TECHNOLOGY

The Technology Committee continues to focus on the advancement of a strong ecosystem designed to enable the rapid development, deployment, and growth of technologies and innovation in Taiwan in support of Taiwan's transformation toward becoming a regional technology hub. The regulatory environment and available funding mechanisms are among the key factors in creating a business climate that serves to foster economic growth. In this regard, we would like to recognize the Taiwan government's continued support for the technology industry by facilitating business development.

In this year's *White Paper*, the Committee explores areas in which we see opportunity for further improvement in the business environment. We believe that actively enabling business start-ups, allowing greater flexibility for workers to manage their own time, and re-establishing Taiwan as the leader in IT infrastructure should be priorities for government policy-makers. These issues are expanded on in the suggestions below

Suggestion 1: Enhance Taiwan's start-up ecosystem as the key to maintaining its technology leadership.

As consumer spending around the world shifts rapidly

from devices to content and software, it is more necessary than ever for Taiwan to secure its leadership position as a technology hub in the region. Taiwan should continue to focus on allocating resources to create a stimulating business environment for early-stage technology startups, in order to boost the development of diverse, innovative technologies on the island.

In line with the government's growing recognition of the importance of technology start-ups, a heightened issue on the national agenda is how to plug Taiwan into the world startup ecosystem. The Committee commends the recent efforts by the Ministry of Science and Technology and other government agencies to promote startups, including the creation of various venture capital funds, support to several startup accelerators, and establishment of the Go Incubation Board for Startup and Acceleration Firms (GISA).

While cultivating a local startup community is essential for Taiwan's potential growth, attracting foreign entrepreneurs to establish their technology startups in Taiwan would accelerate the process, increase the pool of available technologies, and diversify the technology sectors on the island. Foreign startups would contribute to Taiwan's position as a technology leader in Asia in many ways, including developing local talent and countering brain drain, creating employment opportunities, increasing the chances of finding "the next big thing," creating bridges to overseas partnerships, and more.

Taiwan's existing technology infrastructure, engineering talent, solid intellectual property protection, and central location in Asia (including the proximity to China) are some of the reasons why foreign startups choose Taiwan. The Committee offers the following recommendations for how Taiwan could make itself even more attractive to foreign technology startups:

a. *Relax the restriction on the types of business entities that may register to conduct business in Taiwan.* Under current law, a non-Taiwan business entity may register a Taiwan branch only when the legal structure is similar to that of a Taiwan limited company or a Taiwan company limited by shares. This restriction excludes many business entities that specialize in investment, including general partnerships, limited partnerships, limited liability partnerships, business trusts, statutory trusts, and others. The result is to close off potential opportunities for investment.

b. *Clarify the types of rights and restrictions that shareholders may agree on in a company's articles of incorporation.* In the United States and other jurisdictions where technology startups are popular, it is common for shareholders to negotiate their rights among themselves in detail, with different shareholders enjoying different sets of rights depending on when they invested, the price at which they invested, and other factors. Taiwan law

does not clearly state how much flexibility shareholders of a Taiwan company have to attach different rights and restrictions to different shares.

c. *Relax the revenue requirement imposed on an entity with foreign investment for hiring foreigners as executives.* Under the current law and regulations governing the hiring of foreigners, an entity with foreign investment that wishes to hire a foreigner as a manager or executive officer is required (i) to have paid-in capital or operating funds in Taiwan of more than NT$500,000, and (ii) to earn sales revenue of more than NT$3 million a year, have an import/export amount of more than US$500,000, or receive commission of more than US$200,000. Even more severe restrictions apply if a company wants to hire a foreigner as a technical specialist, hire more than one foreign citizen, or renew its foreign citizens' work permits when they expire. It would be unrealistic to expect a technology startup to achieve any sales revenue in its first few years, as its primary goal is to invest in R&D, which may not bring any return for some years. Yet it is critical for a technology startup to be able to employ, and rely on, foreign professionals' skills and experiences in their respective practice areas.

