合作，亦是重要原因。

富比士於2018年4月指出，因為大尺寸智慧型手機的替代，全球平板銷售成長遲緩；不過，臺灣廠商雖然是供應鏈的核心，卻可以找出突圍的辦法，全球硬體科技的核心企業如富士康與和碩，則發展可拆卸式（Detachable）的平板電腦，並獲得佳績。富士康在2017年第四季，全球可拆卸平板電腦出口量達43%，位領群雄；和碩在可拆卸平板電腦中排名第2，全球市占率達19%。

富比士在2018年4月亦提到，谷歌、IBM和微軟2018年起積極在臺灣招聘員工、培訓人工智慧（Artificial Intelligence，AI）人才。其引用臺北美國商會執行長傅維廉（William Foreman）的看法，認為臺灣有合理的成本結構，給科技公司提供合理的水電、租金和勞動力成本。政府的獎勵和支持也有幫助。

英國經濟學人（The Economist）和PC Magazine於2018年4月報導，台積電即將成為全球領先的晶片製造商，而其競爭對手美國Intel正處於動盪時期。台積電最新的晶圓價值將達到200億美元，達到晶圓代工56%的市場占比。台積電已在2018年6月開始發售新半導體製程的7奈米晶片，並於2017年投入30億美元在分析與改善，因此可以降低成本並縮小節點。

CNN於2018年3月報導，以組裝Apple iPhone聞名的富士康以高達8.66億美元的大筆資金（約新臺幣259.8億元）併購美國Belkin。Belkin以生產消費性電子產品和智慧型手機配件為主，而富士康併購Belkin，將獲得無線充電器、Linksys路由器和智慧家庭系統WeMo等業務與資源，且預計花費至少90億美元在美國威斯康辛州建造工廠，僱用數千名員工。顯示富士康前進美國市場，積極布局之野心。臺灣資通訊發展2018年經國際媒體報導之重要事蹟，參見表1-8。

表1-8 | **2018年國際媒體對於臺灣資通訊發展重要報導列表**

新聞媒體	日期	原文標題	翻譯標題
富比士	2018/8/17	Why Amazon Picked Taiwan For Its Latest Innovation Center	為何亞馬遜選擇臺灣成為其最新的新創中心
富比士	2018/4/13	Global Tablet Sales Are Struggling, But Taiwan's Tech Firms Know What To Do	全球平板銷售面臨瓶頸，但臺灣科技公司知道如何迎戰
富比士	2018/4/4	Why Google, IBM & Microsoft Are All Expanding In Taiwan This Year	為何谷歌、IBM和微軟皆在今年於臺灣擴展營運版圖
英國經濟學人	2018/4/5	TSMC is about to become the world's most advanced chipmaker	台積電將成為全球領先的晶片製造商
PC Magazine	2018/4/10	TSMC set to beat Intel to become the world's most advanced chipmaker	台積電接替英特爾成為全球領先的晶片製造商
CNN	2018/3/27	Foxconn makes another big move in the US with Belkin deal	富士康另一重要舉措係以大筆資金併購美國Belkin

資料來源：各國際新聞媒體，資策會MIC整理，2018年10月

⭐ 1-7 ▸ 小結

　　臺灣2017-2018年在國際評比表現與國際媒體報導，在亞太地區的排名皆在前5名，全球排名部分，表現最佳的是日本早稻田大學電子化政府評比，排名第10，其次是WEF GCI4.0排名第13，其餘都排在世界前20名的領先群。

　　從IMD世界數位競爭力評比的頂級指標，以及EIU的數位包容指標來看，臺灣在網路基礎建設，包含固定網路、行動網路頻寬及網路普及率，均名列前茅，電子化政府實行頗有成效；另一項競爭優勢則是人力資源，高品質研發人才是吸引國外廠商來臺布局的主要原因之一。臺灣是全球硬體生產與代工組裝重要的供應鏈核心國家，可在硬體基礎上，朝向以軟帶硬的數位轉型。

　　就上述國際指標中，卻也看到未來整備度、國際貿易／投資、高等教育師生比、國內經商環境等為弱勢的構面，受限於政治法規及國內經商環境，企業效能表現待精進，難以促進國外高階人才和國內人才存量。資本投入減少，影響研發技術提升，對產業影響較大。在隱私與安全信任表現，亦有待提升。

　　面對全球資通訊科技（Information Communication Technology，ICT）之快速變化，創新思維是趨勢所在，政府除了推動資通訊科技發展，對民眾生活、企業經營、國家經濟與社會帶來正向實質影響的政策外，亦可與企業攜手合作，挹注資本，提升軟體研發技術與人才培育，希冀能在整體資訊數位競爭力上有所成長，這也正是臺灣積極推動DIGI⁺方案、前瞻基礎建設、臺灣AI行動計畫等資通訊政策的用心所在。

02

數據說話，資訊國力表現與時俱進—
我國資通訊建設發展現況

▶ **固定通訊網路**（包含Leased Line、ADSL、Cable Modem和光纖）

2018年7月固網寬頻帳號數達 **570.5** 萬戶
其中光纖帳號數362萬戶，占固網寬頻帳號的 **64.1%**

🏠 光纖（FTTx）固網寬頻帳號　　🏠 = 10萬戶
🏠 其他類型固網寬頻帳號

家庭連網普及率
85.0%

民眾上網普及率
82.3%
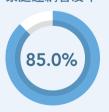
📺 有線廣播電視訂戶數 **515.7** 萬戶
　　有線電視數位機上盒訂戶占比 **99.7%**
▶ 多媒體內容傳輸平臺服務訂戶數 **180.5** 萬戶

▶ 行動通訊網路

民眾智慧型手機持有率 97.2%

民眾行動上網普及率 80.1%

行動寬頻帳號數 2,426.0萬戶

📱 = 100萬戶

無線寬頻帳號數 2,453.7萬戶

🧍 = 100萬戶

4G LTE 行動上網平均速率（定點量測）

| 下載 | 52.39Mbps |
| 上傳 | 21.04Mbps |

3G 行動上網平均速率（定點量測）

| 下載 | 9.35Mbps |
| 上傳 | 1.67Mbps |

註：此處民眾智慧型手機持有率，係指12歲以上接觸網路民眾

第二章、數據說話，資訊國力表現與時俱進─
我國資通訊建設發展現況

➕ 2-1 ▶ 我國資通訊建設指標現況

　　臺灣2017-2018年在政府及產學研各界的努力下，資通訊建設表現穩健。本章綜整各項資通訊基礎建設重要指標，包含固定網路、行動網路、我國資通訊前三大產業、行動支付使用調查以及數位生活品質滿意度。各項資通訊建設重要指標的發展情形，整理如表2-1。

表2-1 ┤ 我國資訊基礎建設現況

指標分類	指標名稱	數據	資料時間	資料來源
固網	固網寬頻帳號數	570.5萬	2018/07	通傳會
	光纖帳號數占比	64.1%	2018/07	通傳會
	有線廣播電視訂戶數	515.7萬	2018/06	通傳會
	有線電視數位機上盒訂戶占比	99.7%	2018/06	通傳會
	多媒體內容傳輸平臺服務訂戶數	180.5萬	2018/06	通傳會
	家庭連網普及率	85.0%	2017/11	國發會
	民眾上網普及率	82.3%	2017/11	國發會
行動	行動寬頻帳號數	2,426.0萬	2018/06	通傳會
	無線寬頻帳號數	2,453.7萬	2017/12	通傳會
	4G LTE行動上網速率（定點量測）平均下載速率	52.39Mbps	2017/03	電信技術中心
	4G LTE行動上網速率（定點量測）平均上傳速率	21.04Mbps	2017/03	電信技術中心
	3G行動上網速率（定點量測）平均下載速率	9.35Mbps	2017/03	電信技術中心
	3G行動上網速率（定點量測）平均上傳速率	1.67Mbps	2017/03	電信技術中心
	民眾智慧型手機持有率	97.2%	2017/11	國發會
	民眾行動上網普及率	80.1%	2017/11	國發會

註：此處民眾智慧型手機持有率，係指12歲以上接觸網路民眾
資料來源：通傳會、國發會、電信技術中心，資策會MIC整理，2018年10月

2-1-1 ▶ 固定網路

　　根據國家通訊傳播委員會（簡稱通傳會）的統計，近年來我國固網（有線）寬頻帳號數處於穩定的階段（如圖2-1）。包含Leased Line、ADSL、Cable Modem和光纖（FTTx）。Cable Modem和光纖帳號數持續成長，兩者分別在2015年和2011年超過ADSL帳號數；而Leased Line及ADSL帳號數逐年下滑。以2017年為例，Leased Line占比最低，僅0.05%，光纖占比最高，約有63.4%。顯示臺灣民眾普遍使用光纖帳號。
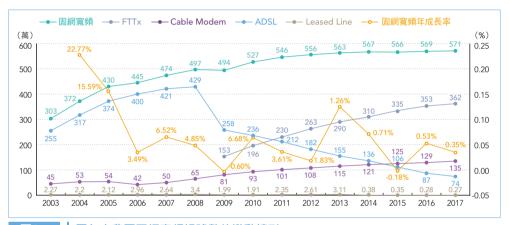
圖2-1 ┣ **歷年來我國固網寬頻帳號數的變動情形**

註：統計數據為每年12月份數據
資料來源：通傳會，資策會MIC整理，2018年10月

　　歷年固網寬頻帳號數變化來看，我國固網寬頻帳號數已處於穩定的階段，從最近一年內固網寬頻帳號數的變化觀之（如圖2-2），固網寬頻帳號數自2017年9月達到最高點的572.3萬戶，逐月緩慢降低至2018年1月的570.8萬戶，2月上升至571.4萬戶，隨後再次下降到2018年5月最低點570.1萬戶，最高與最低使用帳號數約差異2.2萬戶，平均571.1萬戶。

圖2-2 ┣ **最近一年我國固網寬頻帳號數的變動情形**

資料來源：通傳會，資策會MIC整理，2018年10月

　　光纖帳號數由2017年7月的359.1萬，增加到2018年7月的365.7萬。光纖帳號數占固網寬頻帳號數的比例由2017年7月的62.9%，微幅提升至2018年7月的64.1%。ADSL帳號數由2017年7月的78.6萬，降低到2018年7月的67.5萬。

　　截至2018年第二季，我國有線廣播電視訂戶數約達516萬戶，平均有線電視訂戶數達59.37%。數位機上盒訂戶數約514萬戶，有線電視數位化的比例（數位機上盒訂戶數占有線電視訂戶數的比例）已達99.70%。數位付費頻道訂戶數約為149萬戶，占數位機上盒訂戶數的比例28.99%。而過去的一年，多媒體內容傳輸平臺服務訂戶數明顯增加，約從136萬戶成長到近181萬戶，約增加45萬戶，年成長率達33%。

表2-2 ┤ **近一年我國有線廣播電視數位機上盒及多媒體內容傳輸平臺服務訂戶數**（單位：萬）

	2017Q2	2017Q3	2017Q4	2018Q1	2018Q2
有線廣播電視訂戶數	524.3	524.9	522.5	519.4	515.7
數位機上盒訂戶數	514.4	520.0	519.7	517.3	514.1
數位付費訂戶數	151.2	153.1	155.1	151.4	148.8
多媒體內容傳輸平臺服務訂戶數	135.8	144.5	160.2	170.4	180.5
平均每百家戶有線電視訂戶數	60.95%	60.77%	60.41%	59.95%	59.37%
數位機上盒訂戶數占有線訂戶數比例	98.13%	99.08%	99.46%	99.58%	99.70%
數位機上盒訂戶付費收視占比	29.38%	29.42%	29.81%	29.21%	28.99%

資料來源：通傳會，資策會MIC整理，2018年10月

　　由國發會2017年11月公布對家庭連網普及率和民眾上網普及率調查結果發現，我國12歲以上且曾經上網的民眾比率由2005年的62.7%增為2017年82.3%，突破八成，換算為人數，網路族約1,738萬人。另外，12歲以上民眾中，有85.0%的家庭可於家戶內上網。

2-1-2 ▶ 行動網路

　　根據通傳會統計，我國截至2018年6月，行動寬頻用戶累積達2,426萬戶。其中4G行動上網對3G行動上網的替代是很顯著的，2015年9月4G行動上網超越3G行動上網後，便持續增加，成為主流，到2018年6月已經占總行動上網用戶數的95%。4G行動寬頻帳號數在極短的時間內快速成長，取代了3G行動上網，一方面顯示我國基礎建設穩固，而民眾對於4G上網的網速感到滿意，因此持續申辦4G行動上網服務。

圖2-3 ├ 近年我國行動寬頻帳號數的變動情形

資料來源：通傳會，資策會MIC整理，2018年10月

全國行動寬頻上網速率消費者端量測，上傳與下載傳輸速率皆大幅提升。2012年平均下載速率達到2.52Mbps，上傳速率達到0.45Mbps。到2017年3月，全國3G行動上網下載傳輸速率成長至9.35Mbps，平均上傳速率則成長到1.67Mbps。

在此同時，全國4G行動上網速率則呈現跳蛙成長，到2017年3月，平均下載速度已經達到52.39Mbps，平均上傳速率成長至21.04Mbps，已經與固網寬頻速率相當。到2017年3月為止，4G平均下載速率為3G平均下載速率的5.6倍，上傳速率則為12.6倍，也讓國人對採用4G電信服務趨之若鶩。顯示4G建設已為我國行動寬頻上網速率帶來高度成長，也為使用者帶來便利性。

表2-3 ├ 行動寬頻上網速率消費者端量測歷年結果

行動寬頻上網速率消費者端量測歷年紀錄（單位：Mbps）	2012年8月-10月	2013年8月-10月	2014年8月-10月	2016年1月-3月（3G）	2016年11月-2017年3月（3G）	2016年1月-3月（4G）	2016年11月-2017年3月（4G）
平均下載速率	2.52	4.44	6.27	8.84	9.35	40.87	52.39
平均上傳速率	0.45	1.13	1.08	1.36	1.67	18.33	21.04

註1：2016年11月-2017年3月為定點量測結果

註2：2015年當年未發布相關結果

資料來源：財團法人電信技術中心，資策會MIC整理，2018年10月

由國發會於2017年11月公布對民眾智慧型手機持有率和民眾行動上網普及率調查結果發現，12歲以上民眾行動上網使用率由2016年的73.1%增為2017年的80.1%，成長7.0個百分點。此外，在接觸過網路的12歲以上民眾中，主要持有的資訊設備是智慧型手機為97.2%，其次是桌上型電腦為68.8%，接著依序為筆記型電腦52.1%，平板電腦45.0%等。