d. *Relax fixed-term labor contract restrictions.* The Labor Standards Law permits an employer and employee to enter into a fixed-term labor contract only under very limited conditions. While intended to protect employees' rights and benefits, this policy creates hurdles for a technology startup, especially in its early stage when it needs flexibility to adjust the workforce depending on the progress of its R&D development, which is very difficult to predict.

e. *Loosen the salary and working experience requirements for foreign white-collar workers.* The government requires that a foreigner to be hired in Taiwan should have at least two years of work experience or five years of professional training, and that the salary of the foreign worker cannot be lower than a minimum amount prescribed by the authorities. Such restrictions are unhelpful to technology startups, which require flexibility in hiring foreign talent based on their needs and the progress of R&D development.

f. *Ease tax pressures.* Companies often face intense scrutiny from the local tax office if they do not show a minimum profit on their tax returns, but the business plan for technology startups is frequently to reach profitability only after a lengthy period of R&D, product development, and market penetration. The absence of profit during the first few years may be completely consistent with management's long-term objectives for the company, not a sign of tax evasion.

g. *Increase access to funding by attracting VCs to Taiwan.* Until the dot-com bubble, Taiwan had a thriving venture

capital community. Today, it needs to find ways to encourage foreign VCs to establish operations on the island. Whether foreign or local, VCs are an important pillar for startup operations. Korea has been much more active and successful than Taiwan in building a large corps of venture capitalists.

The Committee urges the government to target the above-mentioned obstacles and implement concrete remedies so as to transform Taiwan into a highly favorable environment for technology startups.

Suggestion 2: Assess the impact of workforce regulations on the tech sector's competitiveness and adjust regulations based on industry best practices.

Agility and speed have been Taiwan's competitive strongpoints in the global market for decades. But the evolution of the Internet, Cloud Computing, and mobile applications, coupled with the disruptive innovation occurring in business models, has radically changed the operating model for technology companies. The need for diversified and flexible talent has never been so critical, but Taiwan's current or proposed workforce-related rules, such as the Labor Standards Law and the draft Protection of Dispatched Workers Act and Fixed-Term Labor Contract, severely jeopardize that needed flexibility. These regulations are based on outdated concepts, fail to take into account the operational practices of technology industries, and present a deleterious lose-lose scenario for enterprises and employees.

Taiwan's tech sector suffers from a shortage of professional talent, both foreign and domestic. The recruitment of foreign talent is hindered by regulations, while domestic talent is discouraged from working in Taiwan due to the small market size, low salaries, and limited opportunity for career growth.

The Committee proposes the following ideas for improving the situation:

a. *Provide the technology sector with more flexible working hours and eliminate attendance records.* The Labor Standards Law requires employers to "prepare and maintain worker attendance records for five years." This requirement could be valid for traditional labor, such as production-line workers in the manufacturing sector, but it is inappropriate for knowledge workers in technology industries. For example, many software development tools are placed in the "Cloud," so that R&D activities can take place anytime and anywhere. The office is not the only, or even necessarily the main, place of work. Further, meetings and discussions frequently occur by teleconference or videoconference among customers, suppliers, or colleagues located in several different time zones.

A result-oriented Management-by-Objective (MBO)

approach to performance measurement is commonly adopted in developed economies, where employee self-management, including flexible working time and working location, has become a trend. In the interest of promoting a creative and professional work ethic, enterprises are willing to leave it to employees to decide when, where, and how long to work, as long as their work is completed and completed well. In Taiwan, Ministry of Labor guidelines have accorded some working hour flexibility only to "field workers," including journalists, workers in electronic communications industries, salespersons, and professional drivers. Although the designation of "field workers" is not suitable to the technology sector, the flexibility provided in the guidelines shows an appreciation that rigid requirements cannot be applied to every industry sector.