➕ 2-2 ▶ 我國資通訊前三大產業

觀測全球具重要地位之臺灣產業，平面顯示器、面板、半導體、人造纖維皆占有一席之地，2017年排行第1的產業／產品共有五項，包含晶圓代工、IC封測、高階自行車、機能性布料與綠藻。產業技術基磐研究與知識服務計畫（ITIS）團隊研究指出，2016-2017年平面顯示器均維持總產值破兆，面板產值維持世界第2。2016年半導體產業產值位列世界第2，僅次美國；2017年則排行第3，僅次美國與南韓，其中晶圓代工及IC封裝測試排行第1，IC設計排行第2。

2017年臺灣在全球排名前三位的產業／產品表（以不含海外生產計）

第1位（5項）	第2位（7項）	第3位（10項）
・晶圓代工 ・IC封測 ・綠藻 ・機能性布料 ・高階自行車	・可攜式導航裝置（PND） ・行動輔具（電動代步車＆電動輪椅） ・IC載板 ・IC設計 ・銅箔基板（CCL） ・印刷電路板 ・矽晶型太陽能電池（e）	・中小型TFT LCD面板（<10″） ・大型TFT LCD面板（>10″） ・β-胡蘿蔔素　・ABS ・耐隆纖維　・TPE ・聚酯絲　・WLAN ・滾珠導螺桿 ・OLED

圖2-4 2017年臺灣在全球排名前三位的產業／產品表

資料來源：經濟部技術處ITIS計畫團隊，資策會MIC整理，2018年10月

若從2017年排行全球第1位的五大產業／產品（不含海外生產）來看，晶圓代工產值37,700百萬美元，全球市占率最高，達69.52%，表現最亮眼；其次是IC封測，產值13,683.4百萬美元，全球市占率48.70%，可說晶圓代工、IC封測為臺灣產業產值最大宗的產業。在產品方面，高階自行車也有近三成比率，達到29.31%。

而世界排行第2的產業／產品，以PND（Portable Navigation Device，可攜式導航裝置）產值全球市占率45.00%，產量27.20%表現最佳，其次是行動輔具（電動代步車、電動輪椅）全球市占率25.24%，IC載板23.20%。全球排行第3的產業／產品，則以中小型TFT LCD面板全球市占率27.39%最佳。2017年全球前三大之臺灣產業／產品（不含海外生產）詳參表2-4。

表2-4 ┤ **2017年全球前三大之臺灣產業／產品（不含海外生產）**

項目	產值		產量	
	單位：百萬美元	全球市場占有率	單位：如下	全球市場占有率
世界排名第一 晶圓代工	37,700.00	69.52%		
IC封測	13,683.40	48.70%		
綠藻			890.59 公噸	48.35%
機能性布料	4,246.00	24.78%		
高階自行車			214.92 萬輛	29.31%
世界排名第二 可攜式導航裝置（PND）	811.00	45.00%	5,774 千臺	27.20%
行動輔具（電動代步車&電動輪椅）			18.2 萬臺	25.24%
IC載板	2,244.00	23.20%		
IC設計	19,690.36	17.42%		
銅箔基板（CCL）			72,000 仟米平方	18.00%
印刷電路板	7,719.00	11.90%		
矽晶型太陽能電池（e）			10,52 MW	11.20%
世界排名第三 中小型TFT LCD面板（<10″）	7,862.63	27.39%		
大型TFT LCD面板（>10″）	18,580.10	22.86%		
β-胡蘿蔔素			54.23 公噸	4.51%
耐隆纖維			29.5 萬公噸	6.00%
聚酯絲			78.8 萬公噸	2.10%
滾珠導螺桿	380.00	13.00%	53,340 公噸	15.80%
ABS			1,334 千公噸	15.95%
TPE			324 千公噸	8.30%
WLAN	43.00	0.70%		
OLED	333.94	2.53%		

資料來源：經濟部技術處ITIS計畫團隊，資策會MIC整理，2018年10月

　　如若將海外生產的產業／產品計算在內，全球市占率達八成以上者有主機板產值89.10%、產量81.50%、筆記型電腦產值81.50%、產量83.30%，Cable CPE（有線電視終端）產量80.40%、高爾夫球頭產量81.10%。超過七成者有Cable CPE產值77.11%、晶圓代工產值73.16%。主機板、筆記型電腦、Cable CPE、晶圓代工可謂臺灣在世界占有率最高的代表產業／產品。2017年全球前三大之臺灣產業／產品（含海外生產）詳參表2-5。

表2-5 ┤ 2017年全球前三大之臺灣產業／產品（含海外生產）

項目	產值		產量	
	單位：百萬美元	全球市場占有率	單位：如下	全球市場占有率
主機板	4,062.00	89.10%	84,003 千片	81.50%
筆記型電腦	59,402 .00	81.50%	132,398 千臺	83.30%
Cable CPE	2,022.63	77.11%	36,119 千臺	80.40%
晶圓代工	39,674.34	73.16%		
速食麵			231.2 億包	24.00%
茶飲料			67.58 億公升	16.55%
機能性布料	8,672.32	50.81%		
高階自行車			239.43 萬輛	33.21%
銅箔基板（CCL）			132,100 仟米平方	33.22%
※ABS			3,310 千公噸	29.36%
IC封測	15,690.79	55.84%		
WLAN	3,974.01	67.14%		
DSL CPE	1,919.08	65.40%	61,238 千臺	66.30%
PND	1,042.00	57.80%	8,372 千臺	39.50%
印刷電路板	19,299.00	29.70%		
行動裝置光學鏡頭	2,235.00	50.00%		
桌上型電腦	12,606.00	27.80%	48,789 千臺	49.80%
高爾夫球頭			3,150 萬顆	81.10%
※PTA			1,212 萬公噸	15.53%
※TPE			986 千公噸	19.50%
矽晶型太陽能電池（e）	3,608.00	20.30%		
IC設計	20,299.34	17.96%		
大型TFT LCD面板（>10″）	20,876.52	25.69%		
中小型TFT LCD面板（<10″）	9,473.05	33.00%		
IC載板	2,550.00	26.30%		
電子／數位血壓計			7,390 千臺	22.39%
伺服器	9,085.00	18.00%	3,926 千臺	35.30%
行動輔具（電動代步車&電動輪椅）			25.2 萬臺	35.06%
味精			31.19 萬公噸	8.93%
滾珠導螺桿	475.00	16.10%	66,675 公噸	19.70%
OLED	333.94	2.53%		
LED元件（僅計算臺灣封裝段產值）	3,044.00	17.70%		

（左側：世界排名第一、世界排名第二、世界排名第三）

註：※表以產能估算
資料來源：經濟部技術處ITIS計畫團隊，資策會MIC整理，2018年10月

⊕ 2-3 ▸ 我國行動支付使用調查

行動支付係以用「智慧型手機」透過如條碼掃描、NFC感應、聲波傳輸等特定技術，和實體商家完成實質交易，取得商品或使用服務的支付方式。臺灣消費者目前仍以現金和信用卡付款占最大宗，兩者皆超過七成以上，其次是電子票證，約占三成，行動支付付款則從2016年4.8%提升至2017年占比13.7%，大為成長，且消費者偏好行動支付的比例從2015年19.2%成長至2017年36.2%，逐年攀升。

資策會MIC針對持有智慧型手機消費者調查，持有智慧型手機用戶中對行動支付的認知率，從2016年83.6%提升至2017年90.9%，手機能使用NFC者，從2016年44.3%提升至2017年61.4%，顯見對行動支付的認知有所提升，成長力道可期。估計由於智慧型手機不斷推陳出新，加上業者以優惠方案推廣，促進消費者對行動支付的認知與使用NFC的比率逐年提高。

此外，不論是對於整體消費者或使用Android／iOS手機的消費者而言，LINE Pay、Apple Pay比率均占前2名，超過七成五，整體消費者認知率第3名則是支付寶，有57.7%，但與前2名有所差距。Android Pay（現改為Google Pay）、歐付寶則分居第4、第5名。從這些業者來看，國際行動支付業者較國內業者知名度為高。iPhone用戶，則有高達八成七聽過Apple Pay，第2名的LINE Pay也達到80.4%，顯示iPhone用戶對Apple Pay認知度最高。智慧型手機消費者對行動支付認知率比較，參圖2-5。

曾經「聽過」以下哪些行動支付？（可複選，無限制）　　本題樣本1,068份

整體	
LINE Pay	79.0%
Apple Pay	76.0%
支付寶	57.7%
Android Pay	55.6%
歐付寶	52.9%

iOS	
Apple Pay	87.1%
LINE Pay	80.4%
支付寶	59.3%
歐付寶	51.8%
Android Pay	49.3%

Android	
LINE Pay	78.7%
Apple Pay	71.6%
Android Pay	58.2%
支付寶	57.2%
歐付寶	53.4%

圖2-5 ┤ 智慧型手機消費者對行動支付認知率排行

資料來源：資策會MIC，2018年10月

2015年近八成行動支付用戶為Android手機用戶，但自2017年3月Apple於臺灣推出Apple Pay，iOS用戶略微提升至三成，Android手機用戶略微降低到64.9%。但若從手機作業系統區分，iOS手機用戶，有53.4%是行動支付用戶，而Android手機用戶，則只有39.8%是行動支付用戶（參圖2-6），可見行動支付在iOS手機用戶中普及較Android手機用戶快速。

行動支付用戶—OS區分

	iOS	Android	其他
2015	20.9%	78.7%	0.4%
2016	26.3%	73.7%	
2017	35.1%	64.9%	

行動支付用戶—各OS比例

在iOS手機用戶裡
53.4% 行動支付用戶

在Android手機用戶裡
39.8% 行動支付用戶

備註：2015年有效樣本1,260份、用戶樣本239份；2016年有效樣本1,059份，用戶樣本259份；2017年有效樣本1,068份，用戶樣本424份

圖2-6 ┤ 行動支付用戶比率—以智慧型手機作業系統區分

資料來源：資策會MIC，2018年10月

　　2017年調查指出26-35歲手機用戶有50.7%使用行動支付，是各年齡層最高，其次是18-25歲手機用戶，使用行動支付占比39.2%，最低者則為56-65歲手機用戶，占比26.3%。對提供相同商品服務的店家，整體消費者有38.8%同意偏好到支援行動支付的商店消費，且不到兩成不同意；行動支付用戶則高達67.0%傾向前往有支援行動支付的商店消費，非行動支付用戶（聽過但未曾使用）僅20.7%同意，有30.2%不同意（參圖2-7）。可見若一旦使用過行動支付，則會因商家是否支援行動支付，影響消費者消費意願，故而提供行動支付的商家逐漸普遍。

對提供相同商品服務的兩間店，會較傾向前往有支援行動支付的商店消費

	同意	普通	不同意	
整體	38.8%	43.0%	18.2%	本題樣本1,068份（單選）
行動支付用戶	67.0%	29.0%	4.0%	本題樣本424份（單選）
非行動支付用戶	20.7%	49.2%	30.2%	本題樣本547份（單選）

圖2-7 ┤ 行動支付用戶消費意願比率

資料來源：資策會MIC，2018年10月

　　面臨國外業者進軍臺灣行動支付市場，國內業者在技術或優惠、通路面臨強力競爭，消費者希望能有安全及便利的驗證，故國內業者可加強生物特徵驗證，如指紋掃描、螢幕簽名、人臉辨識、字母密碼或圖形密碼等，更可在功能與用戶族群做出區隔，如繳費、轉帳，或推出學生期望的電子票證或金融卡。

✚ 2-4 ▶ 數位生活品質滿意度

　　隨著數位、創新不斷地演進，逐漸地改變整個世界的形貌，資通訊科技的發展與應用帶來之改變，不只是經濟層面，更觸及到國家、產業及社會層面，尤其對民眾生活品質帶來重大影響。因此，資策會在行政院科技會報辦公室支持下，建構並發展一套數位生活品質滿意度指標，包括生活品質滿意度及資通訊應用服務兩大衡量指標，用以衡量及挖掘對民眾生活品質滿意度具影響力的資通訊應用服務。

2-4-1 ▶ 臺灣民眾生活品質滿意度

　　臺灣民眾生活品質滿意度調查架構以經濟合作暨發展組織（OECD）「美好生活指數」為基礎，包括就業與收入、公共環境品質、健康與保健衛生管理、教育與學習、公共安全與災防、居家生活與便利條件、所得與消費、工作與生活、公共治理、主觀幸福感、社會連結等十一個領域，本次研究調查期間於2017年5月31日至2017年7月31日，針對15歲以上國民，共計完成6,548份樣本數。

　　由調查結果得知2017年各縣市15歲以上民眾生活品質滿意度平均為63.6分，與歷年分數無顯著差異，而生活品質滿意度分數最高的領域為社會連結（74.2分），其次依序為工作與生活（67.3分）、健康與保健衛生管理（66.8分），進一步就2015-2017年度分析結果顯示，各指標排名之間雖有微幅變動，但前3名仍為社會連結、工作與生活及健康與保健衛生管理（如表2-6）。

表2-6 ┥ 2015-2017年民眾生活品質滿意度歷年比較

年 指標	2015		2016		2017	
	排名	分數	排名	分數	排名	分數
就業與收入	9	54.4	9	61.0	10	58.2
公共環境品質	5	64.0	8	62.2	7	61.5
健康與保健衛生管理	1	70.1	2	70.5	3	66.8
教育與學習	7	59.8	6	63.2	8	61.2
公共安全與災防	4	66.6	5	63.8	5	64.1
居家生活與便利條件	3	67.8	7	62.3	6	62.5
所得與消費	8	59.3	10	60.8	9	60.9
工作與生活	6	62.7	3	67.1	2	67.3
公共治理	10	53.7	11	60.0	11	57.3
主觀幸福感	-	-	4	65.1	4	65.6
社會連結	2	68.8	1	71.5	1	74.2

資料來源：資策會，2018年10月

　　以生活圈來看，各生活圈中民眾對於生活品質領域關心程度差異不大，皆包含就業與收入、公共環境品質、健康與保健衛生管理，除了前三項領域外，中部生活圈與花東及離島生活圈民眾較關心教育與學習，北部生活圈關心公共安全與災防，南部生活圈關心居家生活與便利條件（如圖2-8）。

| 中部生活圈 | · 就業與收入
· 公共環境品質
· 教育與學習
· 健康與保健衛生管理 | · 就業與收入
· 公共環境品質
· 健康與保健衛生管理
· 公共安全與災防 | 北部生活圈 |
| 南部生活圈 | · 公共環境品質
· 就業與收入
· 健康與保健衛生管理
· 居家生活與便利條件 | · 健康與保健衛生管理
· 就業與收入
· 公共環境品質
· 教育與學習 | 花東及離島生活圈 |

圖2-8 ╟ 生活品質領域重視度—以生活圈別

資料來源：資策會，2018年10月

　　以都會區及偏鄉區生活品質綜合指數來看，都會區（63.7分）與偏鄉區（62.5分），兩區域民眾生活品質滿意度並無顯著差異，就各領域來看，偏鄉區民眾在所得與消費、公共治理的滿意度分數相對都會區分數差距較大。

	都會區	偏鄉區			都會區	偏鄉區
教育與學習	61.2分	61.1分		公共環境品質	61.7分	60.0分
工作與生活	67.3分	67.2分		就業與收入	58.3分	56.5分
公共安全與災防	64.1分	64.3分		健康與保健衛生管理	66.9分	65.1分
主觀幸福感	65.5分	65.9分		公共治理	57.7分	52.9分
社會連結	74.1分	74.6分		所得與消費	61.4分	56.3分
居家生活與便利條件	62.6分	61.0分				

生活品質綜合指數　都會區 **63.7**分　偏鄉區 **62.5**分

圖2-9 ╟ 城鄉生活品質滿意度分析

資料來源：資策會，2018年10月

2-4-2 ▶ 臺灣民眾資通訊應用服務使用現況

　　資通訊應用服務涵蓋層面，包括食品營養與安全資訊、數位醫療與健康促進、災害預防與公共安全、智慧交通與運輸服務、環境品質監視與改善、數位教育與終身學習、就業與創新創業服務、即時通訊與網路社群、網路金融與購物消費、數位娛樂與觀光體驗、數位家庭與智慧服務、數位化與互動化政府等十二項應用服務領域，其中，各領域下有三至五項不等的服務項目。有鑑於網路服務發展快速，許多服務民眾認知度逐漸提高，本研究持續就指標進行滾動式調整，2017年研究經過兩輪專家德菲法評估指標適切性及滿意度效度，以確認生活品質滿意度指標效度。十二項應用服務領域及下各服務項目如圖2-10所示。

圖2-10　資通訊應用服務各領域及項目

資料來源：資策會，2018年10月

　　2017年資通訊應用服務對個別生活品質領域的影響，就重要性排序前三大重要之資通訊應用服務，依序為數位娛樂與觀光體驗、環境品質監視與改善、災害預防與公共安全，此三大服務對民眾生活品質的影響層面最廣也最深，顯示民眾非常重視安全與環境意識相關之服務；每當資通訊應用滿意度增加時，生活品質滿意度也顯著增加，可見臺灣已邁入高度資訊化社會，未來若持續提升於資通訊應用服務之投資，可有效提升民眾生活品質。

以2017年資通訊應用服務領域之滿意度來看，平均分數為64.1分，各別領域以即時通訊與網路社群（72.6分）的滿意度最高，其次為智慧交通與運輸服務有68.5分，其餘依序為數位醫療與健康促進（67.8分）、網路金融與購物消費（66.7分）、數位娛樂與觀光體驗（66.4分）、數位教育與終身學習（64.4分）、數位家庭與智慧服務（63.2分）、災害預防與公共安全（62.6分）、環境品質監視與改善（61.2分）、數位化與互動化政府（60.6分）、就業與創新創業服務（59.8分）、食品營養與安全資訊（56.0分）等。比較2015-2017年各領域資通訊應用服務滿意度，滿意度最高的前3項服務為智慧交通與運輸服務、數位醫療與健康促進，即時通訊與網路社群（2016及2017年滿意度最高）（如表2-7）。

表2-7 ┤ 2015-2017年資通訊應用服務滿意度

年 資通訊指標	2015		2016		2017	
	排名	分數	排名	分數	排名	分數
食品營養與安全資訊	12	48.8	12	54.6	12	56.0
數位醫療與健康促進	2	68.7	3	68.0	3	67.8
災害預防與公共安全	10	56.5	10	61.4	8	62.6
智慧交通與運輸服務	1	72.1	2	69.8	2	68.5
環境品質監視與改善	11	54.9	9	62.6	9	61.2
數位教育與終身學習	7	61.7	6	64.4	6	64.4
就業與創新創業服務	9	57.0	11	60.2	11	59.8
即時通訊與網路社群	6	62.0	1	73.0	1	72.6
網路金融與購物消費	4	62.6	5	67.1	4	66.7
數位娛樂與觀光體驗	3	65.8	4	67.8	5	66.4
數位家庭與智慧服務	5	62.3	7	63.8	7	63.2
數位化與互動化政府	8	57.9	8	63.3	10	60.6

資料來源：資策會，2018年10月

以城鄉別分析民眾資通訊應用服務使用度差異發現，都會區在資通訊應用服務的使用度高於偏鄉區，尤以交通、金融消費、教育、就業創業、醫療領域。以區域別來看，北部地區使用度高於其他區域，值得關注的是，南部地區民眾對於食品營養與安全資訊居四區之冠（如表2-8）。

表2-8	民眾資通訊應用服務使用度差異─以區域別											
項目		食品營養與安全資訊	數位醫療與健康促進	災害預防與公共安全	智慧交通與運輸服務	環境品質監視與改善	數位教育與終身學習	就業與創新創業服務	即時通訊與網路社群	網路金融與購物消費	數位娛樂與觀光體驗	數位家庭與智慧服務	數位化與互動化政府
整體平均		28.8	60.7	51.3	77.8	55.5	51.3	38.3	81.9	64.4	69.7	32.0	48.4
城鄉別	都會區	29.2	61.5	51.8	78.8	55.8	52.1	39.1	82.3	65.3	70.3	32.6	48.7
	偏鄉區	24.6	51.5	45.2	66.5	53.1	42.4	30.0	76.8	55.0	63.2	24.9	44.5
區域別	北部地區	28.9	64.8	54.7	84.8	56.3	54.3	40.6	83.3	68.1	72.1	33.3	51.2
	中部地區	27.2	56.6	45.3	75.2	55.1	49.0	35.6	83.3	62.2	68.1	30.9	45.1
	南部地區	30.3	58.4	51.3	69.5	54.9	48.3	38.1	78.7	60.8	67.4	31.4	46.9
	東部地區	27.2	54.8	48.0	69.3	52.3	50.5	29.2	77.6	59.9	67.9	27.3	46.4

資料來源：資策會，2018年10月

　　分別觀察都會區與偏鄉區在資通訊應用服務領域之滿意度情形，偏鄉區民眾對智慧交通與運輸服務及對網路金融與購物消費兩指標之滿意度皆較都會區低，而對災害預防與公共安全之滿意度則較都會區高（如圖2-11）。以智慧交通和網路金融與購物消費來看，偏鄉在交通基礎建設發展上如對外連結交通建設便利性，及基本交通時間等服務較都會區不足；在網路金融與購物消費領域，因受限於地理位置而使得成本增加，如因距離因素產生的運輸費用直接呈現在物價上，需要付更多的運輸費用等問題，因此未來偏鄉地區應強化集運服務，以及需求預測等資通訊應用服務。

■ 都會區
■ 偏鄉區

項目	都會區	偏鄉區
數位化與互動化政府	60.6分	60.5分
數位娛樂與觀光體驗	66.3分	66.6分
食品營養與安全資訊	56.0分	55.7分
就業與創新創業服務	59.8分	59.4分
數位教育與終身學習	64.4分	64.0分
環境品質監視與改善	61.3分	60.8分
數位醫療與健康促進	67.9分	67.1分
數位家庭與智慧服務	63.1分	64.0分
災害預防與公共安全	62.4分	64.1分
即時通訊與網路社群	72.7分	70.9分
網路金融與購物消費	66.9分	64.9分
智慧交通與運輸服務	68.8分	64.9分

資通訊應用服務滿意度
都會區 **64.1**分
偏鄉區 **63.5**分

圖2-11 城鄉分析資通訊應用服務滿意度

資料來源：資策會，2018年10月

2-4-3 ▶ 青少年未來科技生活想像

　　有鑑於數位生活服務使用普及率與滿意度研究調查皆聚焦於15歲以上民眾數位生活需求，對於數位原生代青少年（15歲以下）著墨較少，然而此族群所想像的生活樣態反映出下一世代可能的生活情境，對於未來科技生活極具代表性。藉由繪圖與短文徵稿方式進行資訊蒐集，從中挖掘出對未來生活的食、醫（醫療）、住、行、育、樂等各面向的想法，以作為未來數位生活發展之參考依據。此次募集共蒐集295件作品，其分布是，幼稚園組40件、國小中低年級組129件、國小高年級組111件及國中組15件。

　　從青少年對未來科技生活的想像來看，發現較少有智慧型手機型態的物品出現，但機器人卻是無所不在，無論從居家環境、交通及生活起居等皆可以看見機器人概念或形體存在，摘要重點作品如下（如圖2-12）：

- 對未來居住環境想像，已不再局限於陸地，圓型建築體可以停於天空、外太空、大海，建築體之間可透過通道或訊號相互連結。
- 對未來交通想像，交通工具的型態為海陸空功能整合的混合體，膠囊型圓體飛行交通工具也幾乎是共同的想像。
- 對未來生活起居想像，可用思想控制機器人來執行一般日常生活起居所需活動，且多半具有複合式功能。

本次主要研究發現有三：首先，資通訊應用服務項目與民眾生活品質具高度相關性，數位娛樂與觀光體驗、環境品質監視與改善、災害預防與公共安全是民眾前三大重要之資通訊應用服務，顯然民眾除重視數位生活娛樂外，已逐步重視環境安全與災害意識，但在資通訊應用服務快速進化演變的過程中，仍需長期觀察資通訊應用服務的發展與變動趨勢。其次，加入城鄉分析資訊，從調查結果來看，都會和偏鄉民眾對智慧交通、網路金融、和災害預防等數位生活應用滿意度有所差異，顯示城鄉居民對數位生活有不同的期待。最後，透過繪圖與短文徵稿活動蒐集15歲以下兒童意見，透過圖像與短文瞭解青少年對於未來科技生活想像，從中挖掘出對未來生活的食、醫、住、行、育、樂各面向的期望，同時也勾勒對未來智慧生活的無限想像。

圖2-12 青少年未來科技想像

資料來源：資策會，2018年10月

他山之石，各國競逐資訊巧實力—
國際政策如何呼應社會需求

日本

主要規劃	社會5.0、互聯產業
目 的	用資料進行串接，包含物與物、人與物、人與人、企業對企業、生產對消費，將跨領域進行連結，並創造持續產生的新價值

南韓

主要規劃	智慧資訊社會的中長期規劃
目 的	建立以人為本的智慧資訊社會

新加坡

主要規劃	產業轉型計畫、中小企業數位化計畫
目 的	透過引導企業轉型、開拓新興科技、加強人員專業技能等角度進行輔導

美國

主要規劃	建立AI委員會
目 的	作為協調美國聯邦整體AI研發的一環，致力於結合產業界與學界，以完全發揮AI的潛力

歐盟

主要規劃	推動AI、自駕車、區塊鏈等產業與新興技術發展
目 的	透過政府力量，提供完善制度，使企業能在合適的環境下增加競爭力

中國

主要規劃	中國製造2025、十三五計畫
目 的	以AI、量子資訊、行動通訊、物聯網，以及區塊鏈等列為國家戰略產業發展，以成為新一代技術的世界領導者

泰國

主要規劃	推動泰國4.0經濟改革計畫
目 的	發展5+5目標產業、建設海陸空等交通硬體設施、打造東部經濟走廊，全力推動泰國經濟升級轉型

第三章、他山之石，各國競逐資訊巧實力─
國際政策如何呼應社會需求

🌐 引言 ▶ 各國政策趨勢

　　數位技術不斷地演進，物聯網（IoT）、大數據（big data）、雲端運算、AI、AR／VR與機器人等技術，幫助企業生產力提升，並改變企業產品與服務的提供。網路產業與新創企業，不斷透過數位經濟的新商業模式，促成產業的破壞式創新，改變產業生態系統的利潤分配。因此，數位經濟轉型，將是各國都必須面對的重大課題。

表3-1 ┤ **各國於數位經濟或AI主要政策規劃**

國家	主要規劃	目的
🔴 日本	社會5.0（Society 5.0）、互聯產業（Connected Industries）	用資料進行串接，包含物與物、人與物、人與人、企業對企業、生產對消費，將跨領域進行連結，並創造持續產生的新價值
南韓	智慧資訊社會的中長期規劃	建立以人為本的智慧資訊社會
新加坡	產業轉型計畫、中小企業數位化（SME Go Digital）計畫	透過引導企業轉型、開拓新興科技、加強人員專業技能等角度進行輔導
美國	建立AI委員會	作為協調美國聯邦整體AI研發的一環，致力於結合產業界與學界，以完全發揮AI的潛力
歐盟	推動AI、自駕車、區塊鏈等產業與新興技術發展	歐盟規劃AI、自駕車、區塊鏈業發展，希望透過政府力量，提供完善制度，使企業能在合適的環境下增加競爭力
中國	中國製造2025、十三五計畫	以AI、量子資訊、行動通訊、物聯網，以及區塊鏈等列為國家戰略產業發展，以成為新一代技術的世界領導者
泰國	推動泰國4.0（Thailand 4.0）經濟改革計畫	發展5+5目標產業、建設海陸空等交通硬體設施、打造東部經濟走廊，全力推動泰國經濟升級轉型

資料來源：各國公開資料，資策會MIC整理，2018年10月

　　數位經濟轉型是泛指傳統產業與新興業者，利用數位科技的導入或整合，提升內部生產力、促使交易最佳化，創造新產品以及新商業模式。因此，各國政府紛紛推出相關政策，希望打造具數位轉型DNA的超智慧社會。

首先，是應用服務的建構，亦即透過跨領域的社會服務，如醫療、教育、製造，或是公共智慧服務，如安全、交通、國防等應用，提升人民福祉，培育產業競爭力。

其次，是基礎架構的建構，包含健全資料體系、完備基礎設施建設，打造良好資訊安全環境，並建立AI等核心技術實力，希望打造資料高速公路，加速應用發展。

最後，則是從無形的文化與環境建構，包含形塑良好商業環境與投資環境、進行人員的教育訓練、活絡國際人才交流、進行企業創新文化的塑造等。創造良好的服務支援體系，讓社會可以適應新技術帶來的衝擊。

在此前提下，包含日本、南韓、新加坡、美國、歐盟、中國與泰國等，都提出新興智慧資通訊政策，茲整理如表3-1。

🌐 3-1 ▸ 日本
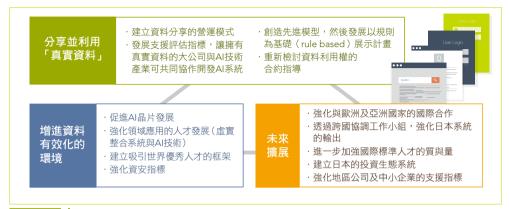
日本正面臨高齡人口增多、生育率下跌、勞動力不足、國家財政支出加劇、防災需要與產業再興等多種挑戰，因此，陸續提出社會5.0（Society 5.0）、未來投資戰略以及互聯產業（Connected Industries）等政策，想要利用先進科技（活用AI、IoT）提高社會生活等各層面的便利性及解決社會存在的問題，也是日本成長戰略的主要支柱。其中互聯產業成為數位轉型的重要基礎。