b. *Loosen restrictions on fixed-term employment contracts.* Technology evolves rapidly, making the knowledge cycle in the tech sector extremely short. When companies seek growth momentum, talent recruitment often plays a critical role in the search for technological advancement. Due to Taiwan's limited market size and scarce technological resources, both local and multinational companies in Taiwan need to leverage foreign innovative applications and emerging technologies. The entry barrier of advanced technology is high, by nature. However, current fixed-term employment contract rules stipulate one year as the maximum contract period. Companies may apply for special approval for extensions, but the process is difficult and time-consuming. To fulfill the needs of the tech sector for flexibility in hiring, the Committee suggests lengthening the fixed-term contract period to a maximum of three years from the time the application is approved.

c. *Revise the proposed draft of the Protection of Dispatched Workers Act.* In recent years, the government has sought to spur growth by encouraging innovation among technology companies and the incubation of new startups. For many tech companies, the use of dispatched labor provides a quick and flexible means of adding workers as innovation increases the need for labor.

The draft Protection of Dispatched Workers Act caps the employment of dispatch labor at 3% of a company's total workforce. Micro startups normally cannot afford a large headcount. Although they would benefit from having dispatched workers to handle non-core activities, the small size of their total workforce will not qualify them to hire many such workers, if any. Besides eliminating job opportunities for dispatched workers in emerging startups, the 3% cap forces core employees to handle non-core activities.

In many countries, the percentage of dispatch labor

that may be hired is not regulated at all. Among our neighboring countries, some have a cap of 10%. Considering that the extremely low percentage proposed in the draft law would negatively impact the technology sector, the Committee suggests that the government review the provisions of the draft, taking into account the nature and needs of individual industry sectors.

Suggestion 3: Expedite the legislative process for the "IT Foundation Law."

Despite the importance of this function, the government has yet to establish an agency to take charge of integrating national IT development strategies. In contrast, neighboring countries have set up cabinet-level departments to oversee the strategic direction of national IT advancement and support industry development. For instance, South Korea has set up a Ministry of Science, ICT and Future Planning; Singapore has established a Ministry of Communication and Information; and China has formed a Ministry of Industry and Information Technology. In Taiwan, the lack of a designated agency under the Executive Yuan to take charge of information integration is why it is always difficult to implement coordination across different government departments.

Since 1998, the Taiwan government has adopted a policy of IT outsourcing, downsizing IT-related agencies, and reducing manpower across government departments. IT service outsourcing has become a global trend due to the advantages of allowing agencies to focus on their core activities and reducing cost. However, the government has not increased IT manpower and budget over the years to reflect the growing need for IT support. As a result, some agencies have lacked appropriate resources for planning their system requirements, and information officers have been transformed from technical experts into administrative staff specializing only in IT procurement, gradually losing their capability in planning, risk management, and IT security control.

The central government's information staff currently accounts for only 1.5% of total personnel. In the U.S. government in contrast, the figure has remained at 4.9% despite the trend toward outsourcing and the significant growth in the domestic IT service industry. In terms of spending, IT accounted for 0.84% of total public expenditures in 2011, and slipped year by year to 0.60% in 2015. In contrast, the U.S. federal IT budget has nudged upward from 2001 onward, accounting for 2.17% of the total budget in 2014.

Private-sector IT service providers are also affected by these adverse trends. They face such problems as unclear system requirements specified at the planning stage, unreasonable budget size, frequent requests for changes, and difficulty in communication, leading to project-management

hardships and increased costs. This unhealthy environment is one reason why Taiwan's IT service industry has for years been limited in its development.

To remove the obstacles hindering the growth of Taiwan's IT industry and regain IT-sector competitiveness, we suggest that the government expedite the legislative process for enacting the draft "IT Foundation Law" in order to establish a cabinet-level organization with dedicated and clearly defined functions for supervising the use of IT within government. We also recommend that the government adjust the ratio of IT budget and staffing in governmental agencies with reference to the practice in major developed economies.

Suggestion 4: Use public-sector data governance to facilitate transition to the cloud.