3-1-1 ▸ 從社會5.0延伸互聯產業

2016年1月，日本內閣會議通過第五期科學技術基本計畫（2016-2020），提出「社會5.0」概念，透過虛擬與現實的高度融合，讓必要的物件與服務對於必要的人、在必要的時刻，作必要的提供，細膩對應年齡、性別、地域、語言差異的各種需求，令所有人享受舒適的社會生活。但是社會5.0如何落實到產業？因此在2017年4月，進一步提出互聯產業政策，希望透過人、企業、機械等數據的連結，提高具創新價值的生產性活動。

互聯產業的政策，要補充社會5.0在技術方面的不足。主要概念是將實體與虛擬介面連結，並用資料進行串接，包含物與物、人與物、人與人、企業對企業、生產對消費，將跨領域進行連結，並創造持續產生的新價值；且訂定五個優先落實產業，包含自動駕駛與移動服務、生物科技與材料、智慧生活、製造與機器人，以及基礎建設安全管理。

互聯產業透過大公司與AI技術公司之間分享真實資料，讓新創企業也可以協助開發先進的AI系統。強化環境以及拓展的生態系統，協助產業能夠以數位化經營模式，向國際輸出數位服務與商品。

分享並利用「真實資料」	·建立資料分享的營運模式 ·發展支援評估指標，讓擁有真實資料的大公司與AI技術產業可共同協作開發AI系統	·創造先進模型，然後發展以規則為基礎（rule based）展示計畫 ·重新檢討資料利用權的合約指導
增進資料有效化的環境	·促進AI晶片發展 ·強化領域應用的人才發展（虛實整合系統與AI技術） ·建立吸引世界優秀人才的框架 ·強化資安指標	
未來擴展	·強化與歐洲及亞洲國家的國際合作 ·透過跨國協調工作小組，強化日本系統的輸出 ·進一步加強國際標準人才的質與量 ·建立日本的投資生態系統 ·強化地區公司及中小企業的支援指標	

圖3-1 日本互聯產業的跨部門政策

資料來源：日本經濟產業省，資策會MIC整理，2018年10月

3-2 ▶ 南韓

2017年7月，南韓科學技術情報通信部發表了「實現智慧資訊社會的中長期規劃（Mid- to Long-Term Master Plan in Preparation for the Intelligent Information Society）」，希望能建立以人為本的智慧資訊社會，擬定之策略一共有四點。

(1) 建構生態系統、導正市場失靈：企業及公民扮演領導角色，並由政府與研究界提供支援，在此公私合作的基礎上建立智慧資訊社會。

- 培養市場領導的能力，讓企業及公民能夠在預期的第四次工業革命和相關創新中提升競爭力。

- 政府及研究界應該透過建立基礎設施與生態系統主動支持私營部門，以發展原始技術和人力資源，並且導正市場失靈，特別是對社會弱勢族群的保護，同時分享對未來發展的強烈願景。

(2) 制定適應政策、滿足社會需求：制定並實施囊括技術、產業和社會均衡的政策制度，並塑造更加人性化社會的發展。

- 將智慧IT、產業和社會活動融合所帶來的需求與創新審慎納入考量。

- 均衡技術和產業發展政策，一方面提高國家競爭力，另一方面則提升公眾所期望的社會政策，如就業、教育、福利等。

(3) 建立重大應用、強化核心技術：為迅速穩固權利和獲取智慧IT及其他相關資源而提供策略支援，以提前確保和培養產業競爭力。

- 智慧IT應首先應用於具有最大效應的產業和服務，例如公共服務（國防、安全和管理）、醫療保健和製造業。

- 集中支援採購數據、技術和核心人事，使企業能夠在智慧IT生態系統中建立早期優勢，並增強他們的技術專長。

(4) 提供安全保障、做好衝擊準備：在社會共識的基礎上進行政策改革，並且擴大社會保障的網絡。

- 在公眾的支持下，透過在教育、就業和社會福利上實施彈性且有效的政策，為產業轉型的社會做好準備。

- 提高公眾對技術創新所造成負面影響的認知，例如對隱私的威脅、社會經濟兩極化等，並建立一個廣泛的公共論述架構，以識別和管理風險。

　　關於實現智慧資訊社會的中長期規劃之戰略任務，包括技術、產業和社會之面向，共三要點。

表3-2　南韓實現人文智慧資訊社會的戰略任務

	技術	產業	社會
目標	為智慧IT建立世界級的基礎建設	促進智慧IT在所有產業中的應用	採取積極措施來改革和加強社會支援系統
政策重點	・強化技術和數據，作為競爭力的來源 ・發展網路以確保取得數據的安全	・依照公共部門的模式，促進私營部門的創新 ・集中支持可能產生重大連鎖反應的產業（例如醫藥和製造業）	・針對構成智慧IT社會基礎的教育、就業和福利政策進行改革 ・強化未解決問題的對策（例如網路威脅和道德問題）
任務	・從數據中產生價值，是未來競爭力的來源 ・建立AI技術的基礎 ・以數據及服務為中心建立一個超連結網路環境	・主動將智慧IT應用於公共服務上 ・藉由建立智慧IT產業的生態系統來支持私部門創新 ・透過智慧醫療保健服務創造新價值 ・確保製造業的數位創新	・實現智慧資訊社會的教育創新 ・積極應對自動化和就業多樣化 ・強化智慧資訊社會的社會保障網路 ・智慧資訊社會的法律和道德改革 ・預防管理可能之負面影響（如資訊安全）

資料來源：南韓科學技術情報通信部，資策會MIC整理，2018年10月

◉ 3-3 ▶ 新加坡

2016年起新加坡政府推出45億新幣的產業轉型計畫（Industry Transformation Programme，ITP），幫助製造業、營建業、貿易與運輸、本地服務、新興服務與生活產業等六大產業進行數位轉型。透過引導企業轉型、開拓新興科技、加強人員專業技能等角度進行輔導。2018年更加強輔導，透過培訓、認證、輔導一批專業人員（Professional, Managers, Executives and Technicians，PMETs），並與中小企業媒合，負責中小企業數位轉型的專案管理，以進行有效的數位轉型。

3-3-1 ▶ 政府成立跨部會小組及與業界合作

2016年3月，新加坡在產業轉型計畫提出產業轉型地圖（Industry Transformation Maps，ITMs），目標到2020年，針對六大領域、23個產業，創造13,000個專業工作，以及210,000個資訊與媒體（Infocomm and Media，簡稱ICM）部門工作。ITM共有三大關鍵驅動力：

(1) 引導公司跨部門的應用科技：包含制定中小企業數位化（SME Go Digital）計畫，一步步引導中小企業採用數位科技解決方案，並提倡跨部門創新。

(2) 利用前瞻科技開拓新領域：透過資訊安全、AR／VR、物聯網、AI與資料分析等前瞻技術促進成長，並建構充滿活力的人工智慧生態系統，以及領先的人工智慧中心。

(3) 加強ICM專業人士和公司的活力核心：為人民提供ICM技能培訓，並與戰略夥伴企業共同拓展新的市場機會。

3-3-2 ▶ 新加坡中小企業數位化計畫

新加坡中小企業貢獻了近一半的GDP，雇用2/3的人力。因此，新加坡資通訊媒體發展局（IMDA）從2017年提出中小企業數位化計畫，提供中小企業轉型所需要的相關資源，包含架構人力、顧問服務與興起標準。新加坡政府推出中小企業數位化計畫，主要希望幫助中小企業轉型，增加生產力、管理企業成本、尋找新的利潤機會並擴大營運規模。

2018年5月起，透過培訓、認證、輔導一批專業人員（PMETs），並與中小企業媒合，負責中小企業數位轉型的專案管理，以進行有效的數位轉型。計畫透過五個步驟給予中小企業協助：

(1) 數位路徑圖（Digital Roadmap）：瞭解企業數位化進程，提升員工數位能力

(2) 數位諮詢（Digital Consultancy）：針對企業數位化旅程，提供建言或深度顧問服務

(3) 數位解決方案（Digital Solution）：選擇預先認證的數位解決方案來達到數位化目標

(4) 數位部門計畫（Digital Sector Project）：參加產業領導者領導的先啟計畫

(5) 數位計畫管理服務（Digital Project Management Service）：導入數位解決方案與數位專案管理服務來取得成果

　　新加坡政府這樣的做法，是在解決中小企業的問題時，同步扶持、協助國內的數位化解決方案廠商，並與中小企業需求媒合，達到國內供需雙贏。

透過ITP指導數位技術部署

在採用與部門相關之數位化技術方面給予一步步的建議

6個焦點部門：　零售　食品服務　批發貿易　後勤　環境服務　保全

與有影響力的合作夥伴一起工作	透過新的中小企業數位技術中心，提供專業數位技術建議	興起符合政府預先批准資助之數位科技解決方案的標準
・合作夥伴IMDA共同創造先探者解決方案，例如具有擴增能力的智慧傳感器和自治系統 ・每一中小企業補助達70%，最高不超過30萬新幣	・專注於數據分析、網路安全、和物聯網 ・參加工作坊或年會來增進數位化能力	・獲得由IMDA預先批准且易於使用的數位化技術解決方案

圖3-2 ┤ 新加坡中小企業數位化策略做法

資料來源：新加坡資通訊媒體發展局，資策會MIC整理，2018年10月

3-4 ▶ 美國

　　美國政府自2015年起，針對非機密AI研發的投資規模已成長40%，2017財政年度約投資20億美元在AI相關技術（不包含五角大廈的經費）。白宮計畫優先資助自主系統（autonomous system）、運算基礎架構（computing infrastructure）、機器學習（machine learning）等領域的AI研發，並規劃結合產業界、學界和政府的力量，以全力發展AI。

3-4-1 ▶ 政府增加AI預算並放寬監管

　　在2018年5月白宮科學與科技政策辦公室（Office of Science and Technology Policy，OSTP）發起，並由美國總統首席科技顧問Michael Kratsios親自主持的會議中，與會專家希望美國政府能投入更多資金，確保美國在AI科技的領先地位，同時力抗中國的潛在競爭。

　　美國政府早已體認AI攸關美國軍事與產業競爭力，OSTP的副技術長指出，美國在AI領域保持領先是必要的，而產業界也呼籲政府更加關注於AI的投資與發展，強調美國正逐漸失去優勢。由於AI技術在新型態的戰爭中扮演關鍵角色，許多國家紛紛加碼投資，AI平臺與應用的發展競爭已被美國國防部（United States Department of Defense，DoD）官員形容為新的軍備競賽。

白宮計畫優先資助自主系統、運算基礎架構、機器學習等領域的AI研發。美國政府也將降低創新相關的監管障礙，並支援AI在軍事與民間活動的運用，將允許AI研發人員獲得美國廣大國家實驗室網路的資料，也可在不觸犯隱私權與國家安全的前提下，萃取由龐大納稅人所資助的資料。

3-4-2 ▶ 政府成立跨部會小組並與業界合作

美國政府在美國產業AI高峰會（Summit on Artificial Intelligence for American Industry），達成許多項政策共識與宣達其成果。

表3-3 ┤ 美國產業AI高峰會之會議內容

共識	成員	目的
建立AI委員會（Select Committee on Artificial Intelligence）	商務部、國防部、能防部、科學與科技政策辦公室、國防部高等研究計畫署、情報先進研究計畫署、國家科學基金會、國家安全會議、管理及預算辦公室等	協調美國聯邦整體AI研發的一環，致力於結合產業界與學界，以完全發揮AI的潛力
建立AI聯合中心（Joint Artificial Intelligence Center）	DoD、國防創新實驗小組等	與產業界發展合作夥伴關係，統整DoD與情報體系的資源，整合DoD目前進行中的數百項AI相關研發，以加速部署AI工具
廣邀產業巨擘參與	亞馬遜、臉書、谷歌、英特爾、微軟，美國銀行、波音、奇異、福特汽車、高盛集團與沃爾瑪等	希望多元產業參與，能夠在企業的組成上達成某種程度的平衡

資料來源：美國產業AI高峰會，資策會MIC整理，2018年10月

3-4-3 ▶ 弭平衝擊與疑慮

美國產業AI高峰會刻劃出美國可改善AI發展的各種路徑，其中包括在匹茲堡市（Pittsburgh）設立許多機器人新創。此可成為如何彌補因自動化進程，而損失工作機會的正面教材，最終結果仍是增加就業機會。像是機器人新創如今大舉聘雇工程師、科學家、會計師與行政人員，意謂AI產業將不會直接導致大規模失業潮的證據。另外，OSTP即將針對改善科學（Science）、科技（Technology）、工程（Engineering）、數學（Mathematics）教育（以上簡稱STEM），公布一項五年期的戰略計畫，最主要目標在於增加未來AI研發人員規模。AI的出現反而帶來意想不到增加就業需求的效果。

🌐 3-5 ▶ 歐盟

近期歐盟推動AI、5G、自駕車、區塊鏈等產業與新興技術發展，希望透過成員國之政府力量與協議，修改已不適宜現況的法規與提供完善制度，使企業能在合適的環境下增加競爭力，以發展相關產業內容，同時也刺激經濟成長。

3-5-1 ▶ 規劃及制定區塊鏈技術標準

意圖成為全球區塊鏈樞紐的歐盟，宣布成立歐盟區塊鏈觀察站和論壇（EU Blockchain Observatory and Forum），以蒐集區塊鏈相關資訊、監測和分析相關趨勢，以促進歐洲區塊鏈技術發展。為推動歐洲金融科技產業進步，尤其是金融科技中心英國即將脫歐，歐盟於2018年初時表示計劃制定通用的區塊鏈技術標準，並簡化歐盟國家金融技術部門的授權和登記制度。

歐盟認為區塊鏈技術在金融乃至其他領域都大有可為，但必須對加密貨幣進行監管。如歐洲證券市場管理局（European Securities and Markets Authority）主席Steven Maijoor曾表示，首次代幣發行（Initial Coin Offering，ICO）缺乏常規投資應有的監管保護，具有相當高的風險。此外，成員國的區塊鏈技術發展程度不一，將導致通用標準制定困難，如區塊鏈技術發展相對較快的德國及瑞士等，需苦苦等待發展相對落後的國家跟上，恐將拖慢歐盟在該領域的發展腳步。

3-5-2 ▶ 推出「AI協調計畫」，並欲立法推動數據開放

未來AI商業價值將急速成長，為了應對AI技術崛起所產生的諸多社會及經濟挑戰，歐盟委員會（European Commission，EC）試圖提高相關支出，鼓勵民間和公共投資，並於2018年底前就AI發展的指導原則制定出一套道德和法律架構。「AI協調計畫」（Coordinated Plan on AI）預計在2018年底前推出，並透過與歐盟的28個成員國之間的合作，極大化地擴大整體的投資效益，鼓勵各國在歐盟範圍內開展合作，交流最佳實踐方式並共同確立前進方向，從而穩固歐盟在AI領域的全球競爭力。

圖3-3 ┫ **2017-2022年全球基於AI的整體商業價值預估（兆美元）**

資料來源：Gartner，資策會MIC整理，2018年10月

在法律和倫理方面，歐盟委員會將計畫於2018年底前，公布基於《歐洲聯盟基本權利憲章》（EU's Charter of Fundamental Rights）基礎下所擬定的AI發展道德準則，並將數據保護和數據透明度列入考量。在投資方面，將規劃在2020年底之前投入約200億歐元用於「AI的研究與創新」，投資範圍包括公營與民營機構。歐盟委員會也計畫在「歐盟展望2020計畫」（Horizon 2020）的架構下，將2018-2020年間的投資金額增加至15億歐元，期望能藉此拋磚引玉，從現有的公營或民營合作夥伴中獲得目標25億歐元的額外資金投入。歐盟委員會將考慮使用「歐洲戰略投資基金」（European Fund for Strategic Investments）為企業和新創公司，在AI的相關項目上提供額外的投資與支持，估計2020年前對關鍵領域的總投入金額將會超過5億歐元。

為了刺激AI的發展，歐盟委員會也考慮開放獲取數據的途徑，例如公共部門的數據以供利用，同時也致力創建旨在簡化數據共享的相關措施，包括分享科學數據的一套新建議、指導公營與民營單位進行數據共享與合作，以及企業間的數據共享等。其他相關議題也列為優先發展項目，例如使歐盟公民能安全獲得自身的健康數據，並支援跨國服務；透過歐盟的數據基礎設施實現個人化醫療；以及使研究人員和其他專業人士能在歐盟範圍內匯集相關資源，包括數據、存儲能力、專業知識和運算處理。

3-5-3 ▶ 訂立技術方針，瞄準2030年全自動駕駛社會目標

隨著自動駕駛汽車技術持續發展，歐盟公布新的工程進度目標是2019年上市之新車款多數能具備連網功能，2022年新車款全數能連網，並在2030年以前讓能在都市內低速自動行駛的汽車上市銷售，2030年進入全自動駕駛社會時代。

目前大部分國家的交通安全法規，還是依據1949年簽訂的日內瓦道路交通條約（Geneva Convention on Road Traffic），內文明訂駕駛的監視義務，與自動駕駛技術完全不相容，若道路交通法未修訂，很難在一般道路上測試。因此，歐盟要在2018年內，制定針對各會員國的道路交通相關法令修訂方針，讓各國進行法律修訂，希望2021年以前，確保歐盟各國上市新車款都能安裝自動緊急煞車等十一項安全系統，並將安裝行車記錄器列為義務，這樣才能從2022年開始推動自駕車上市銷售。

3-6 ▶ 中國

中國政府宣示國家戰略級發展方向，明確指出「以人工智慧、量子資訊、行動通訊、物聯網，以及區塊鏈為代表的新一代資訊技術，正在加速突破應用」，將相關科技列為國家戰略發展內重要一環。

3-6-1 ▶ 區塊鏈為國家級戰略產業之一

早在2016年10月工信部已發布「2016中國區塊鏈技術和應用發展白皮書」，同年12月，更將區塊鏈列入「十三五」國家資訊化規劃中。近期，區塊鏈技術將與「中國製造2025」、互聯網等融合發展，成為國家級戰略產業。一旦被列為國家戰略發展產業，中國幾乎都是傾全力扶持，因此可預期中國區塊鏈產業將獲得包括政策、補貼等一系列政府資源，推動整體產業向上。

雖然中國對於區塊鏈技術廣泛應用給予肯定，但同時也嚴格管制加密貨幣及ICO，包括禁止任何ICO、禁止任何加密貨幣交易，並強制所有涉及加密貨幣交易的網站關閉等。除了認為ICO是非法公開融資行為，擔心涉嫌非法發售代幣票券、非法發行證券、非法集資金融詐騙等違法行為可能造成的金融風險外，也擔心有投資人或企業利用加密貨幣，將大量資金移往海外，難以追查。

3-6-2 ▶ 工業物聯網依地方產業特色訂立發展方向

推動「中國製造2025」，從製造大國晉升製造強國，近年持續推動諸多政策與鼓勵措施，工信部2018年6月公布最新針對未來工業物聯網（IIoT）的發展動向。隨中央產業政策不斷推出，各地對IIoT的發展也日益重視，包括上海、北京、天津、廣東、江蘇、浙江、福建、安徽等主要製造業省市也發布加快IIoT應用的產業發展政策，並依循各省市的產業發展現況與優勢訂立更加明確的發展方向。

表3-4 ┥ 中國IIoT重要地方產業政策

地方	規劃方針
上海市	上海市工業互聯網產業創新工程實施方案
廣東省	廣東省深化互聯網+先進製造業發展工業互聯網的實施方案
浙江省	浙江省人民政府關於深化製造業與互聯網融合發展的實施意見
江蘇省	關於組織實施江蘇省工業互聯網創新發展365工程的通知

資料來源：中國各地方經濟和信息化委員會、上海市人民政府，資策會MIC整理，2018年10月

各地方政府規劃下一階段的IIoT發展，也依據各自的產業現狀與特色，制定符合地方實際發展所需的「路徑規劃」。例如江蘇省著重於新能源設備、工程機械、物聯網、生物醫藥和新型醫療設備、核心訊息技術、汽車及零組件等六個先進製造業群體，並目標在2020年前打造五十個標竿項目以提升產業競爭力。

3-6-3 ▶ 設立園區、扶植企業，全力推動AI產業發展

推動「中國製造2025」，誓言要提高中國在創新科技的研發能力，AI技術前景看好。自1980年代開始，位於北京海淀區的中關村從一個原本以高等教育與科學研究聞名的郊區，開始轉型成為高科技研發中心，如今中關村是許多科技公司的搖籃，研發出許多智慧解決方案。有1,000家以上企業，其中56%是新創公司，產業涵蓋零售、醫療照護、教育、服務以及汽車業，被譽為中國的矽谷。中關村轉型成功，印證中國對科技產業發展的決心。

企業方面，科技業三大巨擘：百度、阿里巴巴、騰訊（三者簡稱BAT）以及電商京東等企業都在積極發展創意中心（creative hub），並投入數十億人民幣的資金發展AI計畫。政府方面，北京當局也積極資助企業發展AI技術，2017年中國科技部宣布委託BAT以及AI語音辨識技術領導廠商科大訊飛，打造各領域AI開放創新平臺；2018年1月更是宣布投資21億美元，將在北京的郊區成立新的AI產業園區。

🌐 3-7 ▶ 泰國

泰國政府積極推動泰國4.0（Thailand 4.0）的經濟改革計畫，包括規劃發展5+5目標產業、建設海陸空等交通硬體設施、打造東部經濟走廊（Eastern Economic Corridor，EEC），並提供各種租稅優惠以吸引外資投入等措施，全力推動泰國經濟升級轉型。

3-7-1 ▶ 加速政府機構數位轉型

泰國政府近年積極推動泰國4.0產業數位轉型政策，近期更規劃設立推動大數據、資料中心以及雲端運算等數位基礎建設的委員會，參與機構涵蓋二十個公家單位，其中泰國國家經濟與社會發展委員會（National Economic and Social Development Board）以及泰國電子化政府局（Electronic Government Agency）將全面加速數位轉型進程的策略。其目的在於管理公家機關蒐集的數據與資訊，以協助政府未來決策，推動泰國4.0為主軸的數位轉型以及降低營運成本。

3-7-2 ▶ 央行開發數位貨幣

泰國央行總裁Veerathai Santiprabhob在2018年7月表示，央行正致力於研究區塊鏈科技用於跨國金流及授權方面的應用，並預計將在2019年3月前完成其所開發的央行數位貨幣概念驗證試驗的第一階段。旨在利用數位貨幣使銀行間的交易變得更加便利，提高泰國金融市場基礎設施的效率。目前已與泰國八家金融機構合作展開一項計畫，將利用區塊鏈聯盟R3的Corda平臺創建出數位貨幣，以助實現泰國國內的資金轉移。除此之外，央行也將更加關注數位支付的採用情況，以提高電子支付交易。

3-7-3 ▶ 設立數位新創聚集地

由泰國最大電信集團True Corporation打造的大型數位園區True Digital Park，其總裁Thanasorn Jaidee gave表示，泰國4.0政策以及東部經濟走廊將引導新科技的快速進步和部署。True Digital Park成立的宗旨，是要成為政府數位一站式服務（Government Digital One-Stop-Service）中心，提供新創與企業承租方的政府相關協助。該園區面積預計將達7.7萬平方公尺，可望成為東南亞最大的數位園區，將在2018年第四季正式啟用。

3-7-4 ▶ 企業探索和執行物聯網解決方案的比率

泰國企業在探索和執行物聯網解決方案以增加生產力和創新方面，排名東協第1，應是政府在軟體和硬體基礎設施的政策以及投資意識。亞洲物聯網商業平臺（Asia IoT Business Platform）的調查發現，2017年泰國有89%的企業探索和執行物聯網解決方案，在東協國家中的比率最高，排名其後依序是馬來西亞、印尼、菲律賓以及越南。泰國在2018年探索和執行物聯網決方案的比率上升到92%，製造業占整體工業價值的比率最高（27.4%），採用並部署物聯網以利用新經濟是為關鍵。
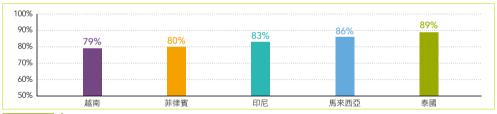

圖3-4 ┣ **2017年東協地區企業探索和執行物聯網解決方案的比率**

資料來源：Asia IoT Business Platform，資策會MIC整理，2018年10月

3-8 ▶ 小結

透過盤點世界重要各國的數位創新經濟政策，以及主要業者發展之重要趨勢，進行觀測與分析，可歸納出他國政府所支持的產業，及其重點工作或增加預算投入項目，在於AI、5G、區塊鏈等數位轉型之相關產業，及其人才之培育與吸引招攬等政策，極為重要。

例如中國將投入大量的資金注入AI、機器人、區塊鏈等產業。歐盟著墨在共建數位化的歐洲，使成員國達成AI、區塊鏈、自駕車和5G之協議與合作，以推動關鍵新興技術發展。美國則對AI產業投入更多的資源，為讓AI發展達到最高潛力，結合來自產、學與政府的資源，像是OSTP將改善STEM教育。正值政府與產業轉型之際，臺灣需要擁有創新思維，各國資通訊政策在數位轉型、智慧科技發展所展現的企圖心，對我國DIGI⁺方案、數位建設、臺灣AI行動計畫等重大科技政策應有深遠的啟發。

運籌帷幄，DIGI⁺方案讓人民有感─
邁向人本永續的智慧國家

推動現況 ▶ ▶ ▶

數位國家‧創新經濟發展方案

‧**DIGI⁺方案**
  - ‧數位基礎環境
  - ‧數位創新人才
  - ‧產業創新轉型
  - ‧人權網路社會
  - ‧建設智慧城鄉
  - ‧數位服務經濟

‧**5+2產業創新**
  - ‧亞洲‧矽谷、生技醫藥、智慧機械、綠色能源、國防安全
  - ‧新農業、循環經濟

臺灣AI行動計畫

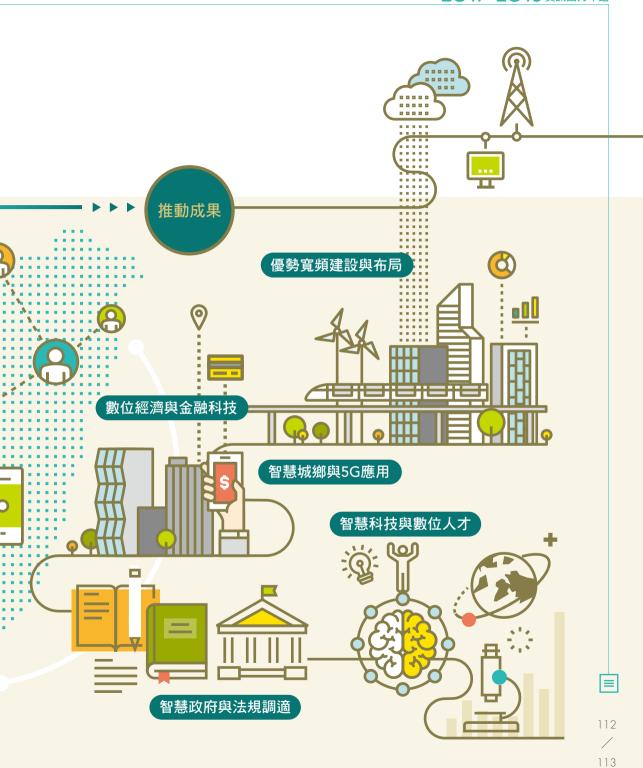AI人才衝刺、AI領航推動、建構國際AI創新樞紐、場域與法規開放、產業AI化

前瞻基礎建設計畫─數位建設

網路安全、寬頻建設、內容建設、服務建設、人才建設

服務型智慧政府推動計畫

‧發展跨域一站整合服務
‧打造多元協作環境

推動成果

優勢寬頻建設與布局

數位經濟與金融科技

智慧城鄉與5G應用

智慧科技與數位人才

智慧政府與法規調適

第四章、運籌帷幄，DIGI⁺方案讓人民有感—
邁向人本永續的智慧國家

　　臺灣面臨人口高齡、少子化以及能源、資源、環境等問題的經濟社會結構之改變，不能僅仿效專注製造業發展的德國「工業4.0」、美國「先進製造」等，更應當為兼顧經濟發展與社會課題而倡議的日本「社會5.0」，利用科技創新發展解決目前所遭遇到的問題與挑戰。透過物聯網、大數據、AI、機器人等第四次工業革命先進技術發展為基礎，跨領域融合擴展應用到社會生活，藉由政府科技創新政策方向導引與落實未來社會創造的行動方案，以達到臺灣產業創造新價值與新服務，改變人民生活提升品質與便捷。臺灣政府推動數位國家・創新經濟發展方案（簡稱DIGI⁺方案）不僅是要提升產業競爭力，還要提升生活的便利性及解決當前社會存在的問題，實現以人為本的智慧國家。