Wider use of cloud services could help the Taiwan government achieve far greater computing power, greater availability and resilience of data, and improved security, even as IT costs are reduced. Most importantly, scalable, on-demand cloud computing services can help government organizations focus on key public priorities. In addition to cost savings, the cloud contributes to job creation, democratization of computing and social inclusion, and increased agility in the delivery of government services.

Government agencies and ministries have already been working to address concerns about protecting sensitive information and national sovereignty through implementation of data-governance policies. The effort would be enhanced by adopting legislation empowering government agencies to classify data appropriately, then relying on the agencies themselves to adopt robust data classification and governance systems to regulate which government data may not be moved to the cloud and which data can be moved to the cloud with the appropriate security controls.

The data classification taxonomy below is offered as a guideline to help government strike the right balance. The taxonomy recognizes that on-premises or other storage may be required for highly sensitive government data that raises national sovereignty concerns (Level 1), while also identifying cloud services and security controls that are appropriate for other classes of government data, even data that is typically still considered sensitive. No such taxonomy is currently in use in Taiwan to help guide the migration of data to the cloud.

Classifi-cation	Definition	Examples	Amount of Potential Data	Appropriate Technical Safeguards
Level 1	Data critical to national and economic security	Extremely sensitive data such as national defense data, actionable intelligence information, and critical economic data	Very small	Storage in government cloud where available; on-premises storage

Level 2	Data restricted by default and shared only with select individuals inside government on a strict "need to know" basis	Sensitive materials with restricted uses, including law enforcement investigations, sensitive personally identifiable information (PII), and restricted health information	Substantial	Information is suitable for government cloud, or for public cloud but only subject to robust security controls
Level 3	Data that can be shared within government by default, but is rarely shared outside of government	Day-to-day government data, such as non-sensitive PII (e.g., driver's license application), routine contracting and economic data, etc.	Large	Suitable for public cloud; some security controls may be appropriate
Level 4	Data sets without source information, viewable only	Data that has been anonymized, or otherwise de-sensitized, and provided as data sets for public analysis (e.g., anonymized public health or tax records)	Large	Suitable for public cloud; robust security controls on the underlying data but minimal controls on anonymized datasets
Level 5	Publicly available data, with no restrictions on use	Data available to the public generally, including government-published data such as bus schedules and weather data	Very large	Suitable for public cloud

By adopting a data classification and governance framework that assesses data storage from a security and technical perspective, the government will be well-positioned to take advantage of cloud technologies. Classifying data according to these needs, and with an understanding of the technical solutions that meet those needs, will help government quickly transition into new forms of data storage, including cloud services.

The emerging international consensus is that legislation should focus on establishing a requirement that government ministries or agencies develop formal policies and practices to safeguard government data, including highlighting the need for special handling of the government's most sensitive national security-related information. But rather than legislating the specific data classification and governance practices, lawmakers should defer to the expertise of the government agencies or ministries that already have established competence in safeguarding government data. Consistent with such a mandate from lawmakers, agencies

and ministries should develop a clear, actionable, and holistic policy to govern their data in the cloud era, one that both leverages the benefits of the cloud while ensuring special protections are given to the most sensitive national security-related information. Not only will classifying data in this manner help government realize savings from storing data in a more efficient manner, it will also increase government's efficiency and drive economic growth, innovation, and social inclusion.

Suggestion 5: Allow dynamic spectrum access to increase spectrum utilization and efficiency.

The explosive pace of growth for wireless data is being driven not only by consumer devices and human communications, but also by machine-to-machine communications, known as the Internet of Things. Such growth has put a severe strain on the radio spectrum resources underpinning all forms of wireless communications, increasing the need for more efficient ways to manage and use spectrum resources. Globally, there is a clear trend of accelerated adoption of spectrum-sharing techniques and policies, one of which is to allow access to more spectrum, such as unused TV broadcast channels (the so-called "TV White Spaces" or TVWS), for unlicensed, shared access, using Dynamic Spectrum Access (DSA) techniques and policies.