　　DIGI⁺方案落實「5G發展戰略」、「數位學習」、「偏鄉數位」、「智慧政府」、「智慧城鄉」等五大「智慧生活」，呼應「社會5.0」，可因應社會、經濟、產業結構的變遷，也可藉由改善人民生活環境，發展成技術，最後將產業輸出國際。DIGI⁺方案將彈性對國內外形勢變化，持續鏈結中央、地方政府及民間資源，積極與各界溝通，以因應未來趨勢。政府在法規調適、計畫及方案執行、政策引導等相關說明如後文所述。

圖4-1　邁向人本永續的智慧國家

資料來源：行政院科技會報辦公室，2018年10月

4-1 ▶ 我國資通訊政策推動現況

4-1-1 ▶ 數位國家‧創新經濟發展方案

DIGI⁺方案於2016年由行政院提出，旨在將數位經濟視為國家重要發展方向，並延續先前資通訊發展方案，透過基礎建設的建構，除了硬體外，更要加強法規環境及人才培育方面，進一步打造數位國家創新生態，為臺灣5+2產業創新提供優質的數位沃土，以擴大數位經濟之規模，邁向人本永續的智慧國家為願景。DIGI⁺方案以「數位國家、智慧島嶼」為總政策綱領，並以「發展活躍網路社會、推進高值創新經濟、開拓富裕數位國土」為發展願景，期望打造堅實數位環境，提供數位政府服務，並實現保障數位人權之網路社會，促使產業導入數位創新。

DIGI⁺方案之重點發展策略包括：建構有利數位創新之基礎環境（DIGI⁺Infrastructure）、深耕前沿科技研發，掌握自主技術解決方案（DIGI⁺Innovation）、營造跨域數位人才發展舞臺（DIGI⁺Talents）、研析調適數位國家創新經濟相關法規（DIGI⁺Regulations）、數位創新支持跨產業轉型升級（DIGI⁺Industry）、軟硬攜手提升我國數位經濟發展動能（DIGI⁺Globalization）、鼓勵青年創業及中小企業再創業（DIGI⁺Incubation）、落實寬頻人權、開放政府，激發網路社會活力（DIGI⁺Governance）與地方協力建設智慧城鄉，強化區域創新（DIGI⁺Cities）。

達到上述發展願景，DIGI⁺方案積極規劃「活躍網路社會」、「創新數位經濟」、「優勢寬頻環境」等主軸重點，並期望在2020年及2025年分別達到下列目標：

(1) 活躍網路社會

‧ 2020年民眾數位生活服務使用普及率達60%；2025年民眾數位生活服務使用普及率達80%。
‧ 2020年資訊國力排名進入全球前12名；2025年資訊國力排名進入全球前6名。

(2) 創新數位經濟

‧ 2020年數位經濟佔GDP的比率從20.3%（3.4兆元）成長至25.2%（4.8兆元）；2025年數位經濟佔GDP的比率成長至29.9%（6.5兆元）。
‧ 2020年數位軟性經濟產值從1.1兆元成長到1.7兆元；2025年數位軟性經濟產值成長到2.9兆。

(3) 優勢寬頻環境

‧ 2020年寬頻服務由目前100Mbps快10倍達1Gbps（涵蓋率90%）；2025年寬頻服務達2Gbps（涵蓋率90%）。
‧ 2020年落實寬頻上網基本權，弱勢家戶保障頻10Mbps；2025年弱勢家戶保障頻 25Mbps。

　　在DIGI⁺方案推動下，我國得以加速數位經濟的發展，讓臺灣從製造型產業環境轉型至創新型生態體系，亦能從創新應用轉型過程推及至數位化政府，進而以資訊化、智慧化施政來福澤民眾生活，以求能在數位經濟發展和數位國家建設的磐石上，打造平等、活躍的網路社會以及永續、活化的智慧城鄉。

4-1-2 ▶ 臺灣AI行動計畫

　　隨著大數據、雲端運算、機器學習、語音辨識等技術的成熟，AI也成為不可小覷的發展趨勢。行政院於2017年7月召開「智慧系統與晶片產業發展策略會議」，共500位國內外產官學研代表參加，依據各方建議，研擬推動計畫，協助產業面對AI所帶來的挑戰。

　　策略方面，規劃五大主軸，搭配5+2產業創新方案、前瞻基礎建設和智慧城鄉計畫，共同推動普及智慧科技應用。五大主軸如下：

(1) **AI人才衝刺**：包括育才、留才及攬才三個面向，由養成、培育及匯流為出發點，以養成千人智慧科技菁英，培育萬人智慧應用先鋒，以及吸引全球AI人才為推動重點。

(2) **AI領航推動**：聚焦推動有利基優勢的研究主題，以開放競爭及公開遴選的方式，精選國內外計畫團隊來執行，接軌國際，吸納全球菁英。並結合前瞻研究、人才培育與科研計畫推動，建立資訊共享、橫向溝通與縱向串連的整合機制，形塑我國 AI前瞻研究網絡。

(3) **建構國際AI創新樞紐**：扶植百家AI新創，帶動AI新創事業鏈結國際產業價值鏈，同時吸引國際級旗艦公司來臺設立研發基地，藉以發展國際級的AI創新聚落。

(4) **場域與法規開放**：開放場域鼓勵AI應用實證，並形成開放資料流通生態，同時加速相關法規鬆綁或調適。

(5) **產業AI化**：將推動AI創新媒合平臺，以5+2產業創新需求為導向的人才培訓與媒合機制，建立完善產業AI化環境，帶動中小企業AI創新轉型，協助產業解決問題。

　　「臺灣AI行動計畫」強化臺灣既有優勢，以硬體扮演經濟推力，軟體為拉力，鏈結國際夥伴能量，塑造臺灣成為全球智慧科技創新重要樞紐，讓臺灣在下一波的智慧革命中取得機會與優勢，帶動我國邁向未來經濟發展的新階段。藉各主軸計畫的整合，本行動計畫全程預期可達成總體目標主要有三：

(1) 為我國培育千人AI高階人才以深耕AI技術，及萬人智慧應用先鋒以擴大AI應用普及至各產業的能量；

(2) 透過AI領航計畫推動AI on Device，讓我國AI晶片躍居全球前三之產業地位；

(3) 透過人才與產業的共同推動，讓臺灣能在AI應用於特定產業領域上居全球第一的優勢地位。

表4-1	臺灣AI行動計畫之五大主軸	
行動計畫主軸	**子項名稱**	**相關部會**
AI人才衝刺	智慧科技菁英	科技部、教育部、經濟部
	智慧應用先鋒	科技部、教育部、經濟部、勞動部
	吸引全球AI人才	經濟部、科技部
AI領航推動	聚焦研究主題	科技會報辦公室、經濟部
	發展國家級AI前瞻研究網絡	科技部、經濟部、資安處、教育部
建構國際AI創新樞紐	扶植百家AI新創事業	經濟部、科技部
	發展國際級AI創新聚落	經濟部、科技部
場域與法規開放	實證場域與資料開放	經濟部、科技部、環保署、交通部、內政部
	AI相關法規議題研析	國發會、科技會報辦公室、各部會
產業AI化	鏈結5+2產業創新與AI人才媒合	經濟部、科技部、國發會、農委會、教育部、勞動部
	完善產業AI化環境，帶動中小企業AI創新	經濟部、科技部

資料來源：行政院數位國家創新經濟推動小組，資策會MIC整理，2018年10月

4-1-3 ▶ 前瞻基礎建設計畫─數位建設

在數位科技的普及下，人和機器間的互動會更加頻繁，在這樣的關係之下，政府能夠提供公平的數位環境，讓人們能不受個人條件因素影響，皆享有便利的數位服務。在資源分配與共榮的目標之下，首先必須考慮城鄉差距的問題，往後所做的建設才能有效地提高人們生活上的舒適、便利和安全。

數位建設的定位在於加速推動國內超寬頻網路社會相關碁磐建設，建構民生、公共物聯網來提升生活品質與安全，並帶動數位文創與內容產業發展，以達成「數位國家·創新經濟發展方案」重點目標。在實現超寬頻生活、營造智慧國土典範和成為全球數位標竿的願景之下，共有以下五大推動主軸：

(1) **推動網路安全基礎建設，提供網路安心服務─網路安全**：提升全國資訊與資安環境，保障國家及人民安全。

(2) **完備數位包容，保障寬頻人權─寬頻建設**：保障弱勢擁有基本網路頻寬及雲端資源。

(3) **發展數位文創，普及高畫質服務─內容建設**：帶動數位文創成為兆元產業。

(4) **建構開放政府及智慧城鄉服務**—**服務建設：**國民普遍使用智慧服務，改善生活品質。

(5) **建設下世代科研與智慧學習環境**—**人才建設：**國民享有數位創新學習環境。

表4-2 ┤ **數位建設之五大推動主軸**

主軸	計畫名稱	期程	主管部會
網路安全	建構公教體系綠能雲端資料中心	107-110	國發會、教育部
	強化政府基層機關資安防護及區域聯防	106-109	資安處
	強化防救災行動通訊基礎建置	106-109	通傳會
	強化國家資安基礎建設	106-109	資安處
寬頻建設	提升偏鄉衛生室及巡迴醫療點網路品質	106-109	衛福部
	普及偏鄉寬頻接取環境	106-109	通傳會
	普及國民寬頻上網環境	106-109	教育部、內政部、經濟部
內容建設	國家文化記憶庫及數位加值應用	106-110	文化部、故宮、國史館
	推動超高畫質電視內容升級前瞻計畫	106-109	文化部
	新媒體跨平臺內容產製計畫	107-110	文化部
服務建設	普及智慧城鄉生活應用	107-109	經濟部
	建構民生公共物聯網	106-109	環保署、交通部、科技部、經濟部、內政部
	體感科技基地–體感園區計畫	107-110	經濟部
人才建設	建置校園智慧網路	106-109	教育部
	強化數位教學暨學習資訊應用環境	106-109	教育部
	高中職學術連網全面優化頻寬提升	106-109	教育部
	建構雲端服務及大數據運算平臺	106-109	科技部
	自研自製高階儀器設備與服務平臺	106-109	中研院、科技部、經濟部
	園區智慧機器人創新自造基地	106-109	科技部

資料來源：行政院，資策會MIC整理，2018年10月

4-1-4 ▶ 服務型智慧政府推動計畫

　　臺灣自1988年以來，推動數位轉型計畫已20年，隨著數位科技的發展，改變了民眾和政府的互動模式，因此政府必須積極面對挑戰並且與時俱進，國家發展委員會提出「第五階段電子化政府計畫–數位政府」中程計畫，期望運用雲端及物聯網大數據，改善政府服務樣態，達成領先全球之數位政府的願景。

在行政院整體規劃DIGI⁺方案，國發會以此為上位指導，將原「第五階段電子化政府計畫」轉型為「服務型智慧政府推動計畫」，以期契合民眾需求，提供更安全與便捷的生活環境，同時提升國家競爭力。

此階段將以資料力量驅動，擴大公共服務的深度和廣度，整合資訊服務，落實透明化治理。本計畫主要推動之兩大策略如下：

(1) 發展跨域一站整合服務：

- 專業決策：公私協力徵集民眾智慧、大數據分析形塑優質決策。
- 服務整合：提供一致操作方式之政府服務入口，提升跨機關數位服務品質。
- 資料活化：安全地使用個人資料，提供更便捷之個人化服務。

表4-3 ┤ **服務型智慧政府推動計畫之策略一**

策略一：發展跨域一站整合服務

專業決策	公私協力徵集民眾智慧 1. 成立業務領域專家學者顧問團 2. 輔導內政、商工、經費結報、社會福利及醫療等一站式服務 3. 每年陸續擇定三個以上數位服務情境，輔導相關服務流程再造 大數據分析形塑優質決策 1. 政務制定決策：蒐整行政院及所屬部會業務資料，結合社群媒體與研究資訊，精進政務決策品質 2. 環境永續決策：即時監控環境變化數據，精確分析環境變化或汙染趨勢 3. 產業發展決策：因應我國推動綠電、電商政策，以經濟部業務資料為基礎，結合政府開放資料，探索我國新興產業發展新契機 4. 人資培力決策：以循證基礎的公務人員職涯發展模式，促進人力運用適才適所
服務整合	發展前臺一致、後臺整合數位服務，盤點及整合政府部門資源，透過一站式政府服務入口網，提供民間便捷及優質服務流程
資料活化	賦予民眾資料自主權，活化資料以提升效益 1. 虛擬整合提供下載：以民眾生活為中心，整合分散於各機關之個人資料以及與個人生活攸關之公共服務資訊，提供便捷安心之個人化服務 2. 提供精準數位服務：在民眾同意下，政府或民間業者可使用民眾資料，即時主動提供線上諮詢與服務，提供以人為本便捷服務

資料來源：國家發展委員會，資策會MIC整理，2018年10月

(2) **打造多元協作環境：**

- 資料治理：從資料、流通、資訊、服務層面訂定完整資料應用規範。
- 開放協作：透過中央及地方一站整合服務，結合全民協作，擴展資料價值。
- 公民參與：資訊科技應用於民主政治，推動跨部會平臺服務。

表4-4 ┥ **服務型智慧政府推動計畫之策略二**

策略二：打造多元協作環境

資料治理	從資料、流通、資訊、服務層面訂定完整資料應用規範，以促進異質平臺交換效率，提升資訊公開價值，進而精進政府服務品質。個人資料去識別化後，提供大數據之應用，同時保障民眾個人資料安全，也優化政府治理
開放協作	強調全民協作，透過一站式政府服務的發展，提升資料品質與使用效益 1. 中央地方服務完整銜接：協調各區域地方政府評估建立內部共用系統及外部共用服務；成立業務領域共榮圈，輔導地方及中央整合業務資料，推動服務流程改造；輔導優質資訊服務導入地方政府，如弱勢e關懷 2. 資料開放促進透明治理：成立政府資料標準跨部會工作圈，擇定商工、財稅等九大業務領域，優先推動領域資料標準；推動共通性應用程式介面納為政府業務系統之預設功能；推動政府資料品質優質標章機制，建立資料應用評獎措施，鼓勵政府資料創新應用
公民參與	資訊科技應用於民主政治，推動多元化公民參與管道和機制 1. 數位機會調查縮短數位落差：定期辦理個人／家戶數位機會調查，掌握我國資訊社會現況，建立長時間與國際序列比較基礎，以提供政府相關部會評估及制定縮減數位落差政策執行參考 2. 公共政策全民網路參與：推動跨院、跨縣市政府之介接服務；擴大公民參與輔導機制，推動多元化參與管道；完備網路參與程序與法令，建構完善的網路參與環境

資料來源：國家發展委員會，資策會MIC整理，2018年10月

Ⓐ 4-2 ▸ **我國資通訊政策推動成果**

4-2-1 ▸ **優勢寬頻建設與布局**

　　智慧化需要建立相關生態系，基礎建設是不可或缺的一環，行政院也積極推動改善寬頻網路建置及人才培育等工作，寬頻聯網布建目標是在2020年1Gbps涵蓋率達90%，2025年2Gbps涵蓋率達90%。中央與地方持續合作，於寬頻建設涵蓋公共場域、偏鄉服務和基礎網路，讓每個城市共同進步、發展更迅速，達成臺灣發展數位經濟，成為智慧國家之目標。

表4-5	優勢寬頻建設之階段性成果
要點	**推動與成果**
公共場域	・2018年8月底止，提供逾9,100個iTaiwan熱點，累積國人註冊帳號487萬人次，外籍旅客逾100萬人次；使用人次逾3.3億人次 ・2018年7月底止，全國公共圖書館有262館寬頻上網100Mbps以上 ・2018年全國45%公立高中職連外頻寬支援Gbps介接能力
偏鄉服務	・2018年全國50%巡迴醫療點及衛生所網路頻寬達100Mbps，提供衛生所資訊系統及影像傳輸儲存系統服務，強化偏鄉醫療品質 ・截至2018年共建置190個部落的戶外無線寬頻環境，全國737個部落有25.8%原鄉部落無線寬頻上網達100Mbps。整合長照資源，便利原民取得健康資訊，提升自我健康管理能力
基礎網路	・2020年提升Gbps等級家戶涵蓋率達90%，2018年8月Gbps等級家戶涵蓋率達50.6%（不含偏鄉） ・普及偏鄉寬頻網路基礎建設（Gbps到鄉；100Mbps到村里），2018年9月核定15個鄉（鎮市區）達Gbps等級寬頻建設

資料來源：行政院科技會報辦公室，資策會MIC整理，2018年10月

　　政府為展現推動5G等創新科技之決心，積極調整法規以創造5G等數位創新發展有利環境，簡化5G實驗申請程序，放寬5G實驗申請對象。並透過「頻率供應計畫」拍板及公告創新實驗頻譜，也另行公告實驗區域及其他條件，符合資格之實驗需求單位即可直接提出申請。而在電信管理法，解除電信業務別管制，將特許制、許可制修正為登記制，鼓勵市場參進。彈性頻譜管理法規，鼓勵創新通訊傳播技術及服務發展。解除網路建設限制，企業可按需求彈性組合與設置網路，發展新技術與設備，也完善資安防護義務，確保網路使用安全。

4-2-2 ▶ 智慧科技與數位人才

　　為智慧科技創新研發，以及加速「5+2」產業創新，行政院已於2018年1月18日通過「臺灣AI行動計畫」，由行政院科技會報辦公室主責，整合科技部、經濟部等8個部會，預計2018-2021年共投入360億元，讓AI與產業需求接軌，以鬆綁、開放、投資精神，落實AI智慧應用。

　　數位跨域人才培育，如培育AI人才方式不再走過去傳統模式（先準備教材、訓練種子教師，然後培訓學員，再轉介給企業），若再以此模式，短期之內，臺灣的機會即有可能會被其他國家取代，來不及應付企業及市場的需求。所以未來跨部會在AI人才培育方面，將採創新模式，先瞭解企業需求，將產業界面臨的問題直接和學者專家討論，對症下藥，做人員培訓。

表4-6 ┤ AI技術之階段性成果

工作重點	工作內容與成果	單位
發展AI 核心技術	・AI領航推動：成立AI on Chip籌備工作小組，結合產官學研，規劃我國AI晶片關鍵議題發展方向；另由5+2產業為出題範疇，先行聚焦資安及醫療領域，以產業需求為導向，透過研發主題之選定，進行AI新創團隊徵選作業	經濟部
	・半導體射月：完成20組研究團隊選拔，與台積電及聯發科等62家公司簽署合作意向書。建置三項晶片及系統設計環境服務建置與二項先進奈米元件服務平臺	科技部
建構AI 雲端平臺	・2018年6月結合華碩、廣達及臺灣大哥大共同建置AI雲端平臺，透過整合一站式之入口，提供AI計算、大數據分析與資料儲存管理，支援學術研究並橋接產業應用	科技部

資料來源：行政院科技會報辦公室，資策會MIC整理，2018年10月

表4-7 ┤ 數位人才培育之階段性成果

培育	工作內容與成果	單位
高階人才	・打造頂尖的 AI 研發環境，推動人才與全球接軌，2018年6月與NVIDIA及Synopsys等簽署合作備忘錄（MOU）推動技術合作及人才培育，目前正與NVIDIA洽談自駕車合作事項 ・已成立四個AI創新研究中心，2018年4月舉辦臺以雙邊交流會，並培育碩博士畢業生約270人，2018年9月臺灣大學與史丹佛大學簽訂MOU為生技醫療開拓新局	科技部
基礎人才	・107學年度大學申請入學管道擇定資訊領域，將大學程式設計先修檢測納為第一階段檢定或篩選試辦項目 ・扎根K-12中小學教育，將於2019年完成高中AI教材，教學目標在於「邏輯與運算思維」，利用基本的AI認知，引發學生學習興趣，銜接大學人才培育	教育部
產業人才	・運用「產業出題、人才解題」人才培育機制，以5+2產業創新需求為導向，培育AI應用人才，以戰代訓試煉AI解決方案，至2018年9月15日合計出題廠商32家，經篩選後上架題目計50題、業師69名，並促成解題團隊28隊	經濟部
	・2018年5月啟動臺灣人工智慧教育平臺，鏈結國內外AI大規模開放線上課程（MOOC）	教育部

資料來源：行政院科技會報辦公室，資策會MIC整理，2018年10月

除了人才培育，前瞻科技需與國際鏈結，科技部赴美國聯合招商成果豐碩，促成南科美萌科技公司與uLab Systems Inc.（AI智慧齒顎矯正軟體開發公司）簽訂技術交流MOU，希望吸引到臺灣投資。也吸引矽谷VR／AR新創公司Aemass Inc.來臺設立研發基地，公司以可攜式3D立體錄影系統作為VR／AR影像技術支持並應用在各產業，目前正協助該公司進駐Taiwan Tech Arena（TTA）鏈結相關創業資源。另建構RICHI Foundation & Richi Entrepreneurs臺美雙邊創業平臺，未來可與該基金會創業平臺合作，培訓臺灣新創團隊晉級國際盃。

4-2-3 ▶ 數位經濟與金融科技

數位經濟蓬勃發展時代，臺灣要能成功轉型為創新驅動經濟，就必須打造良好的新創投資環境。國發會於2017年11月14日「加速投資臺灣專案會議」第四次會議中提出「優化新創事業投資環境」，彙整各部會具體做法，研提「優化新創事業投資環境行動方案」，經2018年2月22日行政院院會通過，由國發會與經濟部、科技部等十二個部會及國發基金共同推動，以鼓勵、支持及培植新創事業發展，帶動我國產業轉型。並希望兩年內先孕育至少一家獨角獸新創事業，並帶動未來五年新創事業獲投資金額每年成長50億元，使臺灣成為亞洲新創資本匯聚中心。

表4-8 ┥ **優化數位經濟生態之階段性成果**

工作重點	工作內容與成果	單位
提升服務商轉	2018年上半年電子化支付工具交易金額1.8兆元，較去年同期成長23%，其中國內金融機構辦理之行動支付部分185億元，超越去年全年度總交易金額（148億元），順利推動友善電子化支付環境	金管會
	透過輔導電商業者跨境交易、行動支付、超高畫質電視內容升級等措施，提升電商、電視產業等業者共328億元產值	經濟部、文化部
打造創新生態	啟動10億元創業天使投資方案、1,000億產業創新轉型基金，協助企業創新轉型募資，並成立諮詢輔導服務團，提供多元輔導能量	國發會
	結合臺北市於數位產業園區（Taipei digiBlock）設置「產業技術支援中心」，提供逾200坪研發測試空間，供業者投入研發使用	經濟部
鬆綁數位法規	2018年8月28日修正發布「電子支付機構使用者身分確認機制及交易限額管理辦法」，增加電子支付帳戶之消費支付彈性及提升電子支付帳戶使用便利性	金管會
	頒布實境體感應用服務業自律規範機制，威達公司於7月20日為首家通過政策指導自主管理之場域，成為營運商參考示範場域	經濟部

資料來源：行政院科技會報辦公室，資策會MIC整理，2018年10月

此外，政府建構金融科技創新基礎，推動創新實驗機制，如「金融科技發展與創新實驗條例」自2018年4月30日施行迄今，已受理申請案三件，一件已核准，另二件分別處於審查及補件程序；預計受理十件申請案之年目標可達成。首宗核准案係凱基商銀與中華電信，運用電信行動身分認證技術，實現客戶資料可攜權，辦理新戶之線上信貸及信用卡業務，提供更公平合理之訂價，實現普惠金融。

另也引領創新生態成形，如國內第一個金融科技實驗共同空間「金融科技創新園區」（FinTechSpace）已於2018年9月18日開幕，建立金融科技生態圈，孵育國際級人才及新創企業。新創進駐通過三十七家，包括新加坡二家、美國、香港、日本、菲律賓各一家等六家國際團隊。企業實驗室包括中信商銀、星展銀行、悠遊卡公司、華南銀行等。由金融總會及金融研訓院共同主辦的「2018臺北金融科技展」，於2018年12月7日-12月8日舉行，彰顯金融科技之推動成果。透過金融科技博覽展、國際趨勢研討會及多元媒合活動等，提供人才資金之相互交流、協助業者拓展商機與跨業合作，深化金融科技能量。

優化新創事業投資環境行動方案有五大政策方向推動，包括：

(1) 充裕新創早期資金：推動天使投資人租稅優惠、積極與國際創投合作，加強投資前瞻產業；

(2) 人才發展及法規調適：落實外國專業人才延攬及僱用法，並策略性吸引東南亞學生與人才來臺，加速推動公司法修法，讓新創營運更便利；

(3) 政府成為新創好夥伴：政府、法人及國營事業帶頭，透過採購新創產品及服務、開放資料等方式促進新創參與，並以政府計畫鼓勵企業與新創合作或投入創新創業；

(4) 提供新創多元出場管道：增列上櫃電子商務產業類別，並提出多元上市櫃條件，協助尚未有獲利之新創進入資本市場，持續研議有助企業併購新創之租稅優惠等誘因；

(5) 新創進軍國際市場：吸引國際知名加速器來臺設點，選送新創赴海外加速器，帶領新創參加全球專業展，透過外館提供新創落地諮詢及媒合服務，協助拓展業務。

表4-9 ┤ 優化新創事業投資環境之階段性成果

工作重點	工作內容與成果	單位
充裕新創 早期資金	創業天使投資方案5月正式啟動	國發會
	產業創新條例增加有限合夥創投，採穿透式課稅，天使投資人租稅優惠於5月、6月實施	經濟部
人才發展及 法規調適	外國專業人才延攬及僱用法2月施行，針對八大領域外國高端人才核發就業金卡（迄9月中核發112張）	國發會
	公司法修正條文8月公布，提出10項有利新創發展的措施	經濟部
	建置新創稅務線上專區，提供企業併購稅務及商譽攤銷等資訊	財政部
政府成為 新創好夥伴	推動新創共同供應契約採購，已提供51項新創產品服務供政府、國營事業採購	經濟部
	國營事業與新創合作，如臺電與Pi拍錢包、街口支付等業者合作提供多元繳費	經濟部等相關部會
提供新創多元 出場管道	3月增列上櫃電子商務產業類別、公布大型無獲利企業多元上市櫃方案	金管會
新創進軍 國際市場	3月增設駐以色列科技組	科技部
	小巨蛋青年科技創新創業基地6月、林口新創園9月啟動	科技部、經濟部
	帶領新創赴CES等國際展會，其中愛瑪麗歐於新加坡IoT Asia 2018獲獎、ReCactus在香港RISE奪冠	科技部、經濟部、國發會

資料來源：行政院科技會報辦公室，資策會MIC整理，2018年10月

4-2-4 ▶ 智慧政府與法規調適

　　隨著數位科技的進步，改變民眾和政府的互動方式，世界先進國家皆面臨政府數位轉型之挑戰，包括使用更少資源提升政府能力，提供更廣泛的高品質服務，實現更透明、開放、課責、有效的公共管理，以強化公眾對政府的信任。臺灣為接軌世界先進國家推動數位服務轉型趨勢，並厚植我國數位競爭力，國發會以DIGI⁺方案為上位指導方針，將「第五階段電子化政府計畫」轉型為「服務型智慧政府推動計畫」，優先以民眾關切議題推動數位服務，契合民眾的需要，並提升國家數位競爭力。

表4-10	服務型智慧政府之階段性成果	
工作重點	**工作內容與成果**	**單位**
網路報稅服務	·簡化Mac報稅程序，5分鐘內完成報稅 ·106年度綜所稅「網路申報」較上年度成長3.21%，「網路申報」加「試算申報」占總申報比率達96.34%	財政部
健康存摺服務	·2018年6月起擴增大腸癌、口腔癌、子宮頸癌、乳癌等4項癌症篩檢結果資訊的提供 ·2018年5月啟用手機註冊程序，使用人數快速增加超過80萬人，較去年同期增加1.5倍	衛福部
戶政一站式服務	·一次提供資料，多處使用。民眾至戶所變更資料時，同步通知稅務、地籍等8機關（構） ·戶所接受勞、國保生育給付申請，由原本約15個工作天提早2-5個工作天入帳	內政部
社福一站式服務	·民眾申辦社會福利業務，低收入戶生活補助等5項作業由45天減少為最快7天	衛福部
公司登記 一站式服務	·2018年完成公司登記免印鑑全程線上申辦及第一階段流程簡化作業，並配合8月1日公司法修訂，預告修正之「公司登記辦法」，規劃第二階段公司登記程序簡化作業	經濟部

資料來源：行政院科技會報辦公室，資策會MIC整理，2018年10月

　　所謂開放資料分級使用，是以政府資訊公開法為基礎，極大化政府資料開放。自由利用資料，係以原始電子資料提供各界利用，且以無償方式，不限制使用目的、地區及期間，且不可撤回之方式授權利用為原則。有條件利用資料，則是於一定條件下，以原始電子資料提供各界取用，並將資料清單列示於政府資料開放平臺。除此之外，以獎勵機制使質量並進，打造優質環境，展現資料應用成果，打造高品質政府開放資料，政府與民間合作發展優質創新服務。

　　新創事業是臺灣未來經濟成長不可忽視的力量，政府首要工作是排除各種新興商業模式適用法規的不確定性。國發會已建置推動「新創法規調適平臺」，為青年創業者提供穩定的發展環境。各機關積極配合國發會規劃參與平臺運作，並依據「法律沒禁止的，原則上就是可以」的開放心態，協助釐清法規適用疑義，以擴大新創事業發展空間，為經濟成長動能注入活水。國發會邀集主政機關及新創業者釐清商業模式法規適用疑義，已釐清及解決包括共享停車位分級管理與稅率從寬認定、網路租車平臺驗車方式適法性、放寬電子票證感應距離等十六案。

在數位經濟時代下，大數據運用與資訊共享已成為不可逆的趨勢，而全球化的資料流通，勢必也讓個人資料保護面臨更嚴峻的考驗。歐盟於2018年5月全面施行一般資料保護規則（General Data Protection Regulation，GDPR），建立嚴格的個人資料保護法制架構，促使許多國家重新檢討個人資料保護法規。國發會於GDPR施行後，即於行政院院會報告因應之相關作為，並於2018年7月4日成立「個人資料保護專案辦公室」：

- 辦理GDPR 相關事宜，與向歐盟申請適足性認定工作
- 檢討並協調各部會執行個人資料保護法之一致性
- 撰擬申請 GDPR 適足性認定自我評估報告
- 陸續召開專家諮詢會、中央及地方政府機關座談會等
- 已分別於9月11日、9月14日及9月19日舉辦北、中、南宣導說明會

4-2-5 ▶ 智慧城鄉與5G應用

在尋求數位轉型的同時，資訊安全的重要性相對提高，其在各產業的應用存在巨大落差。臺灣大力推動5+2產業創新政策與DIGI⁺方案，目標就是要推動臺灣企業的數位轉型與數位經濟發展，而這些政策基礎都需要良好的資安環境。行政院積極發展「資安法制工作」、「資安產業發展行動計畫」，扶植國內資安產業，協助強化臺灣各個產業的資安整備，也期盼建立全球資安產業創業基地，打造臺灣產業優質安全品牌。同時期許能夠扮演資安服務提供者和產業資安應用者間的橋樑，致力打造適合資安發展環境，提升臺灣各產業的資安防禦能力。

「智慧城鄉溝通平臺」為中央與地方協作的創舉，是落實DIGI⁺方案主軸「智慧城鄉區域創新」重要對話機制，目的在於建立並順暢中央與地方的溝通管道，整合地方與中央資源，加速區域合作及建構區域創新生態體系。實現數位國家、智慧島嶼的政策願景，落實以地方需求為導向的創新機制，加速智慧城鄉創新應用與普及。此平臺首先將透過會議方式，形成並標示智慧城鄉推動議題，確立推動方向，並協調部會與地方在智慧城鄉的統籌規劃，以連結中央和地方資源，避免資源重複投入，加速智慧城鄉創新應用的落實。

透過「智慧城鄉溝通平臺」，地方政府也可分享過去智慧城市推動的成功經驗，加速擴散，各部會也可針對重要政策與地方對話。未來若地方政府遭遇需要協調或法規調適等智慧城鄉推動上的相關問題，無須等待三個月召開一次的會議，只需透過線上平臺反映議題，即可獲得即時的處理和回應。

表4-11 ── **資安相關產業發展之階段性成果**

要點	工作內容與成果
建立校園到產業之人才培育體系	・108學年度核定資安碩士班4校、資安碩士在職專班1校 ・開辦「系統滲透測試攻防實務」、「資安事件鑑識調查」等6門短期實務在職課程，及「資訊安全專業精英班-雲端網路系統工程師」中長期課程
研發資安關鍵技術	・促成產學合作計畫33案，金額達3,200萬元；技術移轉7件，金額達540萬；計畫產出專利達6件 ・辦理技術整合，將資安事件管理平臺（SIEM）以國內自研產品替代國外產品
發展產業標準、參與國際標準制定	・完成「智慧巴士車載資通訊系統資安標準暨測試規範」草案，預計12月公告 ・完成「物聯網資安認驗證制度─影像監控系統」，公告「影像監控系統（IP CAM V2.0、NVR V1.0、NAS V1.0）資安標準及測試規範」 ・提供車聯網惡意行為偵測技術貢獻，獲國際標準草案採納
資安行銷與國際推廣	・舉辦「臺灣資安產業躍升交流展示會」，提供30家臺灣資安業者媒合機會 ・舉辦「2018 Explore Next Cyber Taiwan–國際資安新創交流活動」，促成與以色列新創園區的資安人才交流，及荷蘭Security Matters產品合作機會 ・參與新加坡國際資安展RSA Conference，設置APJ臺灣館

資料來源：行政院科技會報辦公室，資策會MIC整理，2018年10月

表4-12 ── **智慧城鄉新創參與暨培育機制**

核心訴求	方向	推動機制（連結國際大廠資源）
智慧創生，城鄉躍升	・結合「在地資源」發展在地特色智慧應用 ・匯集「跨域資源」營造地方友善創業環境 ・透過「在地實踐」打造具實務之整合方案	・結合國際大廠資源（如AWS雲端服務），提供創新創業發展能量 ・以創業輔導結合競賽獎勵，擴大新創團隊參與機會

資料來源：行政院科技會報辦公室，資策會MIC整理，2018年10月

　　智慧城鄉創新成功需仰賴三個條件，首先，瞭解在地需求，並透過智慧科技解決問題，使民眾有感；其次，結合地方政府與企業、學校、研究機構以及人民等力量推廣。第三，需匯集跨區域資源，擴展效益。期許結合中央和地方共同力量，實現服務永續、產業升級、地方受惠及民眾有感的目標。

在5G相關應用發展方面，政府將「鼓勵5G垂直應用場域實證」、「建構5G新創應用發展環境」、「提供5G技術支援及整合試煉平臺」、「規劃釋出符合整體利益之5G頻譜」、「調整法規以創造5G發展有利環境」等五大政策面向研議具體方案，並協調各部會細部推動措施，擬定未來5G發展行動計畫。

通傳會以2020年完成第一波5G頻譜釋出為目標，往「行動寬頻服務」及「垂直創新應用」方向努力，預計在中頻段3.5GHz及高頻段28GHz部分，分別釋出270MHz及2500MHz的連續大頻寬頻譜供5G使用。

國發會則以邁向5G＋物聯網新紀元之願景下，積極建構5G新創產業立基，建立5G物聯網共創生態圈，並聚焦5G新興載具開發與創新應用，同時營造友善5G創新創業環境，檢討鬆綁法規，挹注新創資金，提供試煉場域，培育新創人才。

經濟部規劃我國5G產業生態發展四大策略，首先，將透過研發自主5G專網系統、發展一鍵部署解決方案及成立國際開源系統認證中心等方案，以整備5G應用發展技術；第二，透過政策支持，如頻譜取得、場域補助、法規調適及與中央地方共創具產業及社會價值之5G創新應用；第三，建立電信級資安技術及培育資安服務整合方案供應商，以厚植我國自主防護能量；第四，則結合業界能量，擴大國際社群連結，培育通訊、應用、開源軟體等研發人才。

各部會亦將積極規劃推動5G生活應用，如科技部建構民生公共物聯網、教育部規劃5G校園應用、文化部打造文化科技實驗場域及衛福部推動智慧醫療照護，藉此提供民眾各式型態的新生活智慧服務，實現智慧生活。

ⒶＡ 4-3 ▶ 臺灣未來的創新

DIGI⁺方案為促進數位經濟創新發展，帶動5＋2產業創新及加值應用，提高國人生活品質，加速邁向智慧國家。目前已完成部分數位經濟之法規調適，政府也編列發展數位科技之預算投入，以及推動相關行動方案與計畫，厚實智慧國家發展基礎。以下就幾個面向說明，如下：

在5G發展方面，政府將持續打造臺灣成為適合多元5G創新應用發展之場域，目標是實現產業創新、驅動區域發展、打造智慧生活等。行政院科技會報辦公室協調通傳會、交通部、經濟部、科技部、國發會等相關部會共同合作，規劃我國5G產業創新策略方向，並展開多項5G發展推動措施，包括頻譜整備規劃、創新實驗頻譜、技術研發與產業串連、法規環境整備、量測實驗、創新創業等，亦廣納諮詢產業各界意見，以完善各項政策措施。

在數位學習方面，教育部已規劃在2030年普及數位學習應用。政府將提供無障礙且便利的學習環境，包括主幹、教室無線連網、網路漫遊、智慧網路管理減輕人力負擔；數位科技應用教學，包括線上學分課程、大規模開放線上課程、行動學習、個人化、自主、適性化學習、直播教學、數位學伴等。制度面則支持數位學習創新模式，包括遠距教學法規、跨校選課、學分採認、講師鐘點等，並規劃隨時隨地皆教室、隨手可得學習資源，包括開放課程、影音教材、教育APP、電子書、教學平臺、數據資料分析等。

在智慧城鄉方面，從在地需求出發、連結地方能量、匯集跨域資源，以推動民眾有感之智慧城鄉應用解決方案，並達到國際輸出之產業發展模式。透過建立中央、地方政府級跨部會之智慧城鄉溝通平臺，討論需跨領域整合、協調之議題，如智慧路燈與物聯網裝置共桿用電、長照、災防資料等中央與地方之資料介接、開放資料（Open data）運用等。另一方面，藉由經濟部「普及智慧城鄉生活應用計畫」推動，透過由上而下（Top-down）和由下而上（Bottom-up）雙軌並行機制，促進城鄉應用普及。其中Top-down是由中央政府制定主題規格導引優勢產業發展，如自駕車、物聯網平臺、AI等；Bottom-up則由地方需求出發，由地方政府提出應用需求與開放場域，再由廠商提出解決需求問題之解決方案。另外，為鼓勵創新創業、推動地方創生，也將規劃創新獎助機制，開放新創參與，提出符合在地需求的解決方案。

在智慧政府方面，政府規劃在2020年有三項目標：

(1) 建置跨域一站式服務，包括完成社福等領域之五項政府數位服務再造導入作業；建立經費結報等五項共用系統；

(2) 開放資料，包括優化資料品質，資料格式符合3星級以上者達60%；擴大開放資料使用量累計下載達600萬次；

(3) 資訊安全，包括建構國家情資威脅風險警示機制，完成跨域資安聯防體系，政府總體資安專職人力達千人。

2025年有三項目標：

(1) 深化一站式服務內涵，包括全面社會福利網實整合、完善全國建築管理與輔導、智慧化公務人員攬才；資訊職能電子地圖及電子治理培訓認證制度滿意度達75%；

(2) 開放資料，包括政府與民間協作資料創新應用案例，累計達八項；

(3) 資訊安全：包括扶植資安新創公司累計達四十家，資安產值達780億元。

　　未來的創新可從「內需」著手，讓人民有感，實現人本永續的智慧國家，因此DIGI⁺方案將落實「5G發展戰略」、「數位學習」、「智慧政府」、「智慧城鄉」等「智慧生活」應用，除了可改善人民生活環境與品質，同時也可發展成技術，最後變成產業輸出國際。DIGI⁺方案將彈性因應國內外形勢變化，持續鏈結中央、地方政府及民間資源，積極與各界溝通，因應未來趨勢之發展。

📖 參考文獻

1. Bangkok Post（2018），Thailand leads Asean IoT exploration poll。
2. CNN（2018），Foxconn makes another big move in the US with Belkin deal。
3. Economist Intelligence Unit（2018），The Inclusive Internet Index：Measuring Success 2018。
4. Forbes（2018），Why Amazon Picked Taiwan For Its Latest Innovation Center。
5. Forbes（2018），Global Tablet Sales Are Struggling, But Taiwan's Tech Firms Know What To Do。
6. Forbes（2018），Why Google, IBM & Microsoft Are All Expanding In Taiwan This Year。
7. Gartner（2018），Gartner Says Global Artificial Intelligence Business Value to Reach $1.2 Trillion in 2018。
8. Info-communications Media Development Authority（2017），SMEs Go Digital。
9. International Institute for Management Development（2018），IMD World Competitiveness Yearbook 2018。
10. International Institute for Management Development（2018），IMD World Digital Competitiveness ranking 2018。
11. Ministry of Science and ICT（2017），Mid- to Long-Term Master Plan in Preparation for the Intelligent Information Society。
12. Ministry of Trade and Industry Singapore（2016），Industry Transformation Maps（ITMs）。
13. PC Magazine（2018），TSMC set to beat Intel to become the world's most advanced chipmaker。
14. The economist（2018），TSMC is about to become the world's most advanced chipmaker。
15. The White House Office of Science and Technology Policy（2018），Summary of the 2018 White House Summit on Artificial Intelligence for American Industry。
16. Venturebeat（2018），Blockchain, AI, and 5G: How the EU wants to compete for the future。
17. Waseda University（2017），2017 Waseda-IAC International e-Government Rankings Survey。
18. World Economic Forum（2018），The Global Competitiveness Report 2018。
19. 上海市人民政府（2018），上海市工業互聯網產業創新工程實施方案。
20. 日本經濟產業省（2017），Connected Industries Tokyo Initiative 2017。
21. 日本內閣府（2018），科學技術基本計畫（第五期）。
22. 行政院（2018），「DIGI⁺方案」推動成果—朝智慧國家邁進。網址：https://www.ey.gov.tw/Page/5A8A0CB5B41DA11E/22a0ad26-653c-4e0e-854a-e53da6f759fc。
23. 行政院（2016），數位國家·創新經濟發展方案。網址：https://www.ey.gov.tw/Page/5A8A0CB5B41DA11E/f4d3319a-e2d7-4a8b-8b55-26c936804b5b。
24. 行政院數位國家創新經濟推動小組（2018），臺灣AI行動計畫。
25. 行政院數位國家創新經濟推動小組（2018），數位國家·創新經濟發展方案。
26. 江蘇省工業和信息化廳（2018），關於組織實施江蘇省工業互聯網創新發展365工程的通知。
27. 浙江省人民政府（2017），浙江省人民政府關於深化製造業與互聯網融合發展的實施意見。
28. 國家通訊傳播委員會（2018），有線廣播電視訂戶數調查。
29. 國家通訊傳播委員會（2018），通訊傳播事業概況總覽。
30. 國家通訊傳播委員會（2018），寬頻上網帳號數。
31. 國家發展委員會（2017），106年個人家戶數位機會調查報告。
32. 財團法人電信技術中心（2017），106年度上半年之行動上網速率量測統計。
33. 資訊工業策進會MIC（2018），臺灣行動支付消費者調查—整體消費者分析
34. 資訊工業策進會（2017），數位國家·創新經濟推動計畫—數位生活服務使用普及率與滿意度（QoL）調查報告。
35. 經濟部技術處ITIS（2018），2017全球前三大之臺灣產業／產品。
36. 廣東省人民政府（2018），廣東省深化互聯網+先進製造業發展工業互聯網的實施方案。

Taiwan e-Competitiveness Annual Report 2017-2018 資訊國力年鑑

2017·2018
TAIWAN E-COMPETITIVENESS
ANNUAL REPORT