Dynamic Spectrum Access (DSA) is a policy alternative and technology innovation that allows regulators to put idle spectrum to immediate and valuable use, while preserving flexibility for possible future allocation or other later specific usage. It is a better alternative than "reserving" spectrum resource for "specific usage in the future," which implies that the idle spectrum will remain idle until it is re-allocated. The overall objective of DSA is to dramatically increase spectrum utilization and efficiency, transforming spectrum from a scare resource into an abundant one, in turn unleashing innovation and new value creation.

We were encouraged to see that spectrum sharing and unlicensed access were highlighted as global trends in the draft Telecom Act revision that was published by the National Communications Commission (NCC) for public consultation in late 2015. Specifically, Clause 17 of the draft recognizes the need to maximize spectrum utilization via spectrum re-framing, spectrum sharing, dynamic spectrum access, license-exempt open access, and other innovative spectrum-management technologies. We highly commend the NCC's vision and leadership in recognizing and embracing these global spectrum technology and policy trends.

TVWS regulations are now in place in the United States, Singapore, Canada, and United Kingdom, and dozens of other countries are working on policies and practices to enable access to these TV White Spaces. Thanks to the efforts of the Dynamic Spectrum Access (DSA) Taiwan Pilot Group

and the support of the NCC and government agencies, Taiwan is among the leading Asian countries pioneering the use of TVWS radios in bridging the digital divide in rural areas, enhancing urban connectivity, as well as exploring usage in IoT and Smart City applications such as Smart Metering, campus security monitoring, etc.

In light of these recent developments, we have updated our specific recommendations as follows:

a. *Accelerate the development of a regulatory framework around DSA and unlicensed access to TVWS* for local companies to innovate on wireless technologies using unlicensed spectrum resources. Making available more unlicensed spectrum lowers entry barriers and allows small startup companies to pursue innovative solutions without having to incur hefty upfront spectrum licensing fees. Given the transition to Digital TV and the desirable propagation characteristics of the TV-band spectrum (470-790MHz), there is now a prime opportunity to open up the unused TV broadcast channels for unlicensed wireless connectivity services. We encourage the NCC to build on the Telecom Act revision to develop a full TVWS regulation in the next 12 months in order for Taiwan to keep abreast with global leaders such as the United States, Singapore, United Kingdom, and Canada in enabling innovation in under-utilized TV bands.

b. *Direct government R&D funds and resources to DSA radio research and pilot deployments.* Government R&D agencies such as the Institute for Information Industry (III) and the Industrial Technology Research Institute (ITRI) have already done significant research on white-space-related technologies such as cognitive radio and TVWS databases. These institutes could further build their competency and potentially transfer their research outputs for commercial development by private companies. Further government funding, such as from the Universal Service Obligation (USO) fund, could be directed to allow scaled deployment of these new technologies in pilot projects that address the most pressing needs of society and business, such as bridging the digital divide in rural Taiwan and building Smart City IoT applications in urban areas.

c. *Simplify the process of granting trial licenses and supporting funds for industry to conduct more commercial trials* to explore applications for such programs as Smart City (for disaster response, for example) and Digital Inclusion (providing connectivity to rural and remote areas). The study the government has been undertaking in Fuxing Township of Taoyuan County has proven that using vacant TV-band channels for broadband access is effective and efficient for connecting remote areas. The current project has

focused on proving the concept and the technology. The next step should be to explore business models and scaled deployment with appropriate policy enablement.

d. *Encourage greater involvement of Taiwan ICT industry players in completing the value chain and strengthening the DSA ecosystem in Taiwan,* in order for Taiwanese companies to gain first-mover advantage in the expanding global market for "Super Wi-Fi" (a term used by the U.S. Federal Communications Commission to describe TVWS radio). This market could represent a new growth segment for Taiwan ICT companies from service providers to makers of chipsets, components, radio systems, and devices. We therefore urge the government to encourage greater participation and collaboration in the DSA/TVWS ecosystem by telecom carriers, ISPs, device manufacturers, component providers, systems integrators, and IC design houses and manufacturers. The existing DSA Pilot Group could serve as a platform to foster development of such a collaborative ecosystem